ASSESSMENT OF EMERGING OPPORTUNITIES AND PROSPECTS OF CAREERS IN SCIENCE & TECHNOLOGY
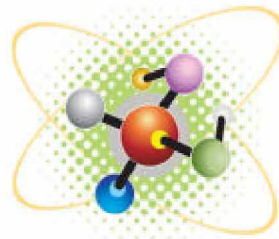

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***

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New Delhi
***
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Y L Nangia
Principal Investigator
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March, 2008   **Manpower Management Centre**

EXECUTIVE SUMMARY

➤ There were 236 UGC approved Universities, 101 Deemed to be Universities, 13 Institutes of National Importance and 18064 University Colleges & Affiliated Colleges out of which 17000 Colleges had the facility of science courses.

➤ 5612 and 5549 Ph. Ds in science were awarded during 2003-04 & 2004-05 as per Annual Reports of UGC. Percentage-wise there was not much increase in students enrolment in Science, Engineering and Technology during the three years of 2003-04, 2004-05 and 2005-06. It was nearly static at 21%.

➤ Noted academicians, scientists, experts and political leaders have expressed their concern about the declining interest of students in pure sciences.

➤ To improve the science education in schools and to generate S&T employment, the Government of India has taken a number of steps recently such as hike in educational budget, setting up of more IITs, NITs, IIITs, IISERs, Schools of Planning & Architecture, Indian Institutes of Space Science & Technology, Science Express-Science on Wheels, Scholarships & Awards, Setting up of Skill Development Centres and proposed setting up of National S&T Commission etc.

➤ In all 27,791 S&T vacancies were advertised in the year 2005 and 32,362 vacancies in the year 2006. The increase in S&T job opportunities in the year 2006 over the year 2005 works out to nearly 17%.

➤ During 2005, 3751 vacancies were advertised for **Scientists** – 2747 (73.23%) "with experience" and 1004 (26.77%) "without experience". During 2006, 4381 vacancies were advertised for **Scientists** – 3198 (73 %) "with experience" and 1183 (27 %). "without experience".

➤ Comparatively, the status of job opportunities for fresh **Scientists** in the years 2005 & 2006 shows only a marginal increase of about 0.23%.

➤ During 2005 & 2006, highest number of vacancies advertised for **Scientists** have been in Agriculture, Physics, Chemistry, Physics–Chemistry–Mathematics combined and Botany in both the years.

➤ State-wise distribution of vacancies of **Scientists** during 2005 & 2006 was in the order of Uttar Pradesh followed by Delhi, Maharashtra, Madhya Pradesh, Andhra Pradesh and other States.

➢ Sector-wise, the highest number of vacancies for **Scientists** were in the Central Government followed by Private Sector, State Government and Public Sector Undertakings.

➢ Vacancies advertised in Academic Sector for **Science Faculty** during 2005 were 964 (84.41%) "with experience" and 178 (15.59%) "without experience" category. Vacancies advertised for **Science Faculty** during 2006 were 1120 (84.46%) in "with experience" and 206 (15.54%) in "without experience" category.

➢ There is a marginal decrease of 0.05% in the "without experience" vacancies advertised during 2006 for **Science Faculty** over the year 2005.

➢ Field-wise, the highest number of vacancies advertised for **Science Faculty** in 2005 were in Agriculture, Physics, Chemistry, Microbiology and Botany. For the year 2006 though the fields are same but there is a slight change in their order that is Agriculture, Chemistry, Physics, Microbiology and Botany followed by other fields.

➢ State-wise distribution of vacancies of **Science Faculty** shows their order as Delhi, Maharashtra, Uttar Pradesh, Andhra Pradesh, Karanataka followed by other States for both the years.

➢ Distribution of vacancies in Academic Sector for **Science Faculty** for both the years was in the same order i.e. Universities followed by Deemed Universities, Colleges and Institutes.

➢ Vacancies advertised for **Science Teachers** during 2005 were 536 (80.48%) "with experience" and 130 (19.52 %) "without experience" category. Vacancies advertised for **Science Teachers** during 2006 were 644 (80.38%) in "with experience" and 158 (19.70%) in "without experience" category.

➢ There was a marginal increase of 0.18 % in "without experience" vacancies of **Science Teachers** in 2006 over the year 2005.

➢ Field-wise the highest number of vacancies advertised for **Science Teachers** were in Physics, Chemistry, Biology, Computer Science and Botany in both the years.

➢ State-wise distribution of vacancies of **Science Teachers** for both the years was in the order of Delhi, Rajasthan, Haryana, Uttar Pradesh, West Bengal and followed by other States.

➤ Sector-wise distribution of vacancies of **Science Teachers** shows that maximum number of vacancies were advertised by Public Schools followed by Government Schools, Kendriya Vidyalayas and Private Schools.

➤ Vacancies advertised for **Science Personnel** during 2005 were 354 (84.89%) "with experience" and 63 (15.11 %) "without experience" category. Vacancies advertised for **Science Personnel** during 2006 were 430 (83.66%) in "with experience" and 84 (16.34%) in "without experience" category.

➤ In comparison of "without experience" vacancies of **Science Personnel** for the years 2005 & 2006, the resultant increase over the previous year is 1.23 %.

➤ Field-wise, the vacancies of **Science Personnel** were in the order of Physics, Computer/Information & Technology and Chemistry for both the years.

➤ State-wise distribution of vacancies of **Science Personnel** were in order of Tamil Nadu, Maharashtra, Rajasthan, Punjab, Uttar Pradesh and followed by other States for both the years.

➤ Sector-wise distribution shows that vacancies of **Science Personnel** were higher in Central Government followed by Public Sector Undertakings, Engineering Institutions/Engineering Colleges, Universities/Deemed Universities and State Governments.

➤ 5930 vacancies of **Medical Personnel** were advertised during 2005 comprising of 3004 (50.66%) in "with experience" category and 2926 (49.34%) in "without experience" category. 6917 vacancies of **Medical Personnel** were advertised during 2006 out of which 3505 (50.67%) were "with experience" category and 3412 (49.33%) in "without experience" category.

➤ Comparison of data of both the years in respect of **Medical Personnel** in "without experience" category shows that there was a marginal increase of 486 vacancies in 2006 over the year 2005.

➤ Field-wise, in **Medical Personnel** the highest fields in order were Ayurvedic, Allopathic Medicine, Nursing, Pharmacy and Public Health in both the years.

➤ State-wise distribution for **Medical Personnel** for 2005 & 2006 is the same i.e. in order of Delhi, Uttar Pradesh, Maharashtra, Chandigarh, Andhra Pradesh and followed by other States.

➤ Sector-wise distribution of vacancies of **Medical Personnel** in order is: State Government, Central Government, Public Sector Undertakings and Private Sector.

➤ 12792 vacancies for **Engineers & Technologists** were advertised in 2005. Out of which, 6872 (53.72%) were in "with experience" and 5920 (46.28%) in "without experience" category. 14877 vacancies for **Engineers & Technologists** were advertised in 2006. 7901 (53.11%) were "with experience" category and 6976 (46.89%) in "without experience" category.

➤ There is a marginal increase of 0.61% in 2006 over the previous year status of vacancies when the data of "without experience" category of **Engineers & Technologists** is compared.

➤ Field-wise, for the years 2005 & 2006, there are 45 branches of **Engineering & Technology,** out of which the highest in order are Civil, Mechanical, Electronics & Communication, Electrical and Computer/IT.

➤ State-wise distribution of vacancies of **Engineers & Technologists** for the years 2005 & 2006 is in order of Delhi, Uttar Pradesh, Maharashtra, Madhya Pradesh and Karnataka followed by other States.

➤ Sector-wise distribution of vacancies of **Engineers & Technologists** during 2005 & 2006 is Private Sector, Central Government, Engineering Institutes/Engineering Colleges, State Governments and Public Sector Undertakings.

➤ 1218 vacancies were advertised during 2005 for **Faculty in Engineering & Technology** out of which 1052 (86.37%) were in "with experience" and 166 (13.63%) in "without experience" category. 1386 vacancies were advertised during 2006 for **Faculty in Engineering & Technology** out of which 1182 (85.28%) were in "with experience" and 204 (14.72%) in "without experience" category.

➤ "Without experience" category indicates an increase of 1.09% of vacancies for **Faculty in Engineering & Technology** in the year 2006 over the year 2005.

➤ Field-wise, the vacancies advertised for **Faculty in Engineering & Technology** in both the years were in the order of Agriculture, Computer/Information & Technology, Mechanical, Civil and Electronics.

(v)

➢ State-wise distribution of vacancies for **Faculty in Engineering & Technology** for the year 2005 & 2006 is in the order of Tamil Nadu, Maharashtra, Karnataka, Madhya Pradesh, Uttar Pradesh and followed by other States.

➢ Sector-wise distribution of vacancies for **Faculty in Engineering & Technology**, indicates that the maximum number of vacancies were in Engineering Institutes/Engineering Colleges.

➢ 1875 vacancies were advertised for **ITI Technicians** during 2005. Out of this 777 (41.44%) were in "with experience" category and 1098 (58.56%) in "without experience" category. 2159 vacancies of **ITI Technicians** were advertised during 2006 out of which 908 (42.06%) were in "with experience" category and 1251 (57.94%) in "without experience".

➢ The increase in vacancies of **ITI Technicians** during the year 2006 is 7.04 % when compared to the data of 2005.

➢ Trade-wise vacancies of **ITI Technicians** which were higher than other Trades during the year 2005, are Mechanical (Motor Vehicle), Mechanical (Refrigeration & AC), Mechanic (Lift Maintenance), Mechanic (Industrial Electronics) and Information Technology. During the year 2006, the position was that Mechanical (Motor Vehicle), Mechanic (Refrigeration & A.C.), Mechanic (Diesel), Mechanic (Industrial Electronics) and Information Technology were higher than other Trades.

➢ Delhi is amongst the top with regard to State-wise distribution of vacancies of **ITI Technicians** followed by Rajasthan, West Bengal, Andhra Pradesh, Jharkhand and followed by other States.

➢ Sector-wise distribution of vacancies of **ITI Technicians** shows the order as Central Government followed by Private Sector, Public Sector Undertakings, State Governments and Engineering Institutes/Engineering Colleges in both the years.

➢ The assessment done on the basis of data analysed for years 2005 & 2006 shows that increase in the S & T vacancies during 2006 over the year 2005 is just 17.6%. The growth of economy remaining at the same level as at present, the generation of S & T Employment each year will hopefully remain between 15 to 18%. However, this increase would not be sufficient and steps will have to absorb the highly qualified S&T personnel coming out of the Universities, Engineering Institutes/Engineering Colleges, Colleges & Schools every year in large numbers.

➢ Analysis and Assessment of the data done in this report shows that the potential sectors for generation of S&T employment are Government Sector and Private Sector. Area-wise potential for generation of more S&T employment lies in Engineering Sector, Agriculture, Biotechnology, Computer/Information Technology and Medical Sciences.

➢ Recent steps taken by the Government of India to promote Science and Technology such as hike in educational budget, setting up of more IITs, NITs, IIITs, IISERs, Schools of Planning & Architecture, Indian Institutes of Space Science & Technology, Science Express-Science on Wheels, Scholarships & Awards, Setting up of Skill Development Centres and proposed setting up of National S&T Commission etc., would certainly improve S & T employment generation in the country. This report has assessed S&T employment growth of 17.32 %, as stated above, without taking into consideration the recent steps taken by the Government. By proper execution and monitoring of the recent steps and expansion of industry, industrial and economic growth, it is estimated that S&T employment can be generated to the extent of at least 5 to 6 lakhs during the period 2007-2012 starting with a growth rate of about 35-40 % in 2007 to about 80 % in the year 2012.

➢ Valuable information for the benefit of S&T students such as Choice of a Career, Career Options, Campus Placements, Entrance & Competitive Examinations, Talent-Fellowships-Scholarships-Studentship Schemes, S&T Entrepreneurship Development, Industrial Training Institutes (ITIs), Institutes of Higher Learning and Websites has been included in this report.

CHAPTER – 1

INTRODUCTION

1.1 Status of Science & Technology (S&T) Manpower in India

To foster and strengthen the economic and social development of a country, Science & Technology (S&T) serves as an important tool. Over the years, India has made significant progress in various spheres of science and technology and can now take pride in having a strong network of S&T institutions, trained manpower and an innovative knowledge base. Given the rapid pace of globalization, fast-depleting material resources, increasing competition among nations and the growing need to protect intellectual property, the importance of strengthening the knowledge base is an important issue.

India today has a large stock of scientific and technical manpower. According to Research & Development Statistics: 2004-05 published by the Department of Science & Technology, the stock of S&T personnel in India in the year 2001 was nearly 8.1 million. The number of scientists and technologists, while being large in absolute numbers, is not commensurate with the requirements in quality and when measured on a per capita basis. The demand is bound to increase in the coming years with more intensive activities involving science and technology. There is need to progressively increase the rate of generation of high quality skilled human resource at all levels. In this direction whatever process may be undertaken, it should initiate new and innovative schemes to attract and nurture young talent with an aptitude for research; and by providing assured career opportunities in Academia, Industry, Government or other sectors. This would certainly entail reversing the present declining trend of talent in science.

1.2 Science Education in India

Looking into the statistics, as on 31.03.2006 there were 236 UGC approved Universities, 101 Deemed to be Universities, 13 Institutes of National Importance and 18064 University Colleges & Affiliated Colleges out of which about 17000 Colleges had the facility of science courses. As per UGC's Annual Report 2005-06 the doctorates awarded in Science during 2003-04 & 2004-05 were 5612 and 5549 respectively. However, irrespective of this position, it is becoming difficult to find science teachers, scientists and researchers in pure sciences.

The following **Table** indicates Faculty-wise students enrolment during the years 2003-04, 2004-05 and 2005-06 in India. Amazingly percentage wise the growth in students enrolment in these three years in science and other subjects is almost negligible except that in numbers the enrolment has gone up to the extent of 4.6%, 5.3% and 5.2% respectively over the preceding year. From this data two important aspects come to the fore. Firstly, the number-wise rise in enrolment is negated by the rise in population every year and secondly it discards the belief that students enrolment in Commerce/Management etc., has been on the rise at the cost of science.

Table 1.1

STUDENTS ENROLMENT: FACULTY-WISE

S.No	Faculty	Total Enrolment 2003-04	%age	Total Enrolment 2004-05	%age	Total Enrolment 2005-06	%age
1.	Arts	44,90,723	45.12	47,29,048	45.12	49,76,946	45.13
2.	Science	20,35,059	20.44	21,42,325	20.44	22,55,230	20.45
3.	Commerce/ Management	17,90,636	17.99	18,85,539	17.99	19,86,146	18.01
4.	Education	1,46,039	1.47	1,54,071	1.47	1,61,009	1.46
5.	Engineering/ Technology	7,16,652	7.20	7,54,635	7.20	7,95,120	7.21
6.	Medicine	3,13,489	3.15	3,30,153	3.15	3,48,485	3.16
7.	Agriculture	58,700	0.59	61,838	0.59	63,962	0.58
8.	Veterinary Science	14,858	0.15	15,721	0.15	16,542	0.15
9.	Law	3,03,629	3.05	3,19,671	3.05	3,36,356	3.05
10.	Others	83,721	0.84	88,041	0.84	88,224	0.80
	Total	**99,53,506**	**100.00**	**1,04,81,042**	**100.00**	**1,10,28,020**	**100.00**

Source: Annual Reports 2003-04, 2004-05 & 2005-06 of U.G.C.

The data in the above **Table** clearly indicates that enrolment in science, and engineering/technology during the three years of 2003-04 to 2005-06 has been almost static and perhaps the same position will emerge for the year 2006-07 when the official statistics is released by the University Grants Commission. Enrolment of students in science during 1950's was 32% and it declined to 15% in 1990's whereas, it has now improved to nearly 21% though it is almost static for the last few years. Hence, there is a pertinent need to improve this situation so that Science & Technology can serve as an important tool in the development of the country.

1.3   Declining Interest in Science : Views & Comments

The above facts being apart, during the past two decades or so, noted academicians, scientists, experts and political leaders have expressed their concern about the declining interest of students in pure sciences. Their growing concern has been that many talented and bright young persons in India do not opt for a career in science. Views and comments of some of them are briefly appended below:

1.3.1 Prime Minister of India

At the 2005 Indian Science Congress, the Prime Minister, S. Manmohan Singh had observed: "I am concerned by the fact that our best minds are not turning to science. It is felt that if this trend is not checked at this stage, India will face a serious shortage of talented researchers and teachers in a few years and symptoms are already visible."

1.3.2 Former President of India

The former President of India, Dr. A.P.J. Abdul Kalam while addressing participants at the diamond jubilee celebrations of the Physical Research Laboratory said that "engineering, management, medicine or administrative services are considered to have better jobs in comparison to the jobs in pure sciences and research. This I consider as an important area of concern of the nation and it needs the attention of the scientific community as a whole."

In his inaugural speech in April, 2005 in a seminar held at Indian Physics Association at Kharagpur, Dr. Kalam said "Attracting bright and enthusiastic youth to science is the major challenge that we face."

1.3.3 Pure Sciences – the last priority?

The clamour for engineering seats, especially Information Technology and allied courses has many a student making a beeline for these courses. As a result, only a few students pursue a degree in pure sciences i.e. subjects such as physics, chemistry and mathematics and even smaller percentage of these students enter the field of research. The skewed trend has become a great cause for concern amongst the academicians and scientists today. Perhaps, it is time for India to take close look at science where it is headed.

Prof. G. Padmanabhan, Biotechnologist at the Indian Institute of Science, Bangalore feels that "the primary reason students shy away from pure sciences is the lure of the lucre." He adds that parents themselves want their children to pursue careers that will earn them higher salaries. He further states that even in the engineering field, no one wants to work on the shop floor as engineers. They prefer to do management and administration tasks. In terms of salaries, the returns are poor. You can not compare the salary of an early level Scientist with that of a Software Engineer. An Assistant Professor or a Scientist at that level may earn Rs. 20,000/- a month. A Software Engineer at the same level could earn much more, and an MBA could even start at Rs. 40,000/- to Rs. 50,000/- a month. Apart from the lack of money, experts believe that there are not many students who have a passion for science or want to solve global concerns through science.

Prof. Padmanabhan further states that "Most industries are knowledge based and need highly qualified people. When there is a dearth of professionals, industries will suffer. In addition, we will not have leaders who can assume leadership."

Prof. K. Balaveera Reddy, former Vice-Chancellor, Visvesvaraya Technological University states that the repercussions of the pure sciences being ignored by the students will be that "Science will suffer since there would be no original inputs and as a result so

would technology. Whenever a new technology is developed by the industry, basic sciences must evaluate it. Otherwise there can be disastrous consequences, since there are no checks and balances in place. These can only be done if there is an established basic sciences culture.

<u>Prof. Roddam Narasimha</u>, Chairman, Engineering Mechanics Unit, Jawaharlal Nehru Centre for Advanced Scientific Research and Director National Institute of Advanced Studies says that "A career in science in India does not appeal to many. The same repercussions will soon be seen in the field of engineering as well. May be not at BE level, but at the ME/M.Tech and Ph.D, where students will be on the decline. The sort of engineering that is required in a novel product development demands research, science and development".

<u>Prof. J.V. Narlikar</u> in his article entitled "No Fizz and Spark – Decline in Science Education" has stated that "today a student.....goes by default to engineering, medicine or.....commerce" in contrast to the scenario that existed in the fifties and sixties when many of our science laboratories, departments and universities were getting established. He says that the present trend of a sharp decline in numbers and standards of students opting for science at the undergraduate level will have its impact in about ten years from now, as is being felt to some extent already; science personnel of high caliber and experience to man our projects will be in short supply. In his view, Methodology of science teaching that encourages rote, ill-equipped teachers and labs, lack of inspirational and committed teachers, poorly written text-books, peer pressure to join lucrative courses are some of the causes for the current sickness that has afflicted the science scenario: the glamour of science and a proper and correct image is just not getting projected by our institutions or the universities. This unfortunate trend can be reversed if the society has a will to do so and creates an environment to cure the causes of the deeply entrenched malady.

1.3.4 Make Science attractive for students by Saikat Neogi

- Students opting for pure science for graduation in India dropped from 32 per cent in 1950 to 15 per cent in 2000.
- India's contribution to global scientific knowledge has slipped from 10 per cent in the eighties to 2.5 per cent now.

The above data summarizes the decline of science education and research in India. The rot is evident in every sphere of scientific life but at the center of it all, is the absence of a collective, forward-looking strategy in our Science & Technology policy. Much of our policy-making remains almost an exclusive reserve of bureaucrats and politicians and its execution is invariably ad hoc in nature without time-bound goals. The result is showing clearly in stagnation of research output at Indian universities, the cradle of basic sciences.

India's S&T policy advocates promoting teaching of science at school and college level, but the fact is a career in science holds less attraction for the younger generation. This has led to the number of scientists per million population coming down from 200 to 157 in the last two decades. India would need to increase its share of scientists 12 times to

meet the OECD benchmark which requires 0.5 per cent of the country's force to be in R&D.

1.3.5 Comments of Prof. C.N.R. Rao, Scientific Advisor to Prime Minister

Prof. C.N.R. Rao has predicted that Indian science will be in a dismal state in the next five years, with only a few science universities and handful of scientists remaining. He added that even smaller countries such as Taiwan, Singapore and South Korea have become global players and overtaken India.

1.3.6 Scientific Advisory Committee to the Cabinet (SAC-C)

The Scientific Advisory Committee to the Cabinet (SAC-C) has stated in one of their reports that the basic reasons for a decline in enrolments in science courses at undergraduate level are the attractions to applied and professional courses, the time and rigour needed for reaching research level in science and the general impression created by society, family and peers of the lack of satisfying career opportunities in science teaching and research. Science education at school level onwards suffers due to lack of reasonable experimental facilities, absence of quality teachers with dedication, inadequacies in curricula, and lack of flexible subject and course combinations. Classroom demonstrations are very rare. The syllabus aimed to be covered by the end of 10+2 is too extensive and could well be intelligently reduced by about 20 to 30%. At present the overlap with the early stages of UG level is quite large.

1.3.7 Indian Academy of Sciences, Bangalore

In December, 1994, the Indian Academy of Science, Bangalore brought out a report on University Education in Science which stated that "increasingly fewer talented and motivated students are being attracted to science degrees in undergraduate education". Commenting on the state of science education in Indian Colleges and Universities, the report had stated "there are of course fortunate exceptions, but the general view is that standards in all respects have declined rapidly and alarmingly, and unless something is done soon to remedy the situation, the country is definitely heading for disaster."

1.3.8 Report on University Education in Science – the summary

The report on University Education in Science summarizes frequently articulated views on the situation as under:

(a)   There has been an alarming drop in the quality of students who opt for higher studies in the sciences after school level. The best products from schools choose to go for courses in engineering, medicine and commerce, the next most talented group opt for administrative services, bank careers and the like, those that pursue science at the undergraduate level are then largely drawn from the residue.

(b)   As against this, there has been no careful assessment of the country's needs for talented scientists in different spheres. The needs are obvious in sectors such as defence, space, atomic energy, health, agriculture and related fields, apart from

the universities. The absence of quantitative estimates of the number of persons needed in the years to come may have contributed to the present problems. Well planned efforts to attract, train and retain appropriate numbers of scientists, to pursue a professional career in science in this country, are essential to prevent a crisis in the near future.

(c)   In contrast to the situation a few decades ago, students, parents and indeed society as a whole do not presently view a career in science as rewarding or challenging or even as offering a satisfying professional life. Career opportunities in science are perceived as limited and as being not at all comparable materially with other professions. Intimately related to these negative impressions is the fact that faculty positions in colleges and universities appear lacking in prestige and respect, and in any case what young people see all too clearly is rampant inbreeding in most educational institutions.

(d)   The National Science Talent Search awards scheme instituted in 1964 was definitely a very worthwhile attempt to attract the best and most highly motivated students to devote themselves to careers in science. However, even here the necessary follow-up steps to retain and provide for such students have been missing. In 1977 this scheme was enlarged to the National Talent Search award scheme, to include areas other than science. By around the mid-to late eighties only about 10 per cent of the total number of awardees were opting for science at the undergraduate level, and the number going on to the post graduate level was even less.

(e)   It is commonly felt that the maximum damage to our students occurs after they come out of the school system and enter the undergraduate level (occasionally even at the 10+2 level). It is at this stage that all curiosity, self-confidence, enthusiasm and eagerness to learn are killed. Added to this are poor methods of evaluation and debilitating memory based examining systems. The products of Indian undergraduate programmes are definitely poorer than their counterparts in developed countries, indeed much more so than at the 10+2 level. The burden of undoing and repairing the damage suffered at the college level has then to be borne by education at the post-graduate and research levels.

(f)   The options available to undergraduate students entering our institutions today are limited and inflexible. The division into engineering and medical streams at the +2 level itself contributes to the problem. Practically nowhere can an undergraduate student hope to pursue emerging combinations like biology and mathematics or biology and physics. One still has to choose from old-fashioned combinations like Physics, Chemistry and Mathematics or Chemistry, Biology and Zoology. In this respect the situation has worsened even in the Indian Institutes of Technology, which were initially quite flexible and open in course and subject combinations available to students. The option of students moving from the engineering stream to science is also rarely exercised. With this absurd and self-created inflexibility, a Ramanujan would never make it today.

(g)   In most universities and affiliated colleges one finds low educational standards and a poor academic environment. Colleges are generally under-equipped, overcrowded and poorly staffed. Not being directly involved in the framing of syllabi or in the evaluation process, it is perhaps not surprising that most teachers become demotivated and are seen to be uninspiring. Questions from students are often discouraged and experiments and demonstrations are few. Due to lack of experimental facilities, science is taught unimaginatively, and learnt by rote. Generally routine and unexciting topics are taught, basic concepts are poorly covered, and at the higher levels teaching remains divorced from research. Quality and excellence in teaching go unrecognized and unrewarded; the few good teachers there are who work under trying conditions. All this has a snow-balling effect − the generally low standards of the output at the undergraduate level get reflected among the entrants to post-graduate education and research.

(h)   Too many universities and institutions have been established over the years without giving adequate thought to the availability of teachers of acceptable quality. Without any attempts to correct the life of existing institutions, all too often new ones are created only to face the same problems.

(i)   It is widely felt that one cause for the sorry state of affairs outlined above is the government's policy of the past half century of establishing chains of specialized research institutions and national laboratories outside the university system, without proper and healthy linkages to the latter. This policy, especially the disproportionate funding of these institutions, has deprived universities of both talent and material support. Even worse, the access of young motivated students to leaders in various fields of science − natural in a university setting in developed countries and so essential to creative work at a young age − has become virtually impossible. Thus the soil where scientists of the future should grow has been deprived of some of its most important nutrients.

(j)   There has been hardly any initiative or involvement by private non-governmental sources of support towards higher levels of education and research. Endowed chairs, industry-supported specialized laboratories and the like are conspicuous by their absence. This is particularly unfortunate since private enterprises depend on products of the educational system for their needs.

(k)   As a result of national level discussions and suggestions for mechanisms to encourage and support scientific research, many schemes have been established by Government agencies, and these have in fact done quite well. Examples are the Science and Engineering Research Council within the Department of Science and Technology, the COSIST programme of the University Grants Commission (UGC) and the (now abandoned) University Leadership Programme. However, in the educational sphere, though on several occasions studies and recommendations have been made to improve the situation, there has been no sustained follow-up action. Even the series of teacher-training schools held successfully in the 60's and 70's, with support from the U.S. National Science Foundation, were discontinued due to lack of support from the Government. As a result, the enthusiasm for excellence in education has been lost.

(l)   With increasing political interference in higher education, the pursuit of excellence has disappeared and given place, among other things, to commercialization of education. The twin aims of social and academic excellence are being seen as opposed to each other. There is no intellectual debate on these overlapping problems, and it is being left to the judiciary and the political leadership to determine the directions open to society.

(m)   From this sampling of frequently heard opinions, it is clear that the problems of university science education, seen in totality, are manifold, and that there has been room for continued criticism and complaint. Under these circumstances, the Academy considers that there is a need to find ways in which it can help identify and reach out to the gifted, save as many of them as possible for the pursuit of science, and make them feel that it is still worthwhile and deeply rewarding to fashion careers in science.

1.4   Recent Steps taken by Government of India

India has produced outstanding scientists, engineers and doctors but on the other hand science teaching in schools has failed to develop inventiveness and creativity in students. There is an urgent need to totally overhaul the present system of teaching and learning science in schools so as to keep pace with the growing importance of science and technology. With a view to attract and motivate students to take up science education, science courses will have to be restructured so as to make them easily comprehensible and interesting. New institutions for science education will have to be set up. In the recent past, the Government of India has taken important steps to improve upon the science & technology education. These are briefly mentioned hereunder:

i)   Planning Commission has in-principle given approval to the setting up of three Indian Institutes of Technology (IITs) in Rajasthan, Bihar and Andhra Pradesh, twenty National Institutes of Technology, twenty Indian Institutes of Information Technology, five Indian Institutes of Science Education & Research (IISER) and two Schools of Planning & Architecture. In fact, three Indian Institutes of Science Education & Research (IISER) have already been set up in Pune, Kolkata and Mohali in the year 2006 & 2007. The education imparted in both these institutions will not be limited by the boundaries of conventional academic compartmentalization and the spirit of education will be research-based learning. The IISERs would extend post graduate, doctorate and post doctorate courses with emphasis on advanced research in physics, chemistry, mathematics, life sciences, computer science, material sciences, environment and earth system sciences.

ii)   Ministry of Science and Technology plans to set up an institute namely the Indian Institute of Space Science and Technology in order to create quality human resources for ISRO.

iii)   German Scientists in collaboration with the Indian Government have put together the equivalent of a "science on wheels" project to rekindle interest among youth in pure sciences. The Science Express – a unique, interactive train exhibition – was flagged off on 29th October, 2007. The train is an adaptation on rails of the famous science tunnel exhibition that focuses on 12 advanced areas of research in science and technology. It will halt at 57 places over the next six months, returning to Delhi on June 4, 2008.

iv)   Science Education and Research will get a boost in the 11th Five Year Plan as under:

- Provision of Rs. 1500 crores from Department of Science & Technology (DST) for initiative of instituting a number of scholarships and awards for attracting young talent to pure sciences. One of the scholarship being initiated by DST is namely "Innovation in Science Pursuit for Inspired Research (INSPIRE).

- 10,000 scholarships of Rs. 1 lakh per person per year from June 2007 to students passing out 10+2 from across the country, for pursuing a five year integrated course in pure sciences.

- One million awards over five years of Rs, 5,000 each for school children in the age group of 10 to 17 years.

- Holding of summer camps for the top 1 per cent students in Class X across the country, where Eminent Scientists, Scholars and Nobel laureates will be invited to address them and inspire them to build a career in science & technology.

- Scholarships of Ph.D students to go up from Rs. 8,000 per month to Rs. 12,000 per month.

- Rejuvenation of 10 Universities to be selected on competitive bidding.

- Rs. 22,800 crores would be allocated for the Skill Development Mission to start 50000 Skill Development Centres. The Mission will have four sub-groups – training youth for industry, community training skills, for agriculture sector and tailor made skill upgradation for specific industries like Information Technology, Pharma and Auto Sector.

- The Steering Committee on S&T for X1th Plan, in its Report, has endorsed a proposal for the setting up of a "National Science and Technology Commission". It will be responsible for all the matters relating to S&T in the country; administrative, financial, scientific manpower and scientific audit etc. It will evolve S&T Policy for India and managerial structure in the Science Departments. It will also plan a model for deployment of resources.

v)   Budget 2008-09 has announced the following schemes:

- 20 per cent hike in education budget – from Rs. 28,674 crore to Rs. 34,400 crore.
- 16 Central Universities to be opened.
- 20 per cent hike in education budget.
- Three IITs to be set up in Andhra Pradesh, Bihar and Rajasthan.

- Indian Institutes of Science Education and Research to be set up at Bhopal and Thiruvananthapuram.
- Rs. 85 crores sanctioned for scholarships to students pursuing sceicne education.

vi)   The Government of India has recently allowed all educational institutions to offer their popular courses through distance and mixed education mode. In this regard, the three regulatory bodies namely, UGC, AICTE and Distance Education Council (DEC) have approved an agreement for constitution of a joint panel to act as a "single window" approval mechanism for distance education. IITs, NITs and other Engineering Institutions will now allow students to join distance education courses. The seven IITs in India have at present an yearly enrolment of about 5000 students and with the aforesaid decision, the number of students will certainly go up in IITs, NITs and Engineering Institutes.

1.5   S&T and Employment

India produces about 30 lakh graduates every year in science & engineering/technology , as is evident from the data in Table 1.1, with no relevant skills that connect to work and employment. In other words, the quality of S&T personnel emerging from the educational system is not matching the needs most appropriately. In addition to this a large number of post-graduates and Ph.Ds are also produced in these subjects by the Colleges and Universities. In contrast to this, the employment opportunities are inadequate.

Also there is a serious lack of coordination between manpower requirements in terms of areas, numbers and levels of training of manpower. This has created shortages of qualified and trained manpower in many areas and as well diverted a large part of S&T personnel to activities that can not be construed as scientific and/or technical. Hence, there is need to take appropriate steps so as to achieve a meaningful development of S&T and its application.

1.6   The Study

Some efforts have been made in the recent past to look into the fast-depleting interest of young people to study pure sciences and its impact on S&T employment in India.. The most important study worth mentioning here is *"Attracting Young People to Careers in Science: July 2005"* by Office of the Principal Scientific Advisor to the Government of India. However, the present study entitled **"Assessment of Emerging Opportunities and Prospects of Careers in Science & Technology"** has adopted a different research approach which is based on the quantum of S&T vacancies advertised during the years 2005 & 2006.

1.7   Objectives of the Study

The objectives of the present study are:

1.7.1   To look into the S&T related Job Advertisements/Notifications from Newspapers of 4 Metros and 10 Major Cities, Websites of Newspapers, Magazines, Journals, Employment News etc., of at least 3 months each of previous two years and a few months of the current year (say 6 – 9 months) while the study is being conducted and to carry out switch/comparative analyses in a systematic manner in order to see the emerging trends in careers of science students.

1.7.2   To collect information about job opportunities offered in government laboratories, ICMR, ICAR, CSIR Laboratories, Public & Private Research Institutions, Non-Scientific Institutions, Media & Voluntary Organizations etc., for the same period as mentioned under S. No. 1 above and to analyse the job trends for the science students.

1.7.3   Similarly, to study job trends for science students from the relevant data/reports of organizations related to HRD & UGC etc.

1.7.4   To list the educational institutions which are offering advance level courses in S&T so that science students can take up such courses for better prospects.

1.7.5   To bring out a net-friendly Report of the study   so that the same can be uploaded on the website.

SCOPE, APPROACH, METHODOLOGY & LIMITATIONS

2.1   Scope of the Study

This study contains information about S & T job opportunities which were advertised during the years 2005 & 2006 in various newspapers,   holding qualifications such as Ph.D, M.E., M. Tech, M. Sc, B. Tech, B.E., B. Sc, 10+2 Science and ITI Diploma/Certificate etc., as detailed in the Tables in the following Chapter.

2.2   Approach for Data Collection

Various newspaper agencies of 4 metros and 10 major cities were approached to collect available back issues from their archives, and also placed orders for their current issues for 6 – 9 months, on payment basis. Information about their websites was also collected which was used for culling out the needed data for the study. Initially, the following newspapers were procured for 6 months each of 2005 & 2006:

- ➢ Assam Tribune, the Daily edition from Guwahati
- ➢ Bihar Times
- ➢ Business Standard
- ➢ Dainik Bhaskar, Rajasthan & Madhya Pradesh
- ➢ Dainik Jagran
- ➢ Deccan Chronicle, Andhra Pradesh
- ➢ Deccan Herald, Bangalore, Karnataka
- ➢ Financial Times
- ➢ The Hindu
- ➢ Hindustan Times
- ➢ Indian Express
- ➢ Kashmir Times
- ➢ Loktej, Surat, Gujarat
- ➢ The Statesman
- ➢ Telegraph
- ➢ Tribune

However on a suggestion from the Project Director/Principal Investigator, it was agreed to by LPAC Members in their first meeting that Hindustan Times, Times of India and Employment News, which have coverage all over India, be procured for 2 years i.e. 2005 & 2006 instead of the approved duration of 3 months and 6-9 months. This was done because vacancy information about S&T from the newspapers/journals of other Metros was not much helpful for the study.   Accordingly, these two newspapers and Employment News for 2 years period of 2005 & 2006 were obtained which enhanced the stock of data beyond expectations.

MMC communicated with and visited various Government Laboratories, ICMR, ICAR, CSIR Labs, public and private research institutions and non-scientific institutions, media, voluntary organizations etc., for the requisite data for the study.

Copies of the Annual Reports/Projections made by HRD, UGC, Planning Commission etc., on the subject were obtained and studied for making further futuristic projections/trends by incorporating the areas of growth.

Listed the Institutions of Higher Learning by collecting information from various sources.

Efforts were also made to collect information about job opportunities from various other sources.

2.3   Methodology

The data so collected was compiled in a systematic manner and entered into the computer through a software which was designed keeping in mind the objectives of the study and to enable producing of a net friendly report for uploading on DST's website.

The data has been analysed according to various Science, Engineering & Technology disciplines of study and sectors of employment i.e. Central Government, State Governments, PSUs, Private Sector, Engineering Institutes/Engineering Colleges, Institutes (IITs & NITs etc.), Universities, Colleges & Schools etc.

2.4   Limitations of the Study

The limitations of this study are that despite the best efforts, all information about S & T vacancies may not have come on hand. However, data presented in this study is related to 27,791 S & T vacancies advertised in the year 2005 and 32,362 vacancies in the year 2006 which is a large coverage and enough to give useful insights on employment opportunities in various sectors. The increase of 4571 S & T job opportunities in the year 2006 over the year 2005 works out to nearly 16.45%.

ANALYSIS OF S&T VACANCIES ADVERTISED DURING 2005 & 2006

3.1   Distribution of S&T Vacancies advertised during 2005 & 2006

.   The S & T vacancies advertised were 27791 during 2005 and 32362 in 2006. The distribution of these job opportunities is presented in the following Table:

Table 3.1
Distribution of S&T Job Opportunities: 2005 & 2006

S No.	Job Opportunities	Vacancies					
		2005			2006		
		With Exp.	Without Exp.	Total	With Exp.	Without Exp.	Total
1	2	3	4	5	7	8	9
1	Scientists	2747	1004	3751	3198	1183	4381
2	Science Faculty	964	178	1142	1120	206	1326
3	Science Teachers	536	130	666	644	158	802
4	Science Personnel	354	63	417	430	84	514
5	Medical Personnel (Inclusive of Faculty)	3004	2926	5930	3505	3412	6917
6	Engineers & Technologists	6872	5920	12792	7901	6976	14877
7	Faculty in Engineering & Technology	1052	166	1218	1182	204	1386
8	I.T.I. Technicians	777	1098	1875	908	1251	2159
	Total	**16306**	**11485**	**27791**	**18888**	**13474**	**32362**

Exhibit 1

3.2   Analysis of S&T Vacancies

The analysis of S&T vacancies is indicated in the following paragraphs and the Tables.

3.3   Vacancies for Scientists

The following Tables 3.2 to 3.5 indicate clearly the status about the vacancies of Scientists advertised during the years 2005 & 2006.

3.3.1   Table 3.2 shows that during 2005 in all, there were 3751 vacancies advertised for Scientists.   Vacancies for those "with experience" were 2747 (73.23%) whereas vacancies for "without experience" were 1004 (26.77%).

Table 3.2
Vacancies for SCIENTISTS according to work-experience during 2005

S No.	Branches of Science	Vacancies						
		Ph.D		M.Sc & Equivalent		Grand Total		
		With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	Total
1	2	3	4	5	6	7	8	9
1	Agriculture	24	11	1085	317	1109	328	1437
2	Astronomy	2	-	3	-	5	-	5
3	Bioinformatics	-	-	3	2	3	2	5
4	Biology	26	5	70	23	96	28	124
5	Botany	26	5	92	48	118	53	171
6	Chemistry	32	5	373	131	405	136	541
7	Chemistry Analytical	2	-	12	6	14	6	20
8	Chemistry Bio-	9	5	56	32	65	37	102
9	Chemistry Industrial	1	-	1	-	2	-	2
10	Chemistry Inorganic	9	3	43	6	52	9	61
11	Geology	10	4	67	21	77	25	102
12	Geology Applied	-	-	3	-	3	-	3
13	Geophysics	16	3	8	3	24	6	30
14	Meteorology	2	-	3	-	5	-	5
15	Microbiology	11	2	52	3	63	5	68
16	Oceanography	-	-	4	2	4	2	6
17	Physics	59	17	354	250	413	267	680
18	Physics, Applied	4	-	4	-	8	-	8
19	Physics, Bio-	1	-	10	2	11	2	13
20	Physics, Mathematical	6	2	26	1	32	3	35
21	Physics, Chemistry & Mathematics	21	4	93	60	114	64	178
22	Physics, Nuclear	2	1	5	1	7	2	9
23	Physiology	1	1	2	2	3	3	6
24	Zoology	37	18	77	8	114	26	140
	Total	**301**	**86**	**2446**	**918**	**2747**	**1004**	**3751**

3.3.2 As per Table 3.3 the position was that during 2006, in all 4381 vacancies for Scientists were advertised. This comprised of 3198 (73%) "with experience" and 1183 (27%) "without experience". In true sense the vacancies of Scientists "with experience" will be considered only notional as they would have filled up vacancies which were already existing and/or meant for experienced persons. Whereas those "without experience" may partly fill up, at the bottom level, some of the consequential vacancies released by experienced persons due to change over or retirement and partly may take up fresh jobs created due to growth, expansion or for any other reason. In view of this expansion all those "without experience" have been considered as fresh job opportunities in S & T for the purpose of this study.

Table 3.3
Vacancies for SCIENTISTS according to work-experience during 2006

S No.	Branches of Science	Vacancies						
		Ph.D		Master Degree		Grand Total		
		With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	Total
1	2	3	4	5	6	7	8	9
1	Agriculture	31	14	1248	366	1279	380	1659
2	Astronomy	4	-	5	-	9	-	9
3	Bioinformatics	-	-	5	3	5	3	8
4	Biology	23	7	82	26	105	33	138
5	Botany	32	8	106	56	138	64	202
6	Chemistry	44	8	428	150	472	158	630
7	Chemistry Analytical	4	1	15	8	19	9	28
8	Chemistry Bio-	12	6	55	38	67	44	111
9	Chemistry Industrial	-	-	5	-	5	-	5
10	Chemistry Inorganic	11	6	51	7	62	13	75
11	Geology	12	5	77	25	89	30	119
12	Geology Applied	-	-	6	-	6	-	6
13	Geophysics	21	5	10	4	31	9	40
14	Meteorology	2	-	5	1	7	1	8
15	Microbiology	14	3	60	5	74	8	82
16	Oceanography	-	-	6	3	6	3	9
17	Physics	76	20	408	288	484	308	792
18	Physics, Applied	5	-	6	2	11	2	13
19	Physics, Bio-	2	-	12	3	14	3	17
20	Physics, Mathematical	9	2	30	1	39	3	42
21	Physics, Chemistry & Mathematics	25	5	108	70	133	75	208
22	Physics, Nuclear	3	1	6	2	9	3	12
23	Physiology	1	1	3	2	4	3	7
24	Zoology	42	21	88	10	130	31	161
	Total	**373**	**113**	**2825**	**1070**	**3198**	**1183**	**4381**

3.3.3 In view of the above statement, comparatively the status of fresh job opportunities for Scientists as emerged in the years 2005 & 2006 is 1004 (26.77%) and 1183 (27 %) showing only a marginal increase of about 0.23% between the two years.

3.3.4 Table 3.2 & 3.3 indicate that during 2005 & 2006, highest number of vacancies advertised for Scientists have been in the fields of Agriculture, Physics, Chemistry, Physics-Chemistry – Mathematics combine and Botany respectively in descending order followed by other fields.

3.3.5 These two Tables also show that during 2005 & 2006 there were 301 and 373 vacancies for Ph. Ds, 2446 and 2825 vacancies for Master's level candidates respectively in the "with experience" category. In the "without experience" category these figures were 86 and 113 for Ph. Ds, 918 and 1070 for Master's level candidates respectively.

3.3.6 Table 3.4 indicates State-wise distribution of vacancies for Scientists during 2005 & 2006. As may be seen, the highest number of vacancies for Scientists were advertised for placement in five States i.e. Uttar Pradesh, followed by Delhi, Maharashtra, Madhya Pradesh & Andhra Pradesh. The status of other States is lower than these States as indicated in the Table.

Table 3.4
State-wise Distribution of Vacancies for SCIENTISTS during 2005 & 2006

S No.	State/Union Territories	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Andhra Pradesh	224	5.97	260	5.93
2	Arunachal Pradesh	2	0.05	5	0.11
3	Assam	3	0.08	6	0.14
4	Bihar	28	0.74	34	0.78
5	Chandigarh	33	0.88	40	0.91
6	Delhi	612	16.31	708	16.16
7	Gujarat	88	2.34	103	2.35
8	Haryana	16	0.42	20	0.46
9	Himachal Pradesh	13	0.34	17	0.39
10	Jammu & Kashmir	40	1.06	48	1.10
11	Jharkhand	42	1.2	50	1.14
12	Karnataka	36	0.96	43	0.98
13	Kerala	62	1.65	73	1.67
14	Madhya Pradesh	259	6.9	302	6.89
15	Maharashtra	591	15.75	684	15.61
16	Manipur	35	0.93	42	0.96
17	Meghalaya	12	0.32	16	0.37
18	Mizoram	26	0.69	32	0.73
19	Orissa	19	0.5	24	0.55
20	Pondicherry	7	0.18	10	0.23
21	Punjab	46	1.22	55	1.26
22	Rajasthan	12	0.32	16	0.37
23	Sikkim	6	0.16	9	0.21
24	Tamil Nadu	89	2.37	104	2.37
25	Tripura	24	0.64	30	0.68
26	Uttar Pradesh	1215	32.4	1404	32.05
27	Uttarakhand	181	4.82	210	4.79
28	West Bengal	30	0.8	36	0.82
	Total	**3751**	**100**	**4381**	**100**

State-wise Distribution of vacancies for SCIENTISTS during 2005 & 2006
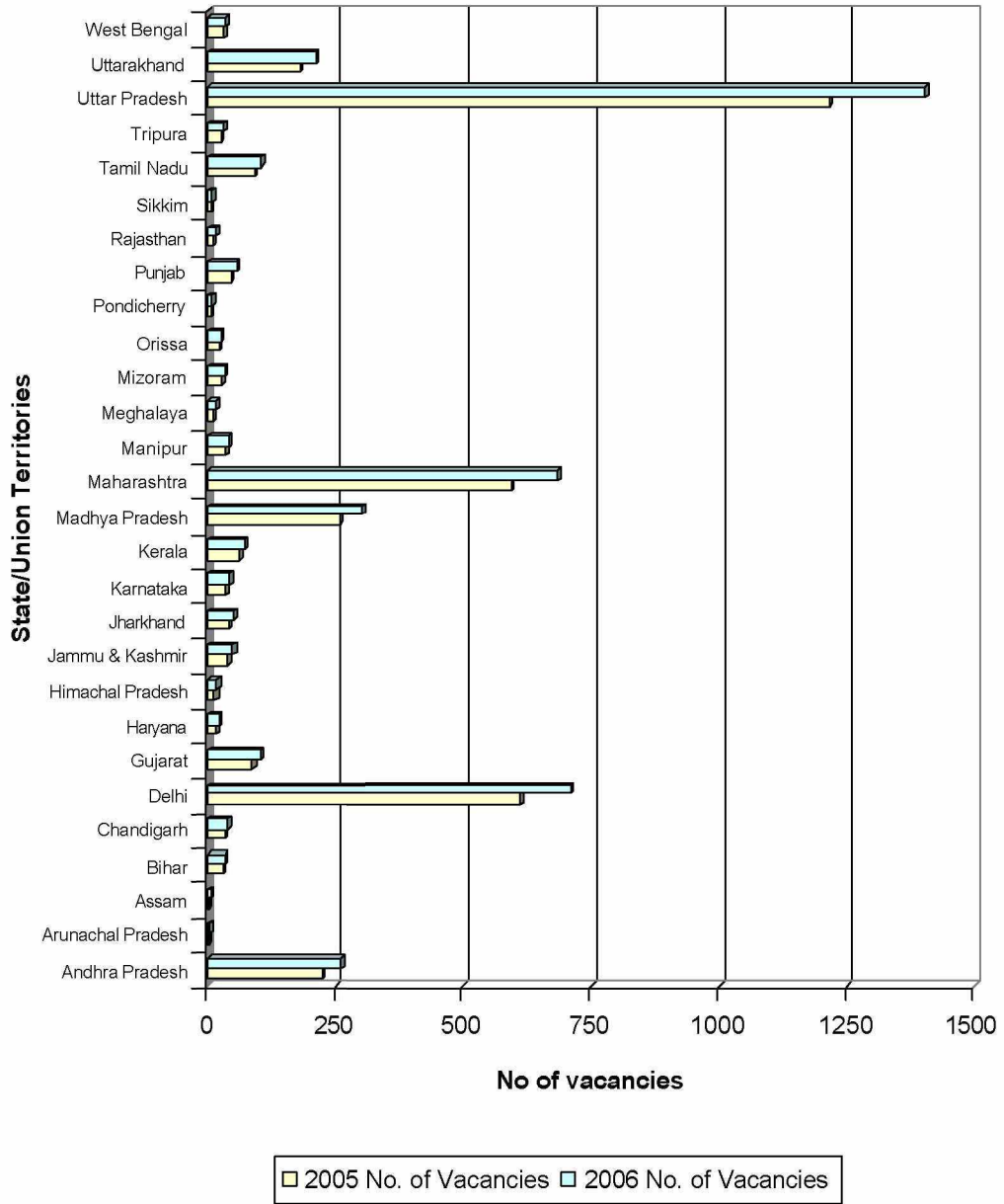
Exhibit 2

3.3.7 Table 3.5 shows Sector-wise distribution of vacancies for Scientists. The highest number of vacancies for Scientists were for placement in the Central Government Ministries/Department/Offices followed by Private Sector, State Government and Public Sector Undertakings (PSUs).

Table 3.5
Sector-wise Distribution of Vacancies for SCIENTISTS during 2005 & 2006

S No.	Sectors	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Central Government Ministries/Deptts/Offices	3081	82.14	3720	84.91
2	State Government Ministries/Deptts/Offices	188	5.01	210	4.79
3	Public Sector Undertakings (PSUs)	111	2.96	125	2.85
4	Private Sector	371	9.89	326	7.44
	Total	**3751**	**100**	**4381**	**100**

Sector Wise Distribution of Vacancies for SCIENTISTS during 2005 & 2006

Sectors (y-axis): Private Sector, Public Sector Undertakings (PSUs), State Govt. Ministries/Deptts/Offices, Central Govt. Ministries/Deptts/Offices

No of Vacancies (x-axis): 0, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000

□ 2005 No. of Vacancies   ■ 2006 No. of Vacancies
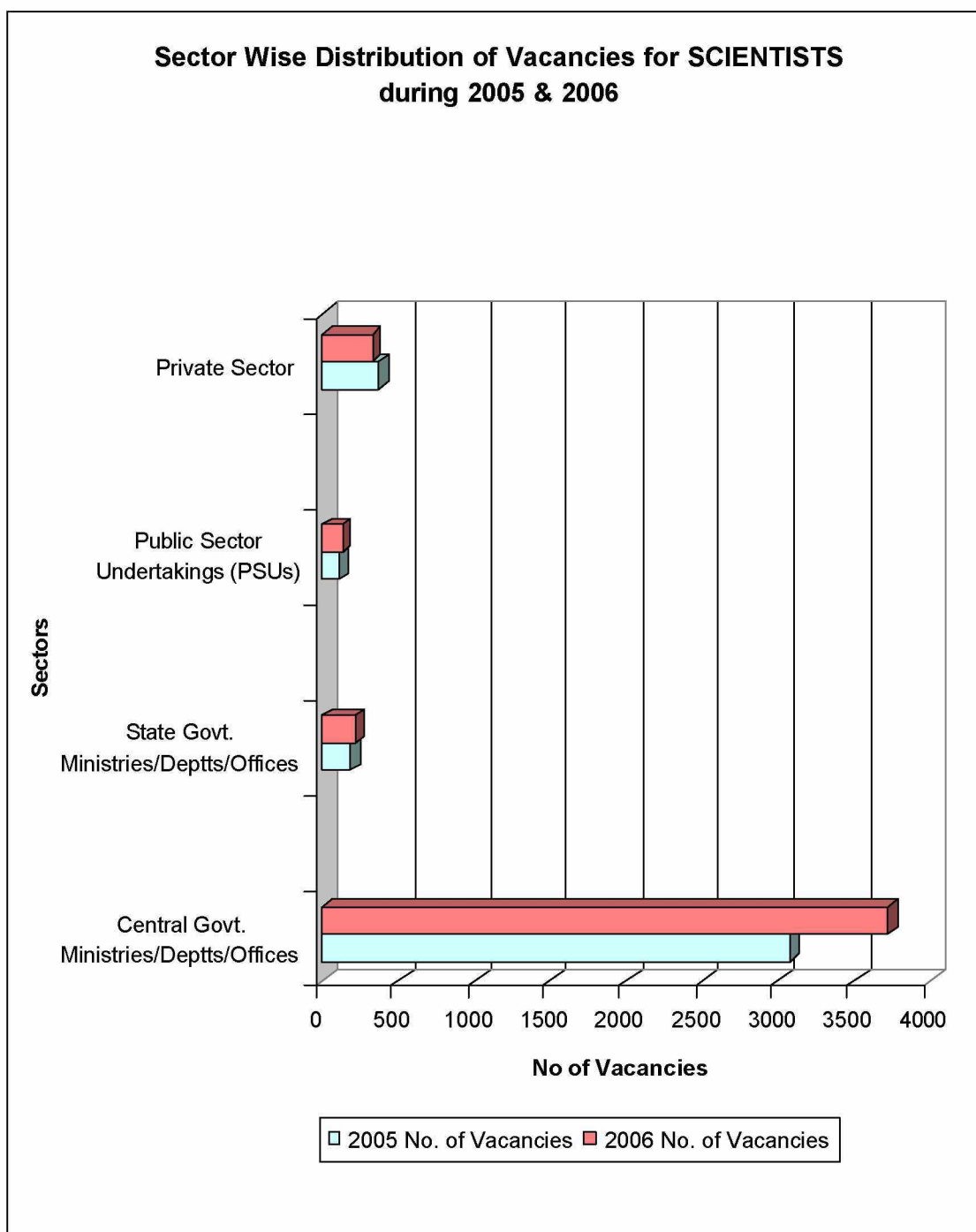
Exhibit 3

3.4   Vacancies for Science Faculty

The position for the vacancies advertised for "Science Faculty" during the year 2005 & 2006 is indicated in the following Tables 3.6 & 3.7.

3.4.1   Table 3.6 shows that during 2005, vacancies advertised for Science Faculty in the "with experience" category were 964 (84.41%) and in the "without experience" category 178 (15.59%).

Table 3.6
Vacancies for SCIENCE FACULTY according to work-experience during 2005

S No.	Branches of Science	Vacancies								
		Ph.D		M.Phil		M.Sc & Equivalent		Grand Total		
		With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	Total
1	2	3	4	5	6	7	8	9	10	11
1	Agriculture	35	3	4	2	202	33	241	38	279
2	Bioinformatics	-	-	-	-	12	2	12	2	14
3	Botany	-	-	1	1	57	23	58	24	82
4	Chemistry	67	5	3	3	71	18	141	26	167
5	Chemistry Analytical	15	2	-	-	17	2	32	4	36
6	Chemistry Bio-	18	3	-	-	26	3	44	6	50
7	Geology	20	2	-	-	27	5	47	7	54
8	Geophysics	8	1	-	-	12	3	20	4	24
9	Meteorology	10	2	-	-	8	4	18	6	24
10	Microbiology	48	8	-	-	22	6	70	14	84
11	Oceanography	23	2	-	-	25	2	48	4	52
12	Physics	63	5	-	-	81	20	144	25	169
13	Physics, Applied	8	2	-	-	12	2	20	4	24
14	Physics, Bio-	8	1	-	-	10	1	18	2	20
15	Physics, Nuclear	12	2	-	-	8	3	20	5	25
16	Zoology	11	3	2	2	18	2	31	7	38
	Total	346	41	10	8	608	129	964	178	1142

3.4.2 During 2006 as per Table 3.7 the vacancies advertised for "Science Faculty" were 1120 (84.46%) in the "with experience" category and 206 (15.54%) in the "without experience" category.

Table 3.7

Vacancies for SCIENCE FACULTY according to work-experience during 2006

S No.	Branches of Science	Vacancies								
		Ph.D		M.Phil		M.Sc & Equivalent		Grand Total		
		With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	Total
1	2	3	4	5	6	7	8	9	10	11
1	Agriculture	41	6	6	3	233	38	280	47	327
2	Bioinformatics	-	-	-	-	15	3	15	3	18
3	Botany	-	-	-	-	65	22	65	22	87
4	Chemistry	80	7	4	4	83	22	167	33	200
5	Chemistry Analytical	18	3	-	-	21	3	39	6	45
6	Chemistry Bio-	20	4	-	-	30	5	50	9	59
7	Geology	25	4	-	-	32	8	57	12	69
8	Geophysics	11	2	-	-	16	5	27	7	34
9	Meteorology	10	3	-	-	12	6	22	9	31
10	Microbiology	57	8	-	-	30	5	87	13	100
11	Oceanography	24	2	-	-	30	2	54	4	58
12	Physics	70	4	-	-	86	10	156	14	170
13	Physics, Applied	5	2	-	-	10	8	15	10	25
14	Physics, Bio-	9	2	-	-	14	2	23	4	27
15	Physics, Nuclear	15	2	-	-	12	3	27	5	32
16	Zoology	12	3	2	2	22	3	36	8	44
	Total	**397**	**52**	**12**	**9**	**711**	**145**	**1120**	**206**	**1326**

3.4.3 By comparing the figures of "without experience" category, in these two Tables viz. 178 (15.59%) for 2005 and 206 (15.54%) in 2006, there is a marginal decrease of 0.05% in the vacancies advertised in Science Faculty for fresh candidates.

3.4.4 Table 3.6 shows that the highest number of vacancies advertised for Science Faculty during 2005 were in the field of Agriculture, Physics, Chemistry, Microbiology and Botany followed by other fields. In the year 2006 as per Table 3.7, there is a slight change in this order, that is Agriculture, Chemistry Physics, Microbiology and Botany followed by other fields.

3.4.5 These Tables also indicate that the vacancies advertised for the Science Faculty were 346 & 397 Ph. Ds, 608 & 711 for Master's Level, 10 & 12 for M. Phil in "with experience' category respectively for the years 2005 & 2006. For "without experience" category, these figures were 41 & 52 for Ph. Ds, 129 & 145 for Master's Level, 8 & 9 for M. Phil respectively for the years 2005 & 2006.

3.4.6 With regard to State-wise distribution of vacancies advertised for "Science Faculty", during 2005 & 2006; the status is shown in Table 3.8. The five highest States in order are Delhi, Maharashtra, Uttar Pradesh, Andhra Pradesh and Karanatka followed by other States.

Table 3.8
State-wise Distribution of Vacancies for SCIENCE FACULTY during 2005 & 2006

S No.	States	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Andhra Pradesh	96	8.41	111	8.37
2	Arunachal Pradesh	3	0.26	4	0.30
3	Assam	21	1.84	24	1.81
4	Bihar	48	4.2	56	4.22
5	Chandigarh	40	3.5	46	3.47
6	Chhattisgarh	16	1.4	18	1.36
7	Delhi	129	11.3	151	11.39
8	Goa, Daman & Diu	1	0.08	1	0.08
9	Gujarat	68	5.96	79	5.96
10	Haryana	34	2.98	39	2.94
11	Himachal Pradesh	26	2.28	30	2.26
12	Jammu & Kashmir	10	0.88	11	0.83
13	Jharkhand	13	1.14	15	1.13
14	Karnataka	85	7.45	98	7.39
15	Kerala	26	2.28	30	2.26
16	Madhya Pradesh	68	5.96	79	5.96
17	Maharashtra	108	9.46	126	9.50
18	Manipur	5	0.44	6	0.45
19	Meghalaya	3	0.26	4	0.30
20	Mizoram	2	0.17	3	0.23
21	Nagaland	2	0.17	3	0.23
22	Orissa	25	2.19	29	2.19
23	Pondicherry	2	0.17	2	0.15
24	Punjab	30	2.63	35	2.64
25	Rajasthan	44	3.85	51	3.85
26	Sikkim	3	0.26	4	0.30
27	Tamil Nadu	65	5.69	75	5.66
28	Tripura	2	0.17	2	0.15
29	Uttar Pradesh	98	8.58	114	8.60
30	Uttarakhand	20	1.75	23	1.73
31	West Bengal	49	4.29	57	4.30
	Total	**1142**	**100**	**1326**	**100**

State-wise Distribution of vacancies for SCIENCE FACULTY during 2005 & 2006

Legend: 2005 No. of Vacancies | 2006 No. of Vacancies

X-axis: No of Vacancies

Y-axis: State/Union Territories
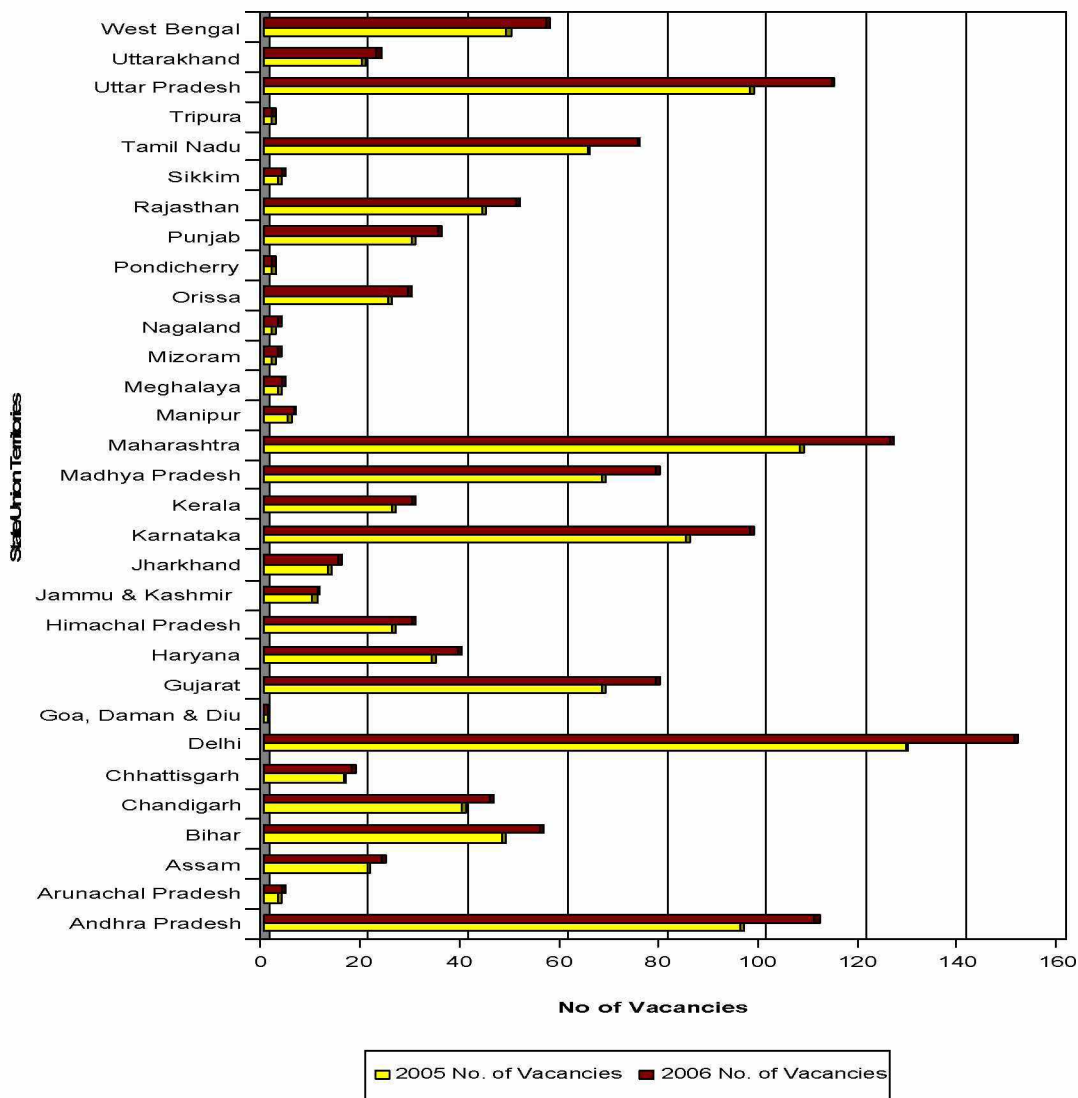
Exhibit 4

3.4.7 Table 3.9 shows Sector-wise distribution of vacancies advertised for "Science Faculty". The first in order is "Universities' followed by Deemed Universities, Colleges and Institutes.

Table 3.9
Sector-wise Distribution of Vacancies for SCIENCE FACULTY during 2005 & 2006

No.	Sectors	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Universities	896	78.46	1047	78.96
2	Deemed Universities	105	9.2	116	8.75
3	Instititues (IITs, NITs etc.)	44	3.85	51	3.85
4	Colleges	97	8.49	112	8.45
	Total	**1142**	**100**	**1326**	**100**
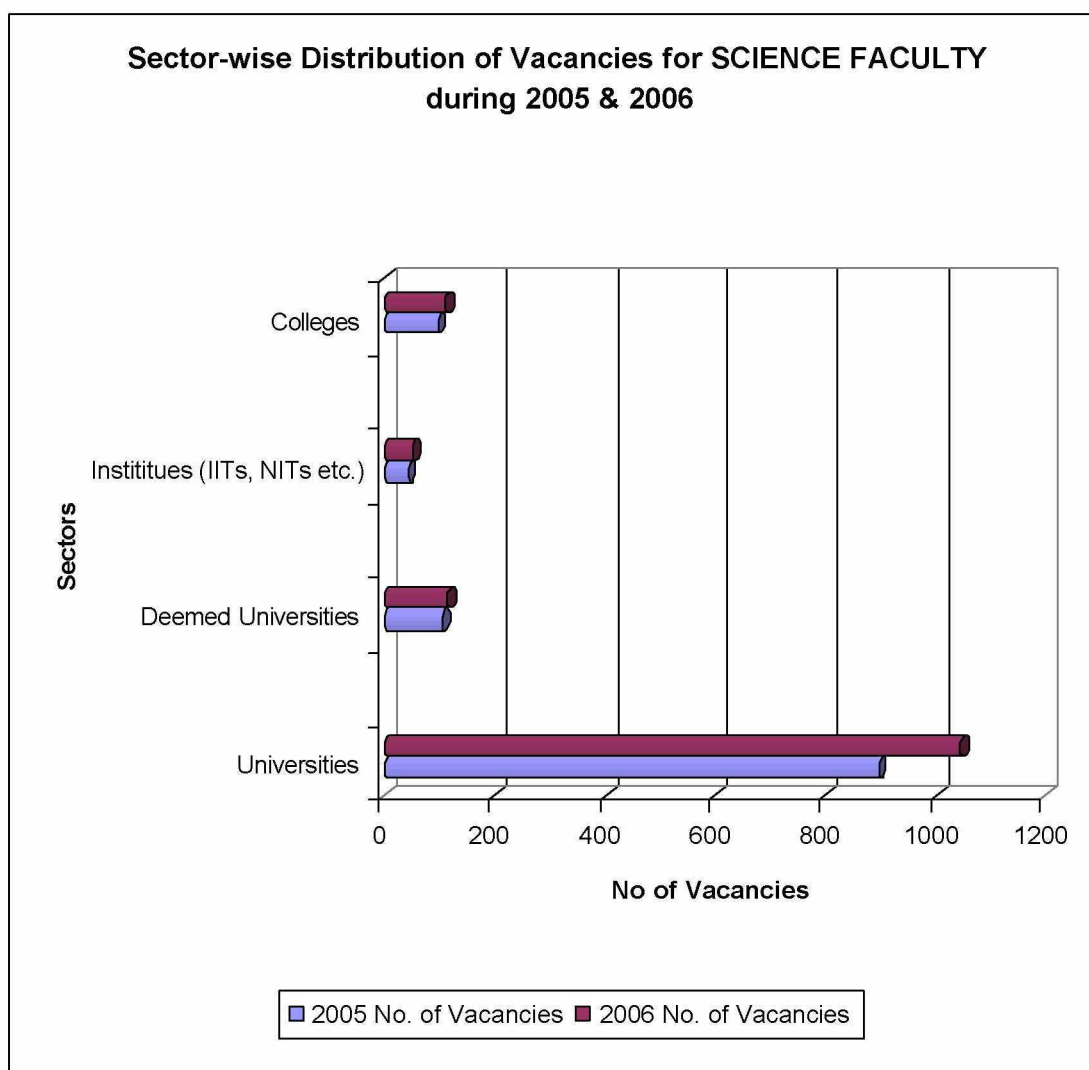
Exhibit 5

**3.5	Vacancies for Science Teachers**

Table 3.10 & 3.11 hereunder indicate the status of vacancies advertised for Science Teachers in Schools during 2005 & 2006.

3.5.1	As per Table 3.10, in all there were 666 vacancies advertised for Science Teachers – PGT & TGT. In the "with experience" category there were 536 (80.48%) and in the category of "without experience" there were 130 (19.52%).

Table 3.10
Vacancies for SCIENCE TEACHERS in Schools according to
work-experience during 2005

S No.	Branches of Science	Vacancies						
		P.G.T.		T.G.T		Grand Total		
		With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	Total
1	2	3	4	5	6	7	8	9
1	Biology	59	11	67	17	126	28	154
2	Botany	17	4	19	10	36	14	50
3	Chemistry	66	13	68	20	134	33	167
4	Computer Science	40	5	17	4	57	9	66
5	Environmental Science	6	2	8	5	14	7	21
6	Physics	75	14	66	16	141	30	171
7	Zoology	12	4	16	5	28	9	37
	Total	275	53	261	77	536	130	666

3.5.2	With regard to vacancies advertised for Science Teachers in Schools during the year 2006, the position is indicated in Table 3.11. There were in all 802 vacancies, comprising of 644 (80.30%) in the "with experience" category and 158 (19.70%) in the "without experience"category.

3.5.3	By looking at the figures comparatively in the "without experience" category for the years 2005 & 2006 which are 130 (19.52%) and 158 (19.70%) the increase over the year is of 0.18%.

3.5.4	Field-wise, as per Table 3.10, the highest number of vacancies advertised for Science Teachers during 2005 were in Physics, Chemistry, Biology, Computer Science and Botany followed by other subjects. This field-wise status is maintained in the year 2006 also, as may be seen from the data presented in Table 3.11.

Table 3.11
Vacancies for SCIENCE TEACHERS in Schools according to
work-experience during 2006

S No.	Branches of Science	Vacancies						
		P.G.T.		T.G.T		Grand Total		
		With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	Total
1	2	3	4	5	6	7	8	9
1	Biology	70	13	78	20	148	33	181
2	Botany	25	6	28	12	53	18	71
3	Chemistry	77	16	79	23	156	39	195
4	Computer Science	47	8	21	6	68	14	82
5	Environmental Science	10	4	12	5	22	9	31
6	Physics	87	17	77	19	164	36	200
7	Zoology	14	5	19	4	33	9	42
	Total	**330**	**69**	**314**	**89**	**644**	**158**	**802**

3.5.5   Table 3..10 & 3.11 indicate that the vacancies advertised for PGT Science Teachers were 275 and 330 in the "with experience" category, 53 and 69 in the "without experience" category. For TGT Science Teachers, the figures were 261 & 314 in the "with experience" category and 77 & 89 in the "without experience" categories respectively during 2005 & 2006.

3.5.6   State-wise distribution for the year 2005 & 2006 is shown in Table 3.12 distribution-wise the highest five States in order are Delhi, Rajasthan, Haryana, Uttar Pradesh and West Bengal followed by other States.

Table 3.12
State-wise Distribution of vacancies for SCIENCE TEACHERS
in Schools during 2005 & 2006

S No.	States	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Andhra Pradesh	7	1.05	9	1.12
2	Delhi	207	31.08	248	30.92
3	Gujarat	4	0.6	5	0.62
4	Haryana	95	14.26	114	14.22
5	Jharkhand	35	5.26	42	5.24
6	Madhya Pradesh	25	3.75	30	3.74
7	Maharashtra	45	6.76	54	6.73
8	Rajasthan	112	16.82	134	16.71
9	Uttar Pradesh	80	12.01	96	11.97
10	Uttarakhand	7	1.05	10	1.25
11	West Bengal	49	7.36	60	7.48
	Total	666	100	802	100
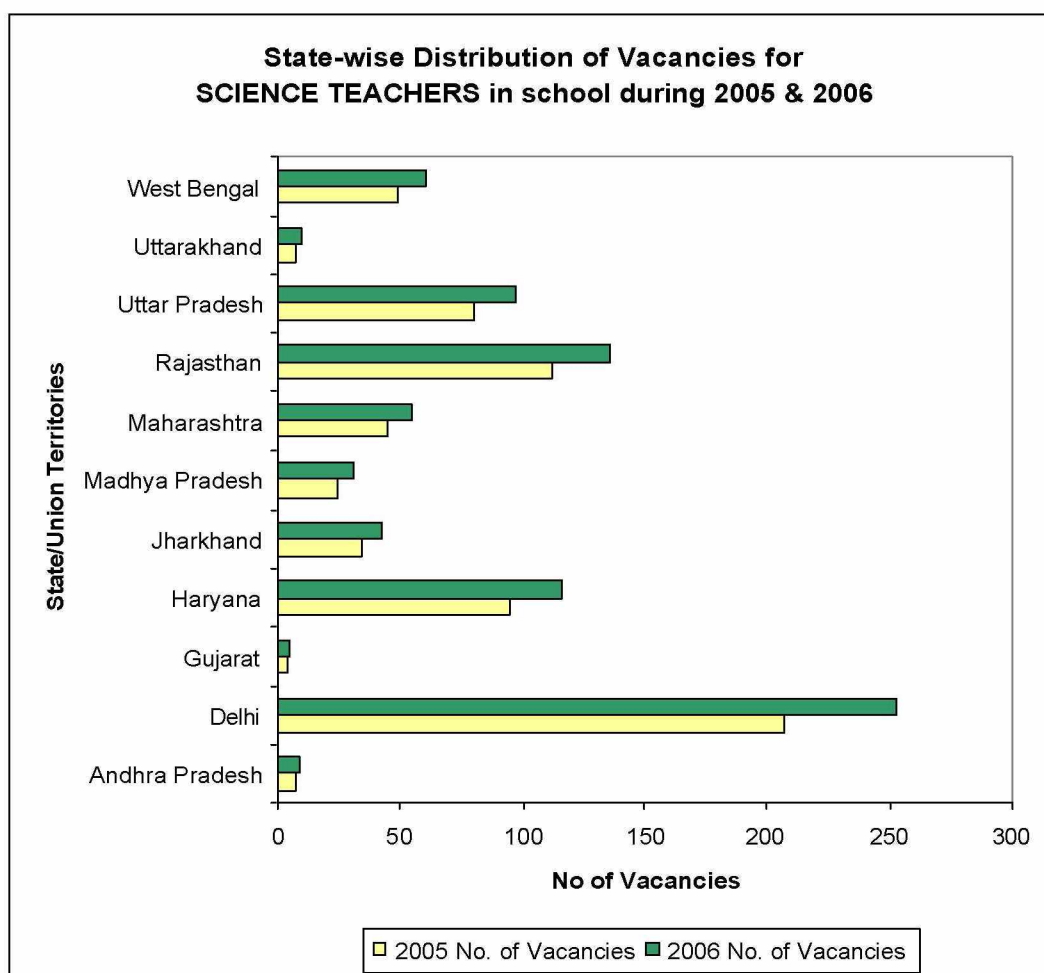
Exhibit 6

3.5.7 Sector-wise distribution of vacancies of Science Teachers for the year 2005 & 2006 as shown in Table 3.13, indicates that the maximum number of vacancies were advertised by Public Schools followed by Government Schools, Kendriya Vidyalayas & Private Schools.

Table 3.13
Sector-wise Distribution of Vacancies for SCIENCE TEACHERS
in Schools during 2005 & 2006

S No.	Sectors	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Government Schools	80	12.01	96	11.97
2	Kendriya Vidyalayas	53	7.96	64	7.98
3	Public Schools	514	77.18	617	76.93
4	Private/Unspecified Schools	19	2.85	25	3.12
	Total	**666**	**100**	**802**	**100**
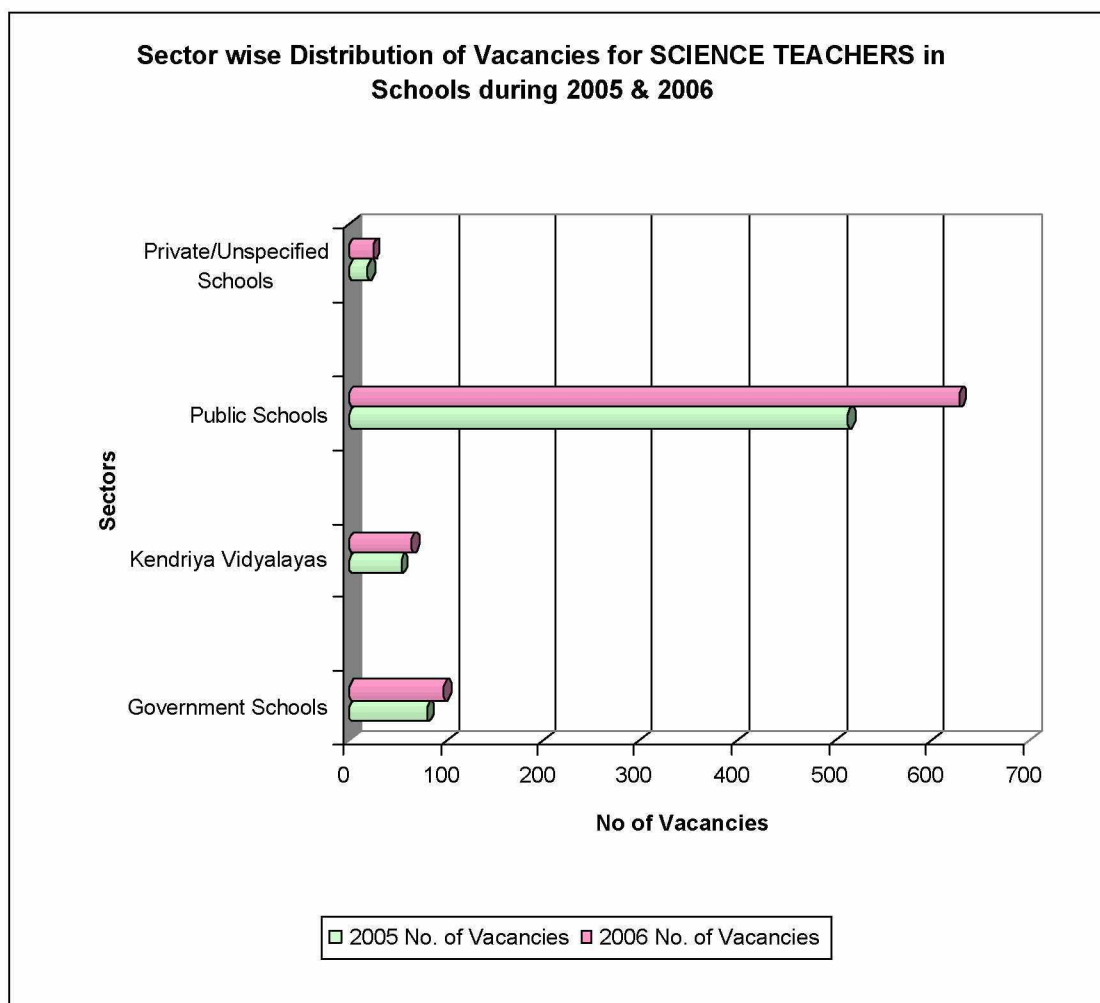
Exhibit 7

3.6. Vacancies for Science Personnel

The status about the vacancies for "Science Personnel" other than Scientists/Engineers/Technologists is shown in Table 3.14 for the year 2005 and in Table 3.15 for the year 2006.

3.6.1. It may be seen that not many vacancies have been advertised for this category. Table 3.14 indicates that there were in all 417 vacancies out of which 354 (84.89%) vacancies were in the "with experience" category, advertised for "Science Personnel" and 63 (15.11%) were in the "without experience" category for persons having qualification from 10+2 Science Level to M. Sc Level.

Table 3.14
Vacancies for SCIENCE PERSONNEL other than Scientist/Engineer/ Technologist according to work-experience during 2005

S No.	Branches of Science	Vacancies								
		M.Sc & Equivalent		B.Sc & Equivalent		10+ 2 Science		Grand Total		
		With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	Total
1	2	3	4	5	6	7	8	9	10	11
1	Biology	-	-	14	2	25	2	39	4	43
2	Botany	20	3	12	3	-	-	32	6	38
3	Chemistry	32	6	15	2	16	3	63	11	74
4	Computer/IT	50	8	21	3	11	2	82	13	95
5	Environmental Science	12	4	16	3	-	-	28	7	35
6	Physics	46	6	25	4	18	7	89	17	106
7	Zoology	18	3	3	2	-	-	21	5	26
	Total	178	30	106	19	70	14	354	63	417

3.6.2 The status of vacancies advertised during 2006 for this category of "Science Personnel" is shown in Table 3.15. The vacancies for the "with experience" category were 430 (83.66%) and for "without experience" category these were 84 (16.34%) out of a total of 514.

Table 3.15

Vacancies for SCIENCE PERSONNEL other than Scientist/Engineer/Technologist according to work-experience during 2006

S No.	Branches of Science	Vacancies								
		M.Sc & Equivalent		B.Sc & Equivalent		10+ 2 Science		Grand Total		
		With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	Total
1	2	3	4	5	6	7	8	9	10	11
1	Biology	-	-	17	2	28	4	45	6	51
2	Botany	24	4	15	4	-	-	39	8	47
3	Chemistry	37	8	18	3	19	4	74	15	89
4	Computer/IT	60	9	26	4	19	4	105	17	122
5	Environmental Science	15	5	20	4	-	-	35	9	44
6	Physics	53	8	30	5	22	8	105	21	126
7	Zoology	22	5	5	3	-	-	27	8	35
	Total	**211**	**39**	**131**	**25**	**88**	**20**	**430**	**84**	**514**

3.6.3 In comparison of "without experience" vacancies of Science Personnel for the years 2005 & 2006, i.e. 63(15.11) & 84 (16.34) respectively, the resultant increase over the previous years is 1.23 %.

3.6.4 During 2005 & 2006, as per Table 3.14 the highest number of vacancies advertised were in the field of Physics, Computer/Information Technology and Chemistry, followed by other fields. For the year 2006, field-wise position remains the same as can be seen from Table 3.15.

**3.6.5** For the Science Personnel during 2005 & 2006 the vacancy position in the "with experience" category was 178 & 211 for M. Sc level, 106 & 131 for B. Sc level, 19 and 25 for 10+2 Science level respectively.

3.6.6 Table 3.16 shows the State-wise distribution of vacancies for Science Personnel. The highest five States in order are Tamil Nadu, Maharashtra, Rajasthan, Punjab and Uttar Pradesh followed by other States.

Table 3.16
State-wise Distribution of Vacancies for SCIENCE PERSONNEL other than
Scientist/Engineer/Technologist during 2005-2006

S No.	State/Union Territories	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Andhra Pradesh	24	5.76	30	5.84
2	Bihar	2	0.48	6	1.17
3	Chandigarh	9	2.16	13	2.53
4	Chhattisgarh	8	1.92	10	1.95
5	Delhi	30	7.19	34	6.61
6	Gujarat	12	2.88	16	3.11
7	Haryana	18	4.32	20	3.89
8	Himachal Pradesh	2	0.48	6	1.17
9	Jammu & Kashmir	6	1.44	10	1.95
10	Jharkhand	6	1.44	10	1.95
11	Karnataka	27	6.47	33	6.42
12	Kerala	9	2.16	13	2.53
13	Madhya Pradesh	20	4.8	24	4.67
14	Maharashtra	38	9.11	43	8.37
15	Orissa	11	2.64	15	2.92
16	Pondicherry	8	1.92	12	2.33
17	Punjab	32	7.67	36	7.00
18	Rajasthan	35	8.39	39	7.59
19	Sikkim	2	0.48	3	0.58
20	Tamil Nadu	48	11.51	53	10.31
21	Tripura	1	0.24	3	0.58
22	Uttar Pradesh	29	6.95	36	7.00
23	Uttarakhand	18	4.32	22	4.28
24	West Bengal	22	5.27	27	5.25
	Total	**417**	**100**	**514**	**100**

State-wise Distribution of vacancies for SCIENCE PERSONNEL other than Scientist/Engineer/Technologists during 2005 & 2006
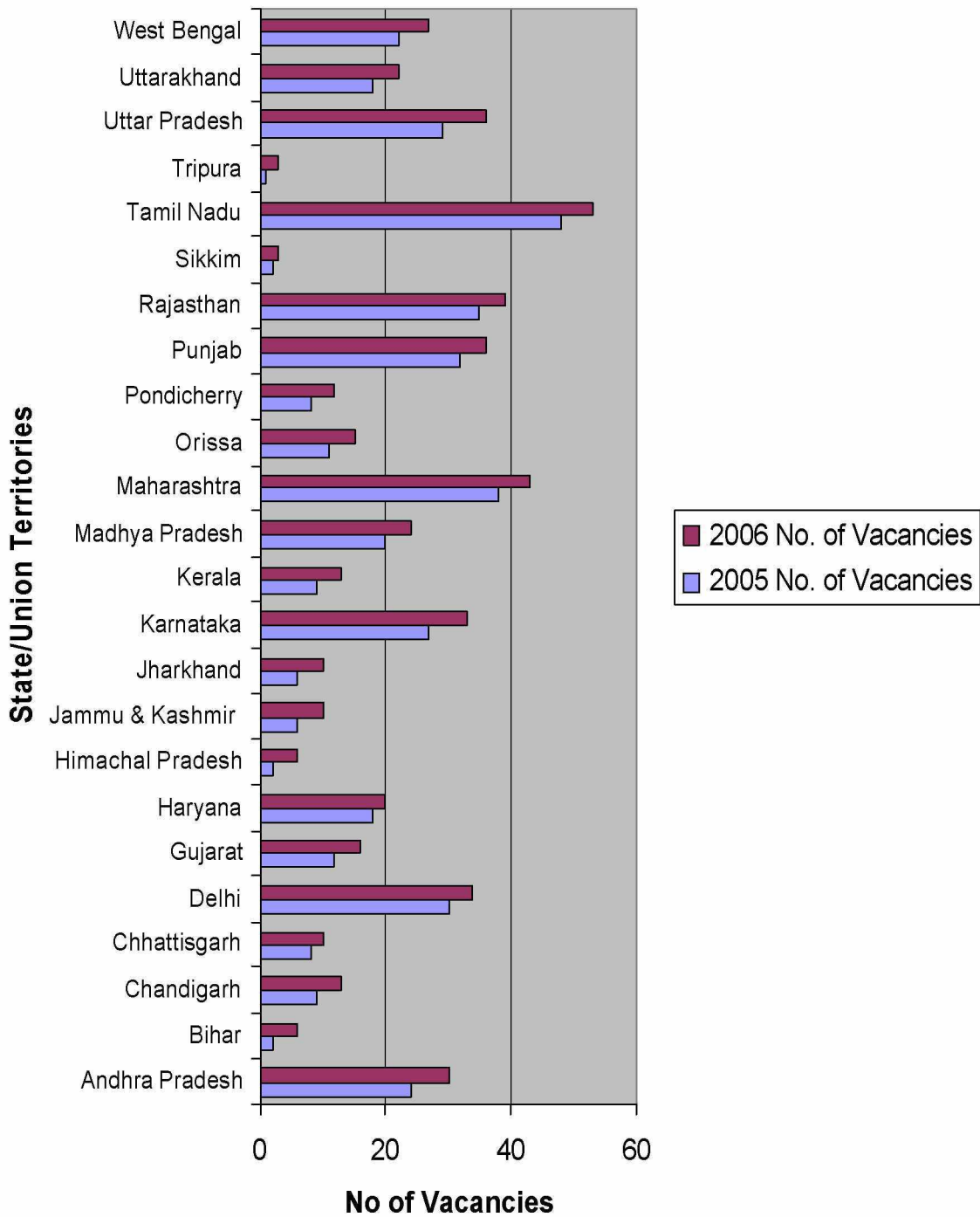
Exhibit 8

3.6.7 As per Table 3.17, the data shows that the Sector-wise distribution of vacancies of Science Personnel for both the years was that of Central Government, PSUs, Engineering Institutions/Engineering Colleges, Universities/Deemed Universities and State Governments.

Table 3.17
Sector-wise Distribution of Vacancies for SCIENCE PERSONNEL
other than Scientist/Engineer/Technologist during 2005-2006

S No.	Sectors	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Central Govt. Ministries/Deptts./Offices	89	21.34	107	20.82
2	State Govt. Ministries/Deptts./Offices	50	11.99	62	12.06
3	Public Sector Undertakings (PSUs)	62	14.87	80	15.56
4	Private Sector	31	7.44	46	8.95
5	Universities/Deemed Universities	53	12.71	62	12.06
6	Colleges/Schools	48	11.51	57	11.09
7	Engineering Institutes/Engineering Colleges	54	12.95	65	12.65
8	Institutes (IITs, NITs etc.)	30	7.19	35	6.81
	Total	**417**	**100**	**514**	**100**

Sector-wise Distribution of vacancies for SCIENCE PERSONNEL other than Scientist/Engineer/Technologist during 2005 & 2006

Exhibit 9

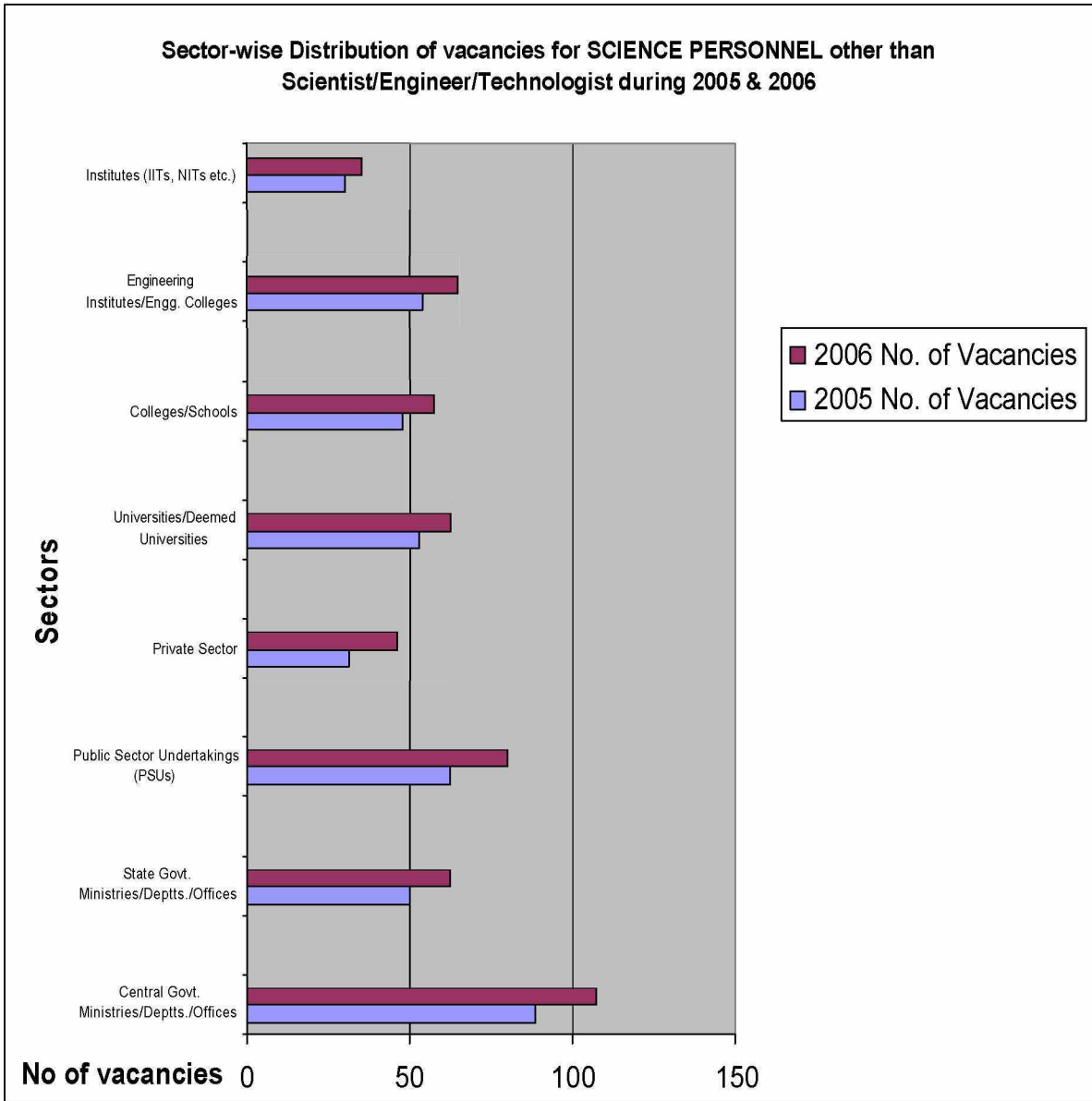## 3.7 Vacancies for Medical Personnel

The data about the vacancies advertised during 2005 & 2006 for the Medical Personnel inclusive of Faculty is shown in Tables 3.18 & 3.19.

3.7.1 As per Table 3.18 below, a total of 5930 vacancies, were advertised during 2005 comprising of 3004 (50.66%) in the "with experience" category and 2926 (49.34%) in the "without experience" category.

Table 3.18
Vacancies for MEDICAL PERSONNEL INCLUSIVE OF FACULTY
according to work-experience during 2005

S No.	Branches of Medical Science	Vacancies								
		DM/MCH/MD/MS		M.B.B.S Level		Diploma/Cert. Level		Grand Total		
		With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	Total
1	2	3	4	5	6	7	8	9	10	11
1	Allopathic Medicine	-	-	303	543	-	-	303	543	846
2	Anaesthesia	-	-	97	5	-	-	97	5	102
3	Anatomy	-	-	25	5	-	-	25	5	30
4	Ayurvedic	-	-	672	969	200	422	872	1391	2263
5	Bioinformatics	-	-	3	-	-	-	3	-	3
6	Biomedical Engineering	-	-	24	-	-	-	24	-	24
7	Cardiology	2	-	130	14	-	-	132	14	146
8	Clinical Pathology & Bacteriology	-	-	38	8	5	5	43	13	56
9	Dental Surgery	1	-	90	6	-	-	91	6	97
10	Dermatology	-	-	19	1	-	-	19	1	20
11	Forensic Medicine	2	-	20	1	-	-	22	1	23
12	General Surgery	5	-	74	11	-	-	79	11	90
13	Gynaecology, Obstetrics	12	2	120	10	-	-	132	12	144
14	Homoeopathic	-	-	110	10	6	2	116	12	128
15	Malariology & Communicable Diseases	-	-	5	4	3	2	8	6	14
16	Maternity, Child Welfare & Health	-	-	5	2	8	2	13	4	17
17	Medical, Bio-Chemistry	2	1	27	12	-	-	29	13	42
18	Medical Radiology & Electrology	-	-	80	20	16	3	96	23	119
19	Microbiology	6	2	20	2	-	-	26	4	30
20	Nursing	-	-	12	3	182	455	194	458	652
21	Occupational Therapy	-	-	14	27	-	-	14	27	41
22	Opthalmic Medicine & Surgery	5	-	22	6	-	-	27	6	33
23	Orthopaedic Surgery	3	-	26	5	-	-	29	5	34
24	Paediatrics	4	-	95	3	-	-	99	3	102
25	Pharmacy	-	-	50	201	8	18	58	219	277
26	Pharmacology, Medical	-	-	52	78	-	-	52	78	130
27	Physiology	-	-	28	6	-	-	28	6	34
28	Physiotherapy	-	-	3	1	7	2	10	3	13
29	Preventive & Social Medicine	-	-	24	11	-	-	24	11	35
30	Psychiatry	2	-	16	3	-	-	18	3	21
31	Psychology, Medical	-	-	7	21	-	-	7	21	28
32	Public Health	-	-	192	-	55	5	247	5	252
33	Sanitary Science	-	-	-	-	-	8	-	8	8
34	Tubercular Diseases	-	-	18	3	4	3	22	7	29
35	Tropical Medicine	-	-	28	-	-	-	28	-	28
36	Unani	-	-	10	-	-	-	10	-	10
37	Venereology	-	-	5	1	2	1	7	2	9
	Total	44	5	2464	1992	496	925	3004	2926	5930

3.7.2 Table 3.19 shows that during the year 2006, out of a total number of 6917 vacancies advertised for Medical Personnel, 3505 (50.67%) were in the "with experience" category and 3412 (49.33%) in the "without experience" category.

Table 3.19
Vacancies for MEDICAL PERSONNEL INCLUSIVE OF FACULTY
according to work-experience during 2006

S No.	Branches of Medical Science	Vacancies								
		DM/MCH/MD/ MS		M.B.B.S Level		Diploma/Cert. Level		Grand Total		
		With Exp.	With- out Exp.	With Exp.	With- out Exp.	With Exp.	With- out Exp.	With Exp.	With- out Exp.	Total
1	2	3	4	5	6	7	8	9	10	11
1	Allopathic Medicine	-	-	340	624	-	-	340	624	964
2	Anaesthesia	-	-	111	9	-	-	111	9	120
3	Anatomy	-	-	29	7	-	-	29	7	36
4	Ayurvedic	-	-	785	1124	232	485	1017	1609	2626
5	Bioinformatics	-	-	7	-	-	-	7	-	7
6	Bio-medical Engineering	-	-	27	-	-	-	27	-	27
7	Cardiology	4	1	160	18	-	-	164	19	183
8	Clinical Pathology & Bacteriology	-	-	44	10	8	6	52	16	68
9	Dental Surgery	2	1	104	8	-	-	106	9	115
10	Dermatology	-	-	22	2	-	-	22	2	24
11	Forensic Medicine	4	1	25	2	-	-	29	3	32
12	General Surgery	5	-	86	15	-	-	91	15	106
13	Gynaecology, Obstetrics	14	3	138	12	-	-	152	15	167
14	Homoeopathic	-	-	127	14	12	4	139	18	157
15	Malariology & Communicable Diseases	-	-	8	5	4	3	12	8	20
16	Maternity, Child Welfare & Health	-	-	9	4	10	3	19	7	26
17	Medical, Bio-Chemistry	3	1	31	14	-	-	34	15	49
18	Medical Radiology & Electrology	-	-	93	24	18	4	111	28	139
19	Microbiology	8	3	25	4	-	-	33	7	40
20	Nursing	-	-	16	5	210	524	226	529	755
21	Occupational Therapy	-	-	17	30	-	-	17	30	47
22	Opthalmic Medicine & Surgery	7	1	28	6	-	-	35	7	42
23	Orthopaedic Surgery	3	-	30	7	-	-	33	7	40
24	Paediatrics	5	-	109	5	-	-	114	5	119
25	Pharmacy	-	-	58	232	10	22	68	254	322
26	Pharmacology, Medical	-	-	59	85	-	-	59	85	144
27	Physiology	-	-	35	7	8	3	43	10	53
28	Physiotherapy	-	-	5	2	9	3	14	5	19

29	Preventive & Social Medicine	-	-	29	14	-	-	29	14	43
30	Psychiatry	-	-	20	4	-	-	20	4	24
31	Psychology, Medical	-	-	9	24	-	-	9	24	33
32	Public Health	-	-	198	-	58	5	256	5	261
33	Sanitary Science	-	-	-	-	3	9	3	9	12
34	Tubercular Diseases	-	-	22	5	5	2	27	7	34
35	Tropical Medicine	-	-	32	-	-	-	32	-	32
36	Unani	-	-	15	2	-	-	15	2	17
37	Venereology	-	-	7	2	3	2	10	4	14
	Total	**55**	**11**	**2860**	**2326**	**590**	**1075**	**3505**	**3412**	**6917**

3.7.3   Comparison of data of both the years in Tables 3.18 & 3.19 in respect of Medical Personnel with regard to vacancies in the "without experience" category, i.e. 2926 (49.34%) & 3412 (49.33 %), it shows a marginal increase of 486 vacancies in the year 2006.

3.7.4   There are 37 fields of Medical Personnel shown in Table 3.18 and 3.19. Field-wise, the highest number of vacancies occurred in Ayurvedic, Allopathic Medicine, Nursing, Pharmacy and Public Health in both the years.

3.7.5   Data in Tables 3.18 & 3.19 shows that the vacancies advertised for DM/MCH/ MD/MS level were only 44 & 55, for MBBS level 2464 & 2860 and for Diploma level 496 & 590 in the "with experience" category for the years 2005 & 2006 respectively. In the "without experience" category the vacancies advertised were 5 & 11 for DM/MCHMD/MS level, 1992 & 2326 for MBBS level, 925 & 1075 for Diploma level respectively.

3.7.6   State-wise distribution of vacancies of Medical Personnel for the years 2005 & 2006 is shown in Table 3.20. The highest five States are Delhi, Uttar Pradesh, Maharashtra, Chandigarh and Andhra Pradesh followed by other states.

Table 3.20
State-wise Distribution of Vacancies for MEDICAL PERSONNEL
INCLUSIVE OF FACULTY during 2005 & 2006

S No.	State/Union Territories	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Andaman & Nicobar	1	0.01	1	0.01
2	Andhra Pradesh	174	2.94	203	2.93
3	Arunachal Pradesh	4	0.07	6	0.09
4	Assam	171	2.88	199	2.88
5	Bihar	4	0.07	6	0.09
6	Chandigarh	188	3.17	220	3.18
7	Chhattisgarh	122	2.07	143	2.07
8	Delhi	2250	37.94	2627	37.96
9	Goa, Daman & Diu	1	0.01	1	0.01
10	Gujarat	42	0.71	50	0.72
11	Haryana	2	0.03	4	0.06
12	Himachal Pradesh	3	0.05	5	0.07
13	Jammu & Kashmir	17	0.29	20	0.29
14	Jharkhand	10	0.17	12	0.17
15	Karnataka	32	0.54	36	0.52
16	Kerala	93	1.57	107	1.55
17	Madhya Pradesh	114	1.93	133	1.92
18	Maharashtra	485	8.18	561	8.11
19	Manipur	4	0.06	5	0.07
20	Meghalaya	11	0.18	12	0.17
21	Mizoram	7	0.12	7	0.10
22	Nagaland	2	0.03	2	0.03
23	Orissa	5	0.08	7	0.10
24	Pondicherry	57	0.96	66	0.95
25	Punjab	84	1.42	98	1.42
26	Rajasthan	5	0.08	15	0.22
27	Tamil Nadu	51	0.86	56	0.81
28	Tripura	15	0.25	17	0.25
29	Uttar Pradesh	1820	30.69	2123	30.68
30	Uttarakhand	55	0.93	62	0.90
31	West Bengal	101	1.71	116	1.68
	Total	**5930**	**100**	**6920**	**100**

State-wise Distribution of vacancies for MEDICAL PERSONNEL INCLUSIVE OF FACULTY during 2005 & 2006
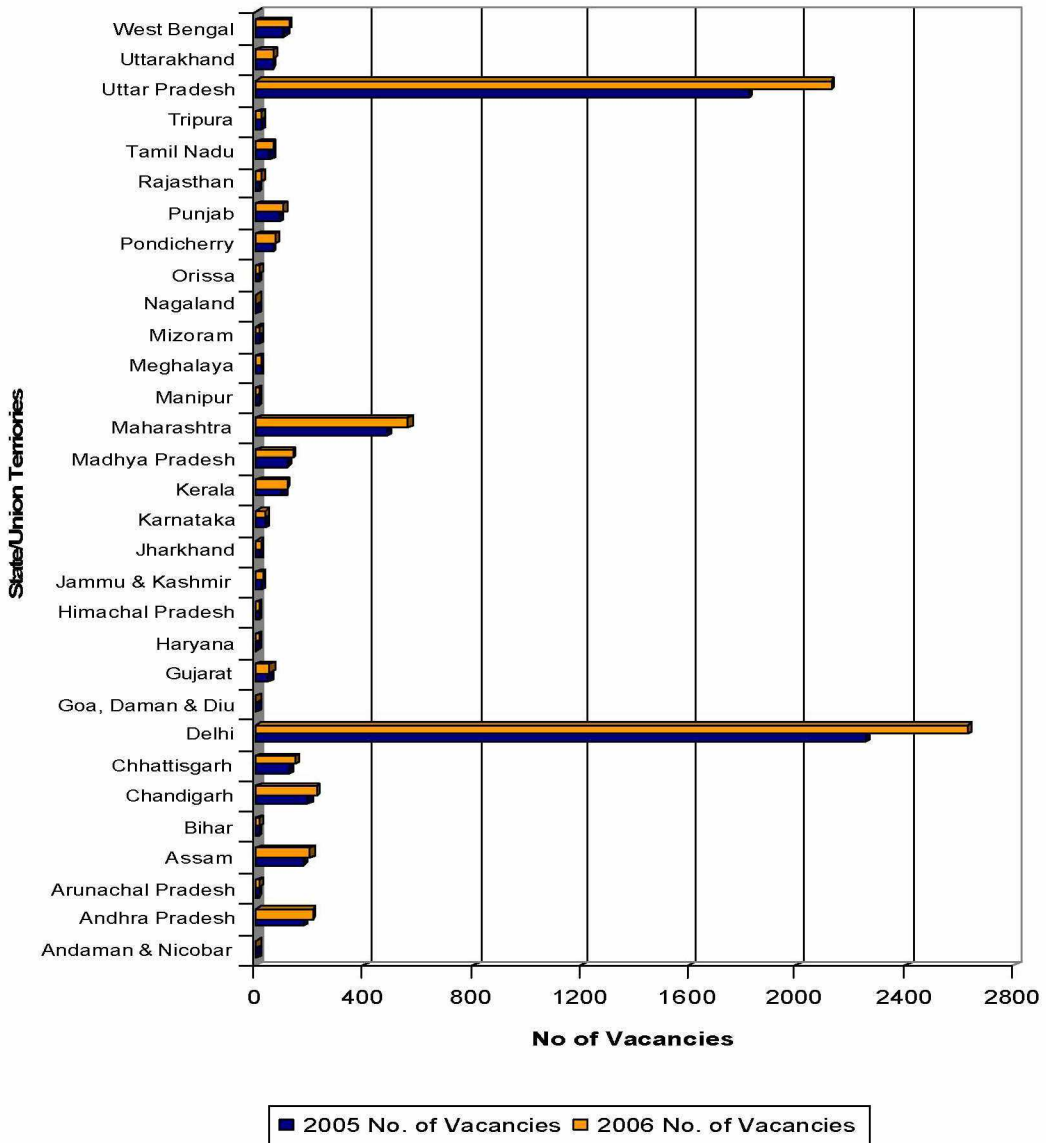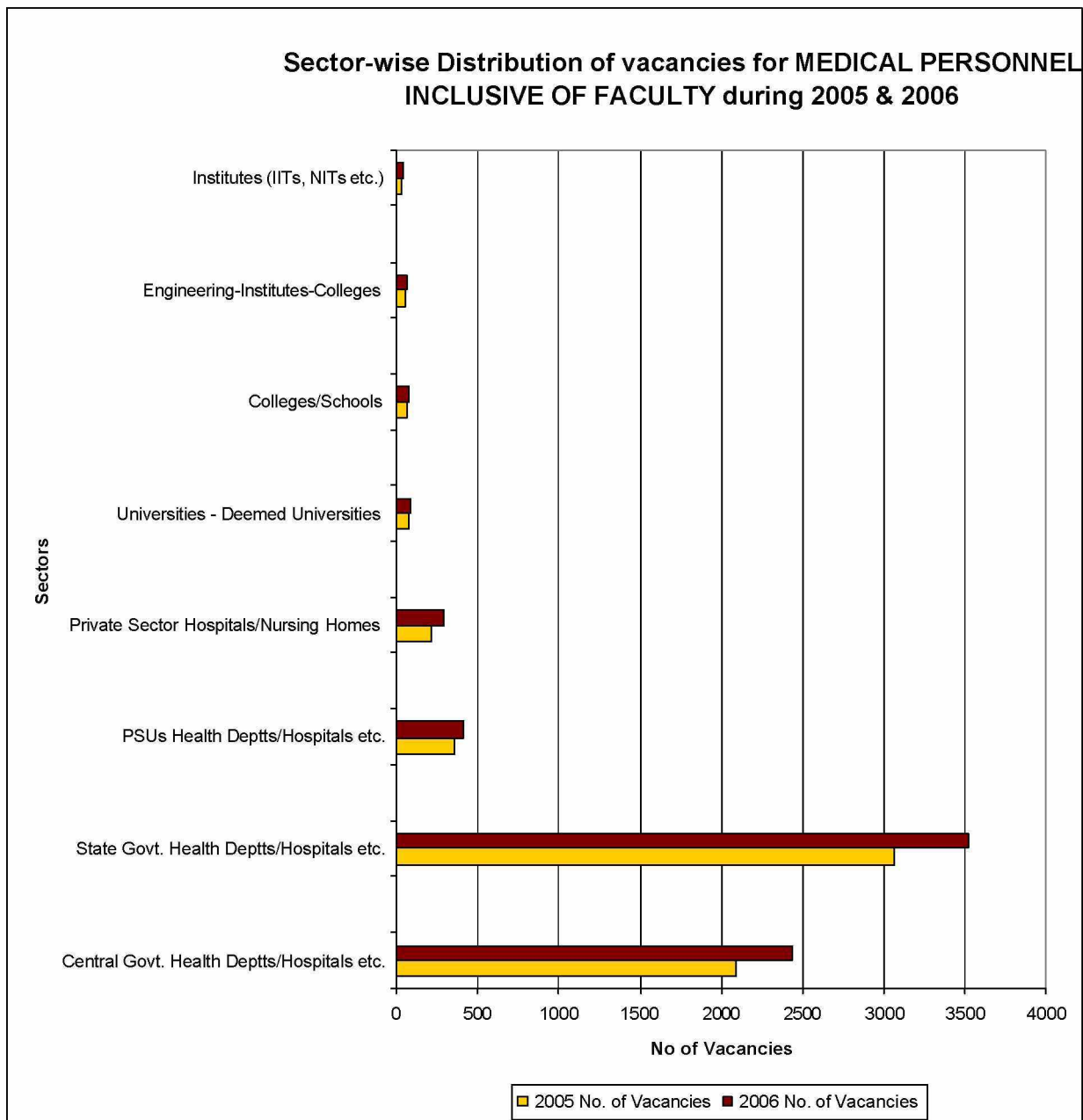

Exhibit 10

3.7.7 Sector-wise distribution of vacancies of Medical Personnel in order is; State Governments, Central Government, PSUs and Private Sector, as can be seen form Table 3.21.

Table 3.21
Sector-wise Distribution of Vacancies for MEDICAL PERSONNEL INCLUSIVE OF FACULTY during 2005 & 2006

S No.	Sectors	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Central Govt. Health Deptts/Hospitals etc.	2091	35.26	2444	35.32
2	State Govt. Health Deptts/Hospitals etc.	3057	51.55	3519	50.85
3	PSUs Health Deptts/Hospitals etc.	361	6.09	412	5.95
4	Private Sector Hospitals/Nursing Homes	219	3.69	289	4.18
5	Universities - Deemed Universities	68	1.15	86	1.24
6	Colleges/Schools	57	0.96	69	1.00
7	Engineering-Institutes/Engg. Colleges	48	0.81	60	0.87
8	Institutes (IITs, NITs etc.)	29	0.49	41	0.59
	Total	**5930**	**100**	**6920**	**100**

Sector-wise Distribution of vacancies for MEDICAL PERSONNEL INCLUSIVE OF FACULTY during 2005 & 2006

Sectors (top to bottom): Institutes (IITs, NITs etc.), Engineering-Institutes-Colleges, Colleges/Schools, Universities - Deemed Universities, Private Sector Hospitals/Nursing Homes, PSUs Health Deptts/Hospitals etc., State Govt. Health Deptts/Hospitals etc., Central Govt. Health Deptts/Hospitals etc.

X-axis: No of Vacancies (0 to 4000)

Legend: ☐ 2005 No. of Vacancies ■ 2006 No. of Vacancies

Exhibit 11

3.8 Vacancies for Engineers & Technologists

Tables 3.22 and 3.23 show the data for the vacancies of Engineers & Technologists related to 45 Branches of Engineering & Technology.

3.8.1 Table 3.22 indicates that in all, 12792 vacancies for Engineers & Technologists were advertised in 2005. Out of this, 6872 (53.72%) were in the "with experience" category and 5920 (46.28%) in the "without experience" category.

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Table 3.22
Vacancies for ENGINEERS & TECHNOLOGISTS according to work-experience during 2005

S No.	Branches of Engineering/ Technology	Vacancies										
		Ph.D		M.E./M.Tech Level		B.E./B.Tech Level		Diploma Level		Grand Total		
		With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	Total
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Air-Conditioning & Refrigeration	-	-	-	-	2	2	2	2	4	4	8
2	Aeronautical	-	-	-	-	21	44	4	80	25	124	149
3	Agricultural	1	1	2	2	285	86	48	116	336	205	541
4	Alcohal	-	-	1	1	2	2	-	-	3	3	6
5	Architecture	-	-	2	2	36	3	2	30	40	35	75
6	Automobile	-	-	-	-	412	63	47	75	459	138	597
7	Bio-Engineering	2	2	3	2	506	44	3	2	514	50	564
8	Ceremic	-	-	-	-	5	3	6	8	11	11	22
9	Civil	-	-	181	45	576	303	480	888	1237	1236	2473
10	Chemical	2	1	2	2	272	33	112	38	388	74	462
11	Computer/I.T.	-	-	280	82	523	169	144	34	947	285	1232
12	Electrical	-	-	108	20	387	304	151	288	646	612	1258
13	Electronics & Communication	-	-	205	35	545	450	124	550	874	1035	1909
14	Environmental Engineering	5	-	35	-	8	3	-	-	48	3	51
15	Fibre	-	-	-	-	12	5	-	-	12	5	17
16	Food	-	-	-	-	18	8	4	2	22	10	32
17	Forging & Heat Treatment	-	-	-	-	3	1	1	1	4	2	6
18	Fuel	-	-	-	-	4	1	-	-	4	1	5
19	Glass	-	-	1	1	8	2	1	1	10	4	14
20	Highways, Roads & Bridges	-	-	-	-	160	-	24	-	184	-	184
21	Hydraulics & Dam	-	-	-	-	6	1	5	-	11	1	12
22	Instrument	-	-	-	-	16	57	4	16	20	73	93
23	Intermediate & Dyes	-	-	-	-	8	2	7	8	15	10	25
24	Internal Combusion	-	-	-	-	4	3	-	-	4	3	7
25	Jute	-	-	-	-	2	2	7	6	9	8	17
26	Leather	-	-	-	-	12	8	6	2	18	10	28
27	Machine Tools & Die Sinking	-	-	-	-	3	1	2	2	5	3	8
28	Marine	-	-	-	-	18	12	12	12	30	24	54
29	Mechanical	4	2	30	8	333	363	314	1367	681	1740	2421
30	Metallurgical	1	1	3	3	18	33	5	17	27	54	81
31	Mining	-	-	-	-	9	3	18	4	27	7	34
32	Paper	-	-	-	-	2	1	-	-	2	1	3
33	Paints, Pigments & Varnishes	-	-	-	-	4	3	3	1	7	4	11
34	Plastics	-	-	-	-	2	-	2	-	4	0	4

35	Pharmaceutical	-	-	-	-	12	6	2	2	14	8	22
36	Printing	-	-	-	-	4	1	12	3	16	4	20
37	Production (Methods, Safety, Planning...)	-	-	-	-	81	26	5	15	86	41	127
38	Rubber	-	-	-	-	10	3	3	3	13	6	19
39	Soil Mechanics & Foundation	-	-	2	-	8	1	6	2	16	3	19
40	Sugar	-	-	-	-	3	1	2	-	5	1	6
41	Telecommunication	-	-	-	-	10	35	45	15	55	50	105
42	Textile	-	-	-	-	4	1	5	1	9	2	11
43	Textile, Dying & Printing	-	-	-	-	-	-	8	2	8	2	10
44	Tools	-	-	-	-	3	6	3	6	6	12	18
45	Town & Country Planning	-	-	-	-	12	4	4	12	16	16	32
	Total	**15**	**7**	**855**	**203**	**4369**	**2099**	**1633**	**3611**	**6872**	**5920**	**12792**

3.8.2   Table 3.23 shows that vacancies advertised for Engineers & Technologists during the year 2006 were 14877 out of which 7901 (53.11%) were in the 'with experience" category and 6976 (46.89%) in the "without experience" category.

Table 3.23
Vacancies for ENGINEERS & TECHNOLOGISTS according to work-experience during 2006

S No	Branches of Engineering/ Technology	Vacancies										
		Ph.D		M.E./M.Tech Level		B.E./B.Tech Level		Diploma Level		Grand Total		
		With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	Total
1	2	3	4	5	6	7	8	9	10	11	12	13
1	A.C. & Refrigeration	-	-	-	-	3	4	5	4	8	8	16
2	Aeronautical	-	-	-	-	24	52	5	89	29	141	170
3	Agricultural	4	1	6	3	327	98	55	133	392	235	627
4	Alcohal	-	-	2	3	4	2	-	-	6	5	11
5	Architecture	-	-	4	3	42	5	3	34	49	42	91
6	Automobile	-	-	-	-	480	73	52	86	552	159	711
7	Bio-Engg.	-	-	6	4	565	61	2	2	573	67	640
8	Ceremic	-	-	-	-	6	2	9	10	15	12	27
9	Civil	-	-	210	52	660	350	552	1020	1422	1422	2844
10	Chemical	4	2	13	3	312	39	128	44	457	88	545
11	Computer/I.T.	-	-	323	94	600	192	165	39	1088	325	1413
12	Electrical	-	-	124	23	421	333	176	381	721	737	1458
13	Electronics & Commun.	-	-	204	28	591	526	148	748	943	1302	2245
14	Environmental Engineering	3	-	30	-	9	3	-	-	42	3	45
15	Fibre	-	-	-	-	16	7	-	-	16	7	23

No.	Field											
16	Food	-	-	-	-	20	9	5	2	25	11	36
17	Forging & Heat Treatment	-	-	-	-	5	2	2	2	7	4	11
18	Fuel	-	-	-	-	5	2	3	2	8	4	12
19	Glass	-	-	2	1	10	1	3	1	15	3	18
20	Highways, Roads & Bridges	-	-	-	-	185	12	28	2	213	14	227
21	Hydraulics & Dam	-	-	-	-	8	1	8	2	16	3	19
22	Instrument	-	-	-	-	19	66	5	17	24	83	107
23	Intermediate & Dyes	-	-	-	-	11	2	9	10	20	12	32
24	Internal Combusion	-	-	-	-	6	4	-	-	6	4	10
25	Jute	-	-	-	-	2	2	8	7	10	9	19
26	Leather	-	-	-	-	14	8	8	4	22	12	34
27	Machine Tools & Die Sinking	-	-	-	-	5	2	5	2	10	4	14
28	Marine	-	-	-	-	20	13	15	10	35	23	58
29	Mechanical	6	4	38	12	383	417	361	1559	788	1992	2780
30	Metallurgical	2	1	6	5	21	37	6	20	35	63	98
31	Mining	-	-	-	-	11	4	21	5	32	9	41
32	Paper	-	-	-	-	3	2	-	-	3	2	5
33	Paints, Pigments & Varnishes	-	-	-	-	5	3	4	2	9	5	14
34	Plastics	-	-	-	-	4	1	3	1	7	2	9
35	Pharma-ceutical	-	-	-	-	18	6	3	3	21	9	30
36	Printing	-	-	-	-	6	3	18	2	24	5	29
37	Production (Methods, Safety, Planning...)	-	-	-	-	93	30	10	12	103	42	145
38	Rubber	-	-	-	-	15	4	5	3	20	7	27
39	Soil Mechanics & Foundation	-	-	-	-	12	3	8	2	20	5	25
40	Sugar	-	-	-	-	4	2	2	1	6	3	9
41	Telecommuni-cation	-	-	-	-	15	40	48	14	63	54	117
42	Textile	-	-	-	-	5	2	4	2	9	4	13
43	Textile, Dying & Printing	-	-	-	-	-	-	10	3	10	3	13
44	Tools	-	-	-	-	4	7	4	9	8	16	24
45	Town & Country Planning	-	-	-	-	13	4	6	12	19	16	35
	Total	**19**	**8**	**968**	**231**	**4982**	**2436**	**1912**	**4301**	**7901**	**6976**	**14877**

3.8.3   There is a marginal increase of 0.61% over the previous year status of vacancies when the data in the "without experience" category of Engineers & Technologists is compared for the year 2006 with the year 2005.

3.8.4   Both the Tables 3.22 & 3.23 show 45 branches of Engineering & Technology under which the data about the vacancies has been presented. Field-wise, the highest number of

vacancies existed in Civil, Mechanical, Electronics & Communication, Electrical & Computer/IT. This status remains the same for 2005 & 2006.

3.8.5 The vacancy position for Engineers & Technologists in the "with experience" category was 15 & 19 for Ph. Ds, 855 & 968 for M.E../M. Tech level, 4369 & 4982 for B.E./B. Tech level and 1633 & 1912 for Diploma level respectively for the years 2005 & 2006. The status in the "without experience" category was 7 & 8 for Ph. Ds, 203 & 231 for M.E./M.Tech level, 2099 & 2436 for B.E./ B. Tech level and 3611 & 4301 for Diploma level respectively for the years 2005 & 2006.

3.8.6 State-wise distribution of vacancies of Engineers & Technologists as appears from Table 3.24 for the years 2005 & 2006 is that the highest States in order are Delhi, Uttar Pradesh, Maharashtra, Madhya Pradesh and Karnataka followed by other states.

Table 3.24
State-wise Distribution of Vacancies for
ENGINEERS & TECHNOLOGISTS During 2005 & 2006

S No.	State/Union Territories	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Andaman & Nicobar	8	0.06	9	0.06
2	Andhra Pradesh	659	5.15	773	5.20
3	Arunachal Pradesh	78	0.61	93	0.63
4	Assam	13	0.1	15	0.10
5	Bihar	228	1.78	290	1.95
6	Chandigarh	44	0.35	57	0.38
7	Chhattisgarh	26	0.2	30	0.20
8	Delhi	2771	21.66	3103	20.86
9	Goa, Daman & Diu	15	0.12	13	0.09
10	Gujarat	548	4.29	651	4.38
11	Haryana	211	1.65	228	1.53
12	Himachal Pradesh	5	0.04	10	0.07
13	Jammu & Kashmir	48	0.38	60	0.40
14	Jharkhand	57	0.45	66	0.44
15	Karnataka	863	6.75	1011	6.80
16	Kerala	248	1.94	305	2.05
17	Madhya Pradesh	985	7.7	1140	7.66
18	Maharashtra	2105	16.46	2527	16.99
19	Manipur	27	0.21	33	0.22
20	Meghalaya	56	0.44	52	0.35
21	Mizoram	3	0.02	3	0.02
22	Nagaland	2	0.01	3	0.02
23	Orissa	24	0.19	45	0.30
24	Pondicherry	12	0.09	21	0.14
25	Punjab	206	1.61	250	1.68
26	Rajasthan	26	0.2	39	0.26
27	Sikkim	7	0.05	6	0.04
28	Tamil Nadu	348	2.72	417	2.80
29	Tripura	11	0.09	8	0.05
30	Uttar Pradesh	2310	18.05	2609	17.54
31	Uttarakhand	422	3.3	512	3.44
32	West Bengal	426	3.33	498	3.35
	Total	**12792**	**100**	**14877**	**100**

State-wise Distribution of Vacancies for Engineers & Technologists during 2005 & 2006

Legend:
- 2006 No. of Vacancies
- 2005 No. of Vacancies

X-axis: No of vacancies

Y-axis (State/Union Territories): West Bengal, Uttarakhand, Uttar Pradesh, Tripura, Tamil Nadu, Sikkim, Rajasthan, Punjab, Pondicherry, Orissa, Nagaland, Mizoram, Meghalaya, Manipur, Maharashtra, Madhya Pradesh, Kerala, Karnataka, Jharkhand, Jammu & Kashmir, Himachal Pradesh, Haryana, Gujarat, Goa, Daman & Diu, Delhi, Chhattisgarh, Chandigarh, Bihar, Assam, Arunachal Pradesh, Andhra Pradesh, Andaman & Nicobar

Exhibit 12

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3.8.7 Table 3.25 shows Sector-wise distribution of vacancies of Engineers & Technologists as advertised during 2005 & 2006. These, in order are: Private Sector, Central Government, Engineering Institutes/Engineering Colleges, State Governments and PSUs.

Table 3.25
Sector-wise Distribution of Vacancies for ENGINEERS & TECHNOLOGISTS during 2005 & 2006

S No.	Sectors	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Central Govt. Ministries/Deptts/Offices	3070	24	3473	23.34
2	State Govt. Ministries/Deptts/Offices	637	4.98	996	6.70
3	Public Sector Undertakings (PSUs)	642	5.02	680	4.57
4	Private Sector	6780	53	7865	52.87
5	Engineering Institues/Engg. Colleges	1151	9	1257	8.45
6	Institutes (IITs, NITs etc.)	512	4	606	4.07
	Total	**12792**	**100**	**14877**	**100**

Sector- Wise Distribution of Vacancies for ENGINEERS & TECHNOLOGISTS during 2005 & 2006
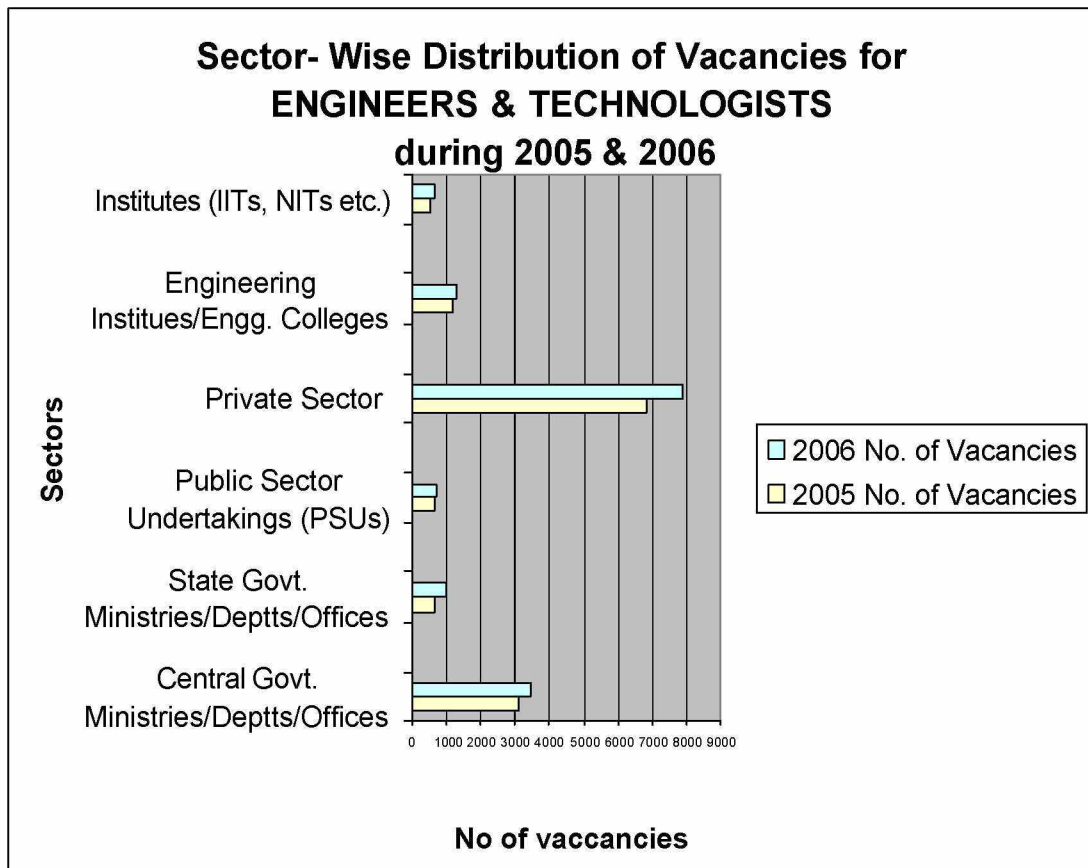
Exhibit 13

3.9 Vacancies for Faculty in Engineering & Technology

The vacancies advertised during 2005 & 2006 for Faculty in Engineering & Technology are shown in Tables 3.26 & 3.27.

3.9.1 Tables 3.26 indicates that in all 1218 vacancies were advertised out of which 1052 (86.37%) were in the "with experience" category and 166 (13.63%) in the "without experience" category.

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Table 3.26
Vacancies for FACULTY IN ENGINEERING & TECHNOLOGY
according to work-experience during 2005

</div>

S No.	Branches of Science/Engineering & Technology	Vacancies								
		Ph.D		M.E./M.Tech level		B.E./B.Tech level		Grand Total		
		With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	Total
1		3	4	5	6	7	8	9	10	11
1	Agriculture	96	2	80	24	40	4	218	30	248
2	Architecture	-	-	8	2	4	1	12	3	15
3	Automobile	-	-	39	4	8	2	47	6	53
4	Bio-Engineering	-	-	12	1	1	1	13	2	15
5	Bioinformatics	-	-	30	4	5	2	35	6	41
6	Chemical	14	2	26	2	6	3	46	7	53
7	Civil	28	2	42	3	12	4	82	9	91
8	Computer/I.T.	16	3	134	26	48	14	198	43	241
9	Electrical	10	2	37	3	4	2	51	7	58
10	Electronics	8	3	46	3	10	3	64	9	73
11	Electronics & Communication	7	2	39	2	7	2	53	6	59
12	Instrumentation & Control	4	2	16	1	3	1	23	4	27
13	Marine	5	1	8	1	5	1	18	3	21
14	Mechanical	26	4	66	5	14	3	106	12	118
15	Metallurgical	5	1	10	2	3	1	18	4	22
16	Mining	4	-	6	2	2	2	12	4	16
17	Technology (All fields combined)	5	-	8	2	2	1	15	3	18
18	Telecommunication	2	-	18	3	7	2	27	5	32
19	Textile	2	-	10	2	2	1	14	3	17
	Total	**234**	**24**	**635**	**92**	**183**	**50**	**1052**	**166**	**1218**

3.9.2 For the year 2006, the vacancy position for Faculty in Engineering & Technology is shown in Table 3.27. In all 1386 vacancies were advertised, out of which 1182 (85.28%) were in the "with experience" category and 204 (14.72%) in "without experience" category.

Table 3.27
Vacancies for FACULTY IN ENGINEERING & TECHNOLOGY
according to work-experience during 2006

S No.	Branches of Science	Vacancies								
		Ph.D		M.E./M.Tech level		B.E./B.Tech level		Grand Total		
		With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	With Exp.	With-out Exp.	Total
1	2	3	4	5	6	7	8	9	10	11
1	Agriculture	112	3	82	28	42	5	236	36	272
2	Architecture	-	1	10	3	5	1	15	5	20
3	Automobile	-	-	43	6	8	3	51	9	60
4	Bio-Engineering	-	-	13	1	2	1	15	2	17
5	Bioinformatics	-	-	25	2	6	2	31	4	35
6	Chemical	17	3	30	3	8	3	55	9	64
7	Civil	31	3	50	4	14	5	95	12	107
8	Computer/I.T.	19	3	140	27	55	14	214	44	258
9	Electrical	11	2	43	4	5	3	59	9	68
10	Electronics	10	3	53	3	12	4	75	10	85
11	Electronics & Communication	8	3	45	3	9	2	62	8	70
12	Instrumentation & Control	5	3	18	2	3	1	26	6	32
13	Marine	5	1	10	2	6	2	21	5	26
14	Mechanical	30	4	76	6	16	5	122	15	137
15	Metallurgical	5	1	11	3	4	2	20	6	26
16	Mining	5	1	7	3	3	3	15	7	22
17	Technology (All fields combined)	7	-	9	2	3	2	19	4	23
18	Telecommunication	3	-	22	4	9	4	34	8	42
19	Textile	2	-	12	3	3	2	17	5	22
	Total	**270**	**31**	**699**	**109**	**213**	**64**	**1182**	**204**	**1386**

3.9.3 "Without experience" category indicates on increase of 1.09% vacancies for Faculty in Engineering & Technology in the year 2006 over the year 2005.

3.9.4 Field-wise, Agriculture, Computer/IT, Mechanical, Civil and Electronics were the highest in the vacancies advertised for Faculty in Engineering & Technology. The status about other fields may be seen from Tables 3.26 & 3.27.

3.9.5 The vacancy position for Faculty in Engineering & Technology in the "with experience" category was 234 & 270 for Ph. Ds., 92 & 109 for M.E./M. Tech level and 50 & 64 for B.E./B. Tech level respectively for both the years.

3.9.6 Table 3.28 indicates State-wise distribution of vacancies for Faculty in Engineering & Technology for the years 2005 & 2006. The status in order is Tamil Nadu, Maharashtra, Karnataka, Madhya Pradesh and Uttar Pradesh followed by other states.

Table 3.28
State-wise Distribution of Vacancies for FACULTY IN ENGINEERING & TECHNOLOGY during 2005 & 2006

S No.	States	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Andhra Pradesh	66	5.42	75	5.41
2	Arunachal Pradesh	1	0.08	5	0.36
3	Assam	14	1.15	16	1.15
4	Bihar	5	0.41	6	0.43
5	Chandigarh	16	1.31	20	1.44
6	Chhattisgarh	15	1.23	16	1.15
7	Delhi	64	5.26	80	5.77
8	Goa, Daman & Diu	9	0.74	7	0.51
9	Gujarat	42	3.45	51	3.68
10	Haryana	39	3.2	47	3.39
11	Himachal Pradesh	4	0.33	3	0.22
12	Jammu & Kashmir	3	0.25	2	0.14
13	Jharkhand	16	1.31	12	0.87
14	Karnataka	142	11.66	155	11.18
15	Kerala	45	3.69	53	3.82
16	Madhya Pradesh	96	7.88	111	8.01
17	Maharashtra	151	12.4	170	12.27
18	Orissa	54	4.44	59	4.26
19	Pondicherry	6	0.49	5	0.36
20	Punjab	40	3.28	50	3.61
21	Rajasthan	32	2.63	35	2.53
22	Sikkim	2	0.16	2	0.14
23	Tamil Nadu	242	19.87	270	19.48
24	Uttar Pradesh	66	5.42	80	5.77
25	Uttarakhand	12	0.99	15	1.08
26	West Bengal	36	2.95	41	2.96
	Total	**1218**	**100**	**1386**	**100**

State wise Distribution of Vacancies for FACULTY IN ENGINEERING & TECHNOLOGY during 2005 & 2006

Horizontal bar chart. Y-axis: State/Union Territories. X-axis: No of Vacancies (0 to 300). Legend: □ 2005 No. of Vacancies ■ 2006 No. of Vacancies

States listed (top to bottom): West Bengal, Uttarakhand, Uttar Pradesh, Tamil Nadu, Sikkim, Rajasthan, Punjab, Pondicherry, Orissa, Maharashtra, Madhya Pradesh, Kerala, Karnataka, Jharkhand, Jammu & Kashmir, Himachal Pradesh, Haryana, Gujarat, Goa, Daman & Diu, Delhi, Chhattisgarh, Chandigarh, Bihar, Assam, Arunachal Pradesh, Andhra Pradesh

Exhibit 14

3.9.7 Sector-wise distribution of vacancies for Faculty in Engineering & Technology during 2005 & 2006, as shown in Table 3.29 is that maximum number of vacancies i.e. 1115 (91.55%) and 1223 (88.24%) were in the Engineering Institutes/Engineering Colleges followed by Institutes such as IITs, NITs etc.

Table 3.29
Sector-wise Distribution of Vacancies for FACULTY IN ENGINEERING & TECHNOLOGY during 2005 & 2006

S No.	Sectors	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Engineering Institutes/ Engineering Colleges	1115	91.55	1223	88.24
2	Institutes (IITs, NITs etc.)	103	8.45	163	11.76
	Total	**1218**	**100**	**1386**	**100**
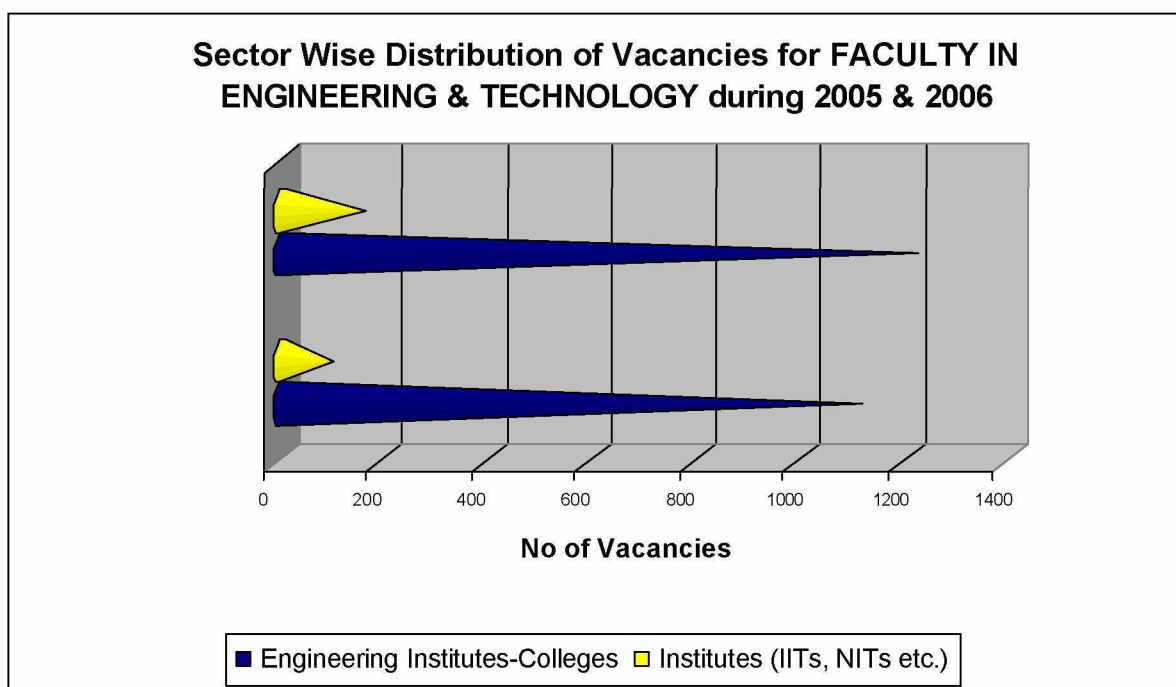
Exhibit 15

3.10.   Vacancies for ITI Technicians

Table 3.30 shows comparative data of vacancies for ITI Technicians for the years 2005 & 2006.

Table 3.30

Vacancies for ITI TECHNICIANS according to work-experience during 2005 & 2006

S No.	ITI Technical Trades	Vacancies						
		2005		2006		Grand Total		
		With Exp.	Without Exp.	With Exp.	Without Exp.	With Exp.	Without Exp.	Total
1	2	3	4	5	6	7	8	9
1	Auto Mechanic	24	37	26	41	50	78	128
2	Computer Operator & Programming	21	36	25	42	46	78	124
3	Data Entry Operator	37	16	40	21	77	37	114
4	Desk Top Publishing	33	23	35	29	68	52	120
5	Draughtsman (Civil)	37	18	40	22	77	40	117
6	Draughtsman (Mechanical)	35	24	38	30	73	54	127
7	Electrician	18	51	25	49	43	100	143
8	Electronic Mechanic	30	33	34	38	64	71	135
9	Fitter	25	40	28	46	53	86	139
10	Forger & Heat Treator	17	19	20	21	37	40	77
11	Foundryman	14	27	20	25	34	52	86
12	Instrument Machinic	11	23	15	24	26	47	73
13	Information Technology	33	39	37	42	70	81	151
14	Laboratory Assistant	6	34	10	36	16	70	86
15	Machine Tools Operator	26	31	29	27	55	58	113
16	Mechanic (Agriculture)	22	45	27	49	49	94	143
17	Mechanic (Computer Hardware)	26	37	31	40	57	77	134
18	Mechanic (Consumer Electronics)	20	44	28	46	48	90	138
19	Mechanic (Diesel)	30	16	32	55	62	71	133
20	Mechanic (Industrial Electronics)	22	54	27	60	49	114	163
21	Mechanic (Lift Maintenance)	27	54	35	58	62	112	174
22	Mechanic (Medical Electronics)	33	31	36	38	69	69	138
23	Mechanic (Motor Vehicle)	34	49	40	55	74	104	178
24	Mechanic (Pump Operator)	25	40	29	46	54	86	140
25	Mechanic (Radio & T.V.)	23	42	28	47	51	89	140
26	Mechanic (Refrigation & A.C.)	32	50	38	56	70	106	176
27	Mechanic (Tractor)	25	27	29	31	54	58	112
28	Machinist	16	44	21	48	37	92	129
29	Machinist (Grinder)	17	41	22	45	39	86	125
30	Welder (Gas & Electric)	33	35	37	38	70	73	143
31	Wireman	25	38	26	46	51	84	135
	Total	**777**	**1098**	**908**	**1251**	**1685**	**2349**	**4034**

Grand Total 2005= 1875   **Grand Total 2006= 2159**

3.10.1 In all 1875 vacancies were advertised for ITI Technicians during 2005. Out of this 777 (41.44%) were in the "with experience" category and 1098 (58.56%) were in the "without experience" category.

3.10.2 2159 vacancies for ITI Technicians were advertised during 2006 out of which 908 (42.06%) were in the "with experience" category and 1251 (57.94%) in the "without experience" category.

3.10.3 The increase in vacancies of ITI Technicians during the year 2006 is (53.52 - 46.48%) 7.04 % when compared to the data of 2005.

3.10.4 Trade-wise, vacancies of ITI Technicians in the trade of Mechanic (Motor Vehicle), Mechanic (Refrigeration. & A.C.), Mechanic (Lift Maintenance), Mechanic (Industrial Electronics) and Information Technology during the year 2005 were higher than other trades. During the year 2006, the position was that Mechanic (Motor Vehicle), Mechanic (Refrigeration. & A.C.), Mechanic (Diesel), Mechanic (Industrial Electronics) and Information Technology were higher than other trades.

3.10.5 Table 3.31 shows, State-wise distribution of vacancies advertised for ITI Technicians. Delhi is amongst the top followed by Rajasthan, West Bengal, Andhra Pradesh, Jharkhand and then other states. The status is the same for years 2005 & 2006.

Table 3.31
State-wise Distribution of Vacancies for ITI TECHNICIANS during 2005& 2006

S No.	State/Union Territories	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Andaman & Nicobar	2	0.11	2	0.09
2	Andhra Pradesh	170	9.07	204	9.45
3	Assam	1	0.05	2	0.09
4	Chandigarh	20	1.07	27	1.25
5	Delhi	663	35.36	730	33.81
6	Gujarat	12	0.64	17	0.79
7	Haryana	18	0.96	26	1.20
8	Jammu & Kashmir	1	0.05	3	0.14
9	Jharkhand	165	8.8	176	8.15
10	Karnataka	78	4.16	99	4.59
11	Kerala	5	0.27	9	0.42
12	Madhya Pradesh	25	1.33	35	1.62
13	Maharashtra	143	7.62	156	7.23
14	Punjab	2	0.11	10	0.46
15	Rajasthan	306	16.32	345	15.98
16	Tamil Nadu	21	1.12	26	1.20
17	Uttar Pradesh	39	2.08	55	2.55
18	West Bengal	204	10.88	237	10.98
	Total	**1875**	**100**	**2159**	**100**

State-wise Distribution of vacancies for ITI TECHNICIANS during 2005 & 2006
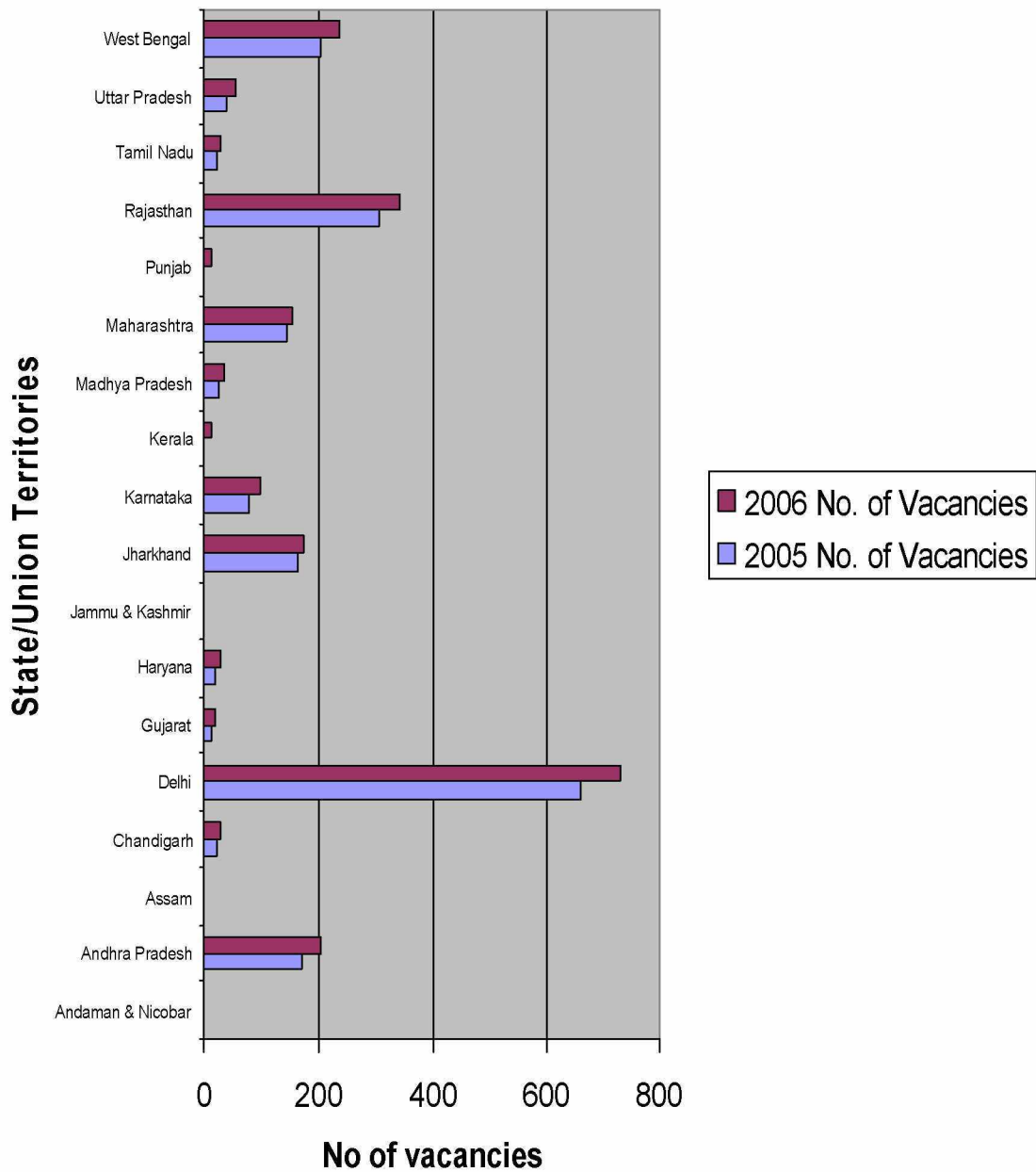
Exhibit 16

3.10.6 Sector-wise distribution of vacancies for ITI Technicians is indicated in Table 3.32, which shows that large number of vacancies appeared for Central Government followed by Private Sector, PSUs, State Governments and Engineering Institutes/Engineering Colleges. This status is maintained in both the years i.e. 2005 & 2006.

Table 3.32
Sector-wise Distribution of Vacancies for ITI TECHNICIANS during 2005 & 2006

S No.	Sectors	2005		2006	
		No. of Vacancies	% age	No. of Vacancies	% age
1	Central Government	1236	65.92	1396	64.66
2	State Governments	75	4	129	5.97
3	Public Sector Undertakings (PSUs)	188	10.03	202	9.36
4	Private Sector	303	16.16	358	16.58
5	Universities/Deemed Universities	28	1.49	24	1.11
6	Engineering Institutes/Engg. Colleges	45	2.4	50	2.32
	Total	**1875**	**100**	**2159**	**100**

State-wise Distribution of vacancies for ITI TECHNICIANS during 2005 & 2006
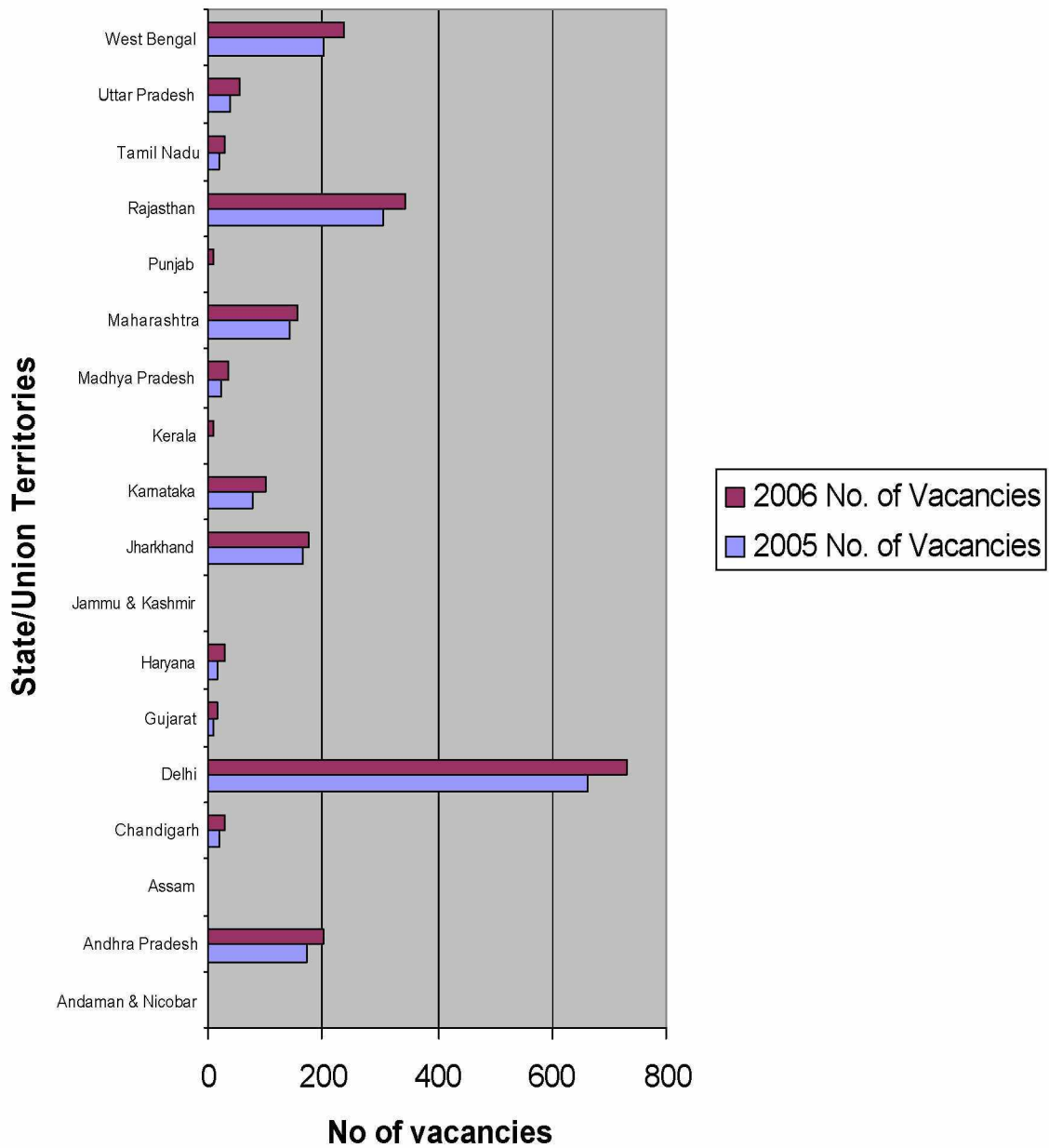
Exhibit 17

ASSESSMENT OF S & T EMPLOYMENT OPPORTUNTIES 2007-2012

4.1   One of the objectives of this study has been to find out the sectors which have significant employment potential. This is being carried out in this Chapter keeping in view the data analysis made in previous Chapter and also the sectors which have potential for S & T employment generation in the present development scenario in the country. As mentioned in the previous Chapter, in all 27791 S & T vacancies were advertised during 2005 and 32362 in 2006. For ready reference, the distribution of these job opportunities is presented once again in the following Table :

Table 4.1
Distribution of S&T Job Opportunities: 2005 & 2006

S No.	Job Opportunities	Vacancies					
		2005			2006		
		With Exp.	Without Exp.	Total	With Exp.	Without Exp.	Total
1	2	3	4	5	7	8	9
1	Scientists	2747	1004	3751	3198	1183	4381
2	Science Faculty	964	178	1142	1120	206	1326
3	Science Teachers	536	130	666	644	158	802
4	Science Personnel	354	63	417	430	84	514
5	Medical Personnel (Inclusive of Faculty)	3004	2926	5930	3505	3412	6917
6	Engineers & Technologists	6872	5920	12792	7901	6976	14877
7	Faculty in Engineering & Technology	1052	166	1218	1182	204	1386
8	I.T.I. Technicians	777	1098	1875	908	1251	2159
	Total	16306	11485	27791	18888	13474	32362

Distribution of S&T Job Opportunities:2005 & 2006

Legend:
- (2005)With Exp
- (2005)Without Exp
- (2005)Total
- (2006)With Exp
- (2006)With-out Exp
- (2006)Total

X-axis: Vacancies

Y-axis: Job Opportunities

Categories:
- I.T.I. Technicians
- Faculty in Engineering & Technology
- Engineers & Technologists
- Medical Personnel (Inclusive of Faculty)
- Science Personnel
- Science Teachers
- Science Faculty
- Scientists
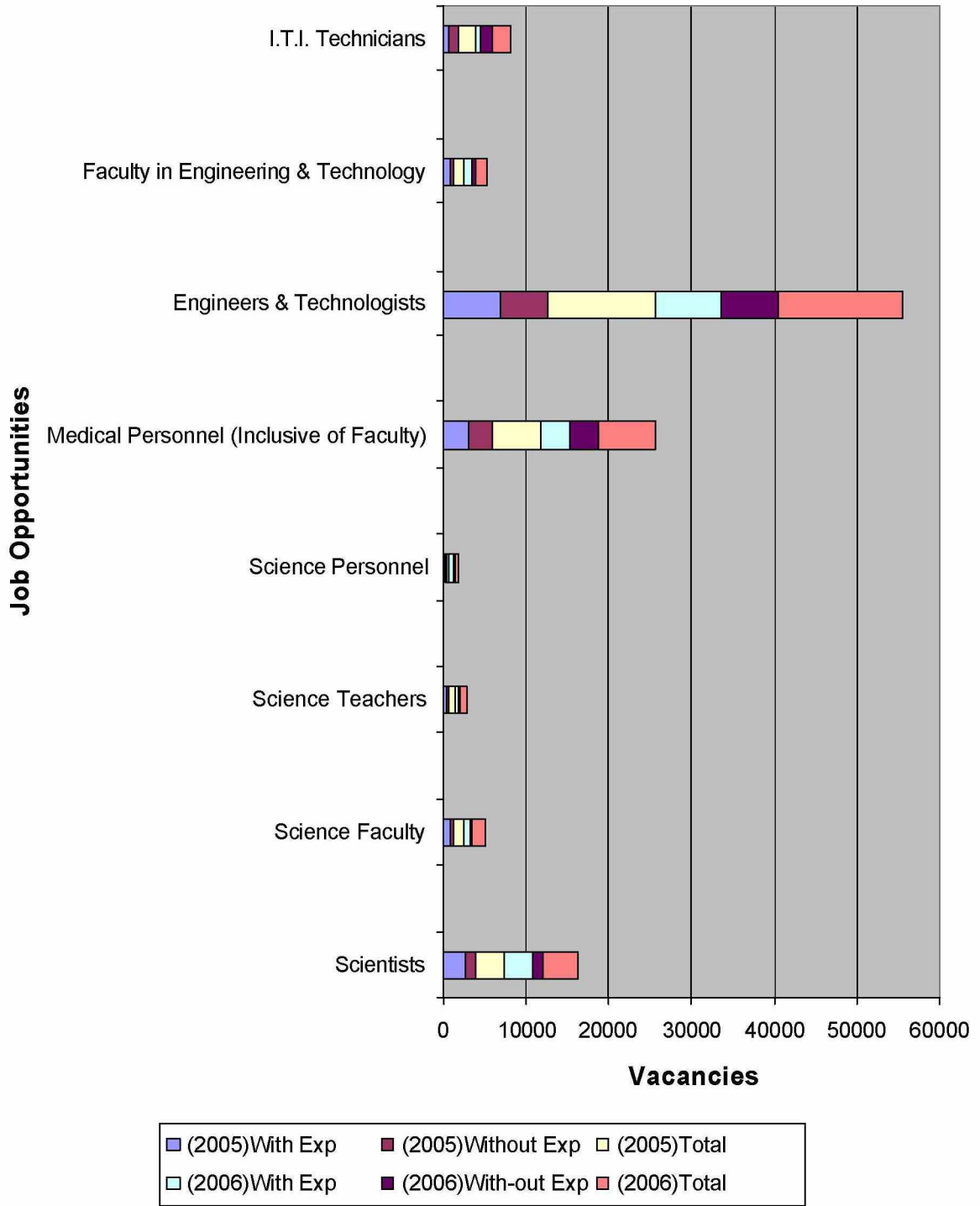
Exhibit 18

4.2 The increase in the total number of vacancies (32362) during 2006 over the year 2005 (27791) is nearly 16.45 %. The vacancies in the "with experience" category in both the years 2005 & 2006 are considered to be notional as these have no consequential effect on employment potential these being the "vacancies", which were already existing. Job opportunities pertaining to "without experience" category can be considered fresh vacancies, where the increase in the year 2006 (13474) over the year 2005 (11485) is 17.32 %. These numbers of fresh job opportunities in each respective years are too meager to absorb the turnout of large number of S & T students coming out of Universities, Colleges & Engineering Institutes/Engineering Colleges every year.

4.3 Based on the above facts, the conclusion is that only an increase of about 15 to 18% can be maintained every year in the S & T vacancies and that too subject to the growth of economy, if maintained, at the existing level. However, this increase is not sufficient enough and steps will have to be taken to absorb the highly qualified S & T personnel coming out of Universities, Engineering Institutes/Engineering Colleges, Colleges & Schools every year in large numbers.

4.4 Table 1.1. in Chapter 1 shows that enrolment of students in Science, Engineering & Technology in the year 2005-06 has been 30,50,350 i.e. nearly 27.66% of the total enrolment in all faculties in that year. Assuming that some of these enrolled students may have dropped out of the studies, some may have gone in for higher studies and for preparing themselves for the various competitive examinations etc. and assuming that a minimum of 10% of the turn out of the S & T students, say 3,00,000 would be available for jobs; as against this, the creation of new job opportunities each year as discussed in the preceeding paragraph, is very low. This rate of growth of S & T jobs opportunities at 17.32 % in a year is far less than the supply.

4.5 With regard to the job opportunities for Ph. Ds, UGC Annual Reports of 2003-04 & 2004-05 indicate that doctorates awarded in Science were 5612 and 5549 respectively. Assuming that in 2005 & 2006 also doctorates at the same level of about 5500 were awarded in each year; the number of job opportunities available to them were just 363 as per Table 4.2 . Here again, if we consider that "without experience" category is for the fresh candidates, then 363 jobs over 5500 works out to only 6.6%. *This is however, not the real position with regard to employment of Ph. Ds.* In another study which was based on data of CSIR's qualified science JRFs, and titled as **"Career Profile of NET Qualified Research Fellows: 1996 to 2001"** completed by Manpower Management Centre in December 2006; the findings were that nearly 93% of Ph. Ds were able to get employment. The reason being that most of the Universities, Colleges and Institutes fill up their vacancies for Ph. Ds through local advertisements/announcements which were not handy for the present study. A large number of Ph. Ds also take up Research Associateships, Fellowships through local references or Notices. Some of them even go abroad for further studies. However, there is certainly a need to take steps to generate more employment for these highly qualified S&T personnel, as the number of qualified Ph. Ds will be much higher due to increased investment in education during the XIth Five Year Plan

Table 4.2.
Vacancies: Ph.Ds 2005 & 2006

S.No.	Job Categories		With Experience	Without Experience
1.	Scientists	2005 (Table 4.1)	301	87
2.	Scientists	2006 (Table 4.2)	373	113
3.	Science Faculty	2005 (Table 4.5)	346	41
4.	Science Faculty	2006 (Table 4.6)	397	52
5.	Engg. & Tech	2005 (Table 4.21)	15	7
6.	Engg. & Tech	2006 (Table 4.22)	19	8
7.	Faculty Engg. & Tech	2005 (Table 4.25)	234	24
8.	Faculty Engg & Tech	2006 (Table 4.26)	270	31
	Total		**1955**	**363**

4.6   Going by the estimations indicated in Economic Survey 2007-2008, the employment potential in the next five years would be much larger. The Economic Survey 2007-08 has made a forecast that the unemployment rate is expected to fall below 5 percent in the $X1^{th}$ Five Year Plan, as the projected rise in job opportunities would be more than the anticipated increase in the labour force. On the issue of employment generation, the survey has stated that 58 million job opportunities would be created in the next five years. The projected increase in total labour force during the Plan is 45 million.

4.7   Potential Sectors & Areas of S & T Employment

Almost all areas of S & T discussed and analysed in the previous Chapter have potential to generate employment. However, the following sectors/areas have more potential to generate S & T employment:

4.7.1   Government Sector: Central Government/Ministries/Departments/Agencies such as Ministries of Communications & Information Technology, Ministry of Environment & Forests, Department of Science & Technology, Department of Biotechnology, Council of Scientific & Industrial Research, Indian Council of Agricultural Research, Indian Council of Medical Research, Defence Research & Development Organisation and various other scientific organizations have potential to increase S & T employment, as large number of their scientific employees are due to retire in the next two to three years. In addition to this there has been attrition in these Departments for quite some time now and the vacancies have not been filled up. For example, as per latest reports, DRDO is facing a shortage of about 1,400 scientists and similarly many of the laboratories under CSIR,

organizations & institutions under ICAR, ICMR & ISRO have shortage of scientific staff. These Ministries/Departments/Agencies will have to adopt a comprehensive and appropriate system to meet their shortages of staff.

4.7.2 **Private Sector:** A large number of companies such as biotechnological, pharmaceutical companies and R & D centres have been set-up in the country during the past two to three years and more are expected to come up in the next two years which will need large number of S & T employees viz., Scientists, Engineers and Technologists. The scope of employment will be much better in comparison to the previous years.

4.7.3 **Engineering Sector:** Tables 3.22 & 3.23 show that fields such as Civil, Mechanical, Electronics & Communication, Electrical and Computer/Information Technology have large number of job opportunities. The demand in these fields will continue to grow.

4.7.4 **Aerospace Science:** Aerospace science offers one of the most promising and rewarding careers, as new airlines are springing up every other day in India and the sector is growing at a very fast space. Most importantly the success with which India has made its foray into space and the grand plans the country has regarding space missions, this sector will provide immense opportunities to budding scientists.

4.7.5 **Agriculture:** Indian Agriculture is now completely exposed to the world markets. This sector can be sustained and developed through developing its competitive strength, its productivity enhancement by value additions and application of S & T inputs. In agriculture there are significant opportunities for enhancing employment through the extension of new agricultural technologies to low productivity regions and to small farmers. With S & T inputs major developments are possible in horticulture, fisheries, piggeries, poultry, animal husbandry, sericulture and post harvest technologies. Similarly, S & T inputs will lead to enhancement of rural energy supply through renewable sources of energy and this would create large number of job opportunities.

4.7.6 **Biotechnology:** Biotechnology is emerging as a top-notch field of study. It encompasses several disciplines and has tremendous prospects. There are numerous job opportunities in Biotech and the growth can be seen in areas such as Bioinformatics, Nanotechnology, Gene Therapy, Therapeutics, Drugs, Secondary Metabolities, Plant Tissue Culture, Pharmaceuticals and Clinical Research etc. This sector is, experiencing shortage of competent trained professionals. The Government intends to create 10 million jobs by 2010. The Union Department of Biotechnology (DBT) had allocated Rs 28 Crores for human resource development in 2006-07. However, there being no definitive data available on the trained manpower and its demand in industry, DBT has gone in for a survey to know the demand and supply of biotechnologists in different areas of Biotechnology over a 10 year time frame. Department of Biotechnology (DBT) also provides Placement Services in Biotechnology and in order to help unemployed persons in getting jobs, it asks the requisitions from biotech companies, research/teaching institutions, having job vacancies. This placement work for DBT is handled by Biotech Consortium India Ltd., New Delhi. (Website: **www.biotech.co.in.** Email: bcildelhi@vsnl.com). According to Government figures, the country's Biotech Sector counted revenues worth US $ 1.07 billion in 2005-06 and a growth of 36.55 percent. The

Government budget has increased from Rs 389 crores in 2005-06 to Rs 521 crores in 2006-07

4.7.7 Computer & Information & Technology Sector: Computer & Information Technology Sectors have already achieved a good prestige in India in relation to the job market. Still there is much scope to expand this sector for providing more employment. There is still a need to increase PC penetration rate and the number of internet users. Computer hardware and software production needs to be developed and extended internally in India. Every school and institution of higher education should have computers and internet connectivity. Information Technology should be used for agricultural and integrated rural development in the country. In fact, all sectors in India be given Information & Technology boosting. This would help in creating a large number of job opportunities.

4.7.8 Medical Science : This science which deals with the maintenance of health, prevention and treatment of disease has a large scope of expansion. The country has a large population but does not have sufficient medical facilities available to meet the medical requirements of its people. Creating more medical facilities in the country such as Dispensaries, Nursing Homes, Hospitals will create more demand for medical personnel. To meet this demand, more medical education facilities will also have to be created, thereby creating demand for medical faculty and medical staff.

4.8 Estimates of S & T Employment Generation: 2007-2012:

As discussed in Para 4.2 in this Chapter, the fresh S & T vacancies during the year 2006 were 13474 i.e.17.32 % more over the figure of 2005 i.e. 11485. Also, a conclusion has been arrived at that this much increase is not sufficient to absorb the large number of S & T personnel coming out of the Universities, Engineering Institutes/Engineering Colleges, Colleges & Schools. The sectors and areas in which expansion is possible have also been discussed in this Chapter . Keeping these statements in mind and with the enlarged investment allocated to S & T by the Planning Commission in the XIth Five Year Plan, it is estimated that the employment generation in S & T will be much larger from the year 2007 onwards. This task is achievable if sincere and calculative methods are adopted by all the concerned agencies.

Recent steps taken by the Government of India to promote Science and Technology such as hike in educational budget, setting up of more IITs, NITs, IIITs, IISERs, Schools of Planning & Architecture, Indian Institutes of Space Science & Technology, Science Express-Science on Wheels, Scholarships & Awards, Setting up of Skill Development Centres and proposed setting up of National S&T Commission etc., would certainly improve S & T employment generation in the country. This report has assessed S&T employment growth of 17.32 %, as stated above, without taking into consideration the recent steps taken by the Government. By proper execution and monitoring of the recent steps and expansion of industry, industrial and economic growth, it is estimated that S&T employment can be generated to the extent of at least 5 to 6 lakhs during the period 2007-2012 starting with a growth rate of about 35-40 % in 2007 to about 80 % in the year 2012.

CHAPTER – 5

CHOICE OF A CAREER

5.1 How to Choose a Career

A number of students remain in a fix and find it very difficult to choose a career. They go by the advise of their parents, friends or counselors without evaluating their own capabilities or interest. In order to avoid any frustration, they must evaluate themselves as advised hereunder:

5.1.1 Choosing the Right Career

Most of the career aspirants stand at cross roads after doing their graduation/post-graduation and diploma etc. Most of the time it is too late to make a choice. Select a professional approach for the selection of your career. Use the following questions for a better vision of your present and future:

- What do I want to become in life?
- Why do I want to become that?
- Where will it take me?
- When can I achieve that?
- Who will help me in that?
- How will I reach there?

5.1.2 Evaluate yourself on SWOT Scale

The pursuance of a career starts from intermediate or 10+2 after which one must measure oneself on the SWOT scale as follows:

Strength – In what respect one is stronger than other aspirants. What qualities does one possess, may be command on language, voice quality, ability to express or a good handwriting.

Weakness – Assess what your weaknesses are and try to overcome them.

Opportunities – Explore the opportunities around you. Are you a local person specializing in a particular field? Can you be the first person to grab the opportunity?

Threats – Assess threats also. Not only professional hazards but also others like lifespan of a particular trade, competition from other aspirants, legislation against any kind of trade or job and veracity of employer etc. If such threats exist what is your alternative plan of action?

5.1.3 Self Assessment

For a proper and suitable choice of a career one has to plan one's career at the school level itself. Self assessment is the first step of the career planning process. One has to know the potentials keeping in mind the values, interests, personality traits and achievements. But most of us get confused and feel frustrated. The common question that comes to our mind is what is suitable for me. You would be in a better position to choose a career if you can assess yourself in a realistic way.

Values play an important role in the choice of a career. One who likes autonomy may not find himself comfortable in a salaries job. He may enjoy working as an entrepreneur. One has to see whether one is keen to earn more money or enjoy status. Similarly, there are persons who enjoy reading and writing and want peaceful life. They may find teaching profession more enjoyable. It is not only values, there are various other factors which play a role in the choice of a career. Your personality traits-extrovert or introvert, sensitive in nature, sense of responsibility, team spirit, emotional stability etc. are also equally important. For example, one who is not good in communication skills may not find marketing very comfortable. But, personality alone should not be used to predict whether you would succeed in a particular career. There are some psychological tests which may help you in knowing your interests and aptitudes.

Individuals differ in their characteristics, intelligence, aptitudes, interests and personality traits. Likewise occupations differ in their requirements. Self assessment is one step which helps an individual in the choice of a career. It is not the end of the career planning process. You have various options before you. You may consider them in the light of results of your self assessment process. Self assessment is not a one time process. It is a continuous process. Think, analyse, discuss and then take a decision about your career keeping in mind values, interests and aptitudes and skills possessed by you.

5.1.4 Role of Self-Selling in Job Search

We all want a career whether in private, government, business and entrepreneurship etc. to lead an affordable and respectable life. Most of us don't know how to look for jobs. We are never taught how to do this. Our training and life experience never prepare us for it.

Some people with the same or less qualification and knowledge are well placed and advance in their career compared to others with higher qualification and knowledge. We leave it to luck but in reality these people have mastered the technique of self-selling in career. Each one of us can do it and the need is only to be well aware of the changing scenarios of the job market and master the art of self-selling along with acquiring the knowledge and experience.

In the world of job-hunting, you have to sell yourself because that will (a) get you in for the interview and (b) it will enable you to prevail over the other people that you are competing against. Selling oneself is basic to activities such as writing a attractive resume, writing good cover letter, networking successfully, appearing in interview

confidently so that you get the job and are successful in negotiating the best salary and benefits package. All of these activities involve some measure of persuasion, some measure of selling yourself.

5.1.5 Internet-Job Hunting

The job hunt is still basically done in the same way as it was done years ago, despite all the technological changes. The Internet is the world's most powerful information and marketing vehicle and can play a great role along with newspapers and official gadgets in finding a job. However, by using the Internet, you can get the most from your job search and expand your reach and prospects but you need to follow some basics of Internet job hunting.

The Internet has transformed the hidden job market. The invisible job market exists because the Internet makes it easy for the employer to place a job ad on the company Web site or post a position on an industry or profession-specific site.

More opportunities for employment usually mean a greater chance of getting hired at a salary level you desire. You have to dig a little harder to "mine" the job market and score. You will have to be more creative.

While the Internet has revolutionized the way job seekers connect with prospective employer, an online job hunt should not be the only strategy to find a new position. The best searches combine a variety of approaches.

CAREER OPTIONS

6.1 Career Options

Valuable information on career options in the field of science & technology is furnished below for the benefit and use by the S & T students.

6.1.1 Career in Agriculture – the concept

Agriculture is a vast field comprising crop farming, horticulture, floriculture, dairy, poultry, fishery, agriculture engineering and sustained land use plans etc. The profession includes farming activities, pest control, harvesting and marketing. Agriculturists manage farms, business and industries that manufacture agricultural machinery, process harvests and market farm products. Properly trained and adequate skilled specialists are required for various agricultural sub-fields.

6.1.2 Requisite Educational Background/Entry Route

For a B. Sc. Degree, candidates who have passed 10+2 with Science (PCB) need to clear an entrance examination for admission to a course in agriculture. In order to pursue a B. Sc., in Agriculture, students should have taken Science at the plus two level (PCM). Graduates from any stream can pursue courses in Agricultural Management and Rural Management.

6.1.3 Skills/Specialisation

With the rapid strides the country has made in Science & Technology, students of Agriculture now have the option of specializing in a whole host of areas that include Crop Science, Horticulture, Animal Science & Horticulture. Aspirants for these jobs require qualities ranging from an ability to organize, physical strength, an enterprising attitude and an interest in plants and animals. They must have a scientific temper, an ability to work in teams and an enquiring mind to undertake agricultural research.

6.1.4 Job Opportunities

Openings are available in the Agriculture Department of the central and state governments, in the Indian Council of Agricultural Research, Indian Institute o Horticulture Research and in the Food Corporation of India, National Seed Corporation of India, National Dairy Development Board and various agricultural research organizations. Industries in the field of vegetable and crop production, crop processing plants, seed producing companies, tea gardens, dairy farms, poultry farms, food processing industries, food freezing and storage plants, soil-testing laboratories etc. also provide employment.

6.1.5 Universities/Colleges/Institutes Offering Courses

1.   Indian Council of Agricultural Research, New Delhi.

2. Indian Institute of Technology, Kharagpur
3. Institute of Agricultural Sciences, Banaras Hindu University, Varanasi.
4. College of Agriculture, G.B. Pant University of Agriculture & Technology, Pantnagar
5. Indian Institute of Management, Ahmedabad
   (The above list is only indicative)

6.2.1 Career in Agricultural Engineering – the concept

Agricultural engineers develop engineering science and technology in the context of agricultural production and processing, and for the management of natural resources. They apply their engineering knowledge and skills to solve problems relating to sustainable agricultural production.

6.2.2 Requisite Educational Background/Entry Route

Different Universities and Institutes offer under Graduate (UG) degree (B.Tech.) in Agricultural Engineering. Eligibility for U.G. is 10+2 pass with Physics, Chemistry and Mathematics or equivalent. The mode of admissions is through entrance test conducted by IITs, State Governments, Universities, Institutes and Indian Council of Agricultural Research (ICAR). ICAR conducts All India entrance examinations for 15% of U.G. seats in SAUs, DUs, CAU & CUs.

For M.Tech/M.Sc. programs in Agricultural Engineering, the requirement is B. Tech. in the discipline. Mode of admission is through entrance cum academic performance (entrance test and/or interview). Entrance test conducted by the Universities and/or qualified in Junior Research Fellowship (JRF) conducted by ICAR for 25% of seats in SAUs, DUs, CAU and CUs through all India Entrance Examination of Graduate Aptitude Test in Engineering (GATE).

Eligibility for admission to Doctorate Degree (Ph.D.) program in various disciplines of Agricultural Engineering is M. Tech, or M. Sc. Mode of admission is through entrance cum academic performance (entrance test and/or interview) conducted by various universities and IITs including those qualified in Senior Research Fellowship (SRF) conducted by ICAR for 25% of seats in SAUs, DUs, CAU & CUs through all India Entrance Examination.

6.2.3 Skills/Specialisation

Agricultural Engineers are trained to deal with soil, water, crop and engineering principle applications to agriculture. They provide inputs for mechanization of agriculture, conservation of produce and by-products, minimization of losses, value addition and agro-processing enterprises for additional income and employment generation, energy management in agriculture and rural living. They act as knowledge binding agents between traditional agriculturists and engineers because of their knowledge in the field of farm machinery and power, dairy and food processing and agricultural structure; land and water management engineering, energy and aquaculture.

6.2.4 Job Opportunities

There is tremendous scope for qualified engineers having professional degrees in agricultural engineering. Agricultural engineers work in production, sales, management, research and development, or applied science in agriculture. A large number of agricultural engineers work in academia or for research and developmental activities in private and government agencies such as Central and State Agricultural Research in various States at different capacities.

6.2.5 Universities/Colleges/Institutes Offering Courses

S. No	Name of Universities /Institutes
1.	Acharya N. G. Ranga Agricultural University (ANFRAU), Hyderbad, Andhra Pradesh
2.	Allahabad Agricultural Institute, Allahabad, Uttar Pradesh
3.	Anand Agricultural University (AAU), Anand, Gujarat
4.	Bidhan Chandra Krishi Vishva Vidyalaya (BCKVV), Mohanpur, Nadia, West Bengal
5.	Birsa Agricultural University (BAU), Kanke, Ranchi, Jharkhand
6.	Central Agricultural University (CAU), Jroisemba, Imphal, Manipur
7.	Chandra Shekhar Azad University of Agriculture & Technology (CSAUT), Kanpur, U.P
8.	Ch. Charan Singh Haryana Agricultural Univesity (HAU), Hisar, Haryana
9.	Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth (KKV), Dapoli, Mahrashtra
10.	Dr. Panjabrao Deshmukh Krishi Vishwa Vidyalaya (PKV), Akola, Maharashtra
11.	Govind Ballabh Pant University of Agriculture & Technology, Pantnagar, Uttarakhand
12.	Indian Agricultural Research Institute, New Delhi
13.	Indian Institute of Technology (IIT), Kharagpur, West Bengal
14.	Indira Gandhi Krishi Vishwa Vidyalaya, Krishak Nagar, Raipur, Chhattisgarh
15.	Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh
16.	Junagadh Agricultural University (JAU), Junagadh, Gujarat
17.	Kerala Agricultural University (KAU), Vellanikkara, Trichur, Kerala
18.	Maharana Pratap Univesity of Agriculture & Technology (MPUAT), Udaipur, Rajasthan
19.	Mahatma Gandhi Gramodaya Viswavidyalaya, Chitrakoot, Madhya Pradesh
20.	Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri, Maharashtra
21.	Marathwada Agricultural University (MAU), Parbhani, Mahrashtra
22.	Narendra Dev University of Agriculture and Technology, Faizabad, Uttar Pradesh
23.	Navsari Agricultural University (NAU), Navsari, Gujarat
24.	Orissa University of Agriculture & Technology (OUAT), Bhubaneswar, Orissa
25.	Punjab Agricultural University (PAU), Ludhiana, Punjab
26.	Rajendra Agricultural University (RAU), Pusa, Samastipur, Bihar
27.	Sardar Vallabh Bhai Patel University of Agriculture & Technology, Modipuram, Meerut, Uttar Pradesh
28.	Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu
29.	University of Agricultural Sciences (UAS), Bangalore, Karnataka
30.	University of Agricultural Sciences (UAS), Krishi Nagar, Dharwad, Karnataka

6.3.1 Career in Agricultural Meteorology – the concept

Agricultural meteorology is an applied meteorology which deals with the influence of weather on crop husbandry as well as animal husbandry. It is concerned with the physical processes of the above environment, which can be exploited to solve the problems relating to sustainable agricultural production.

6.3.2 Requisite Educational Background/Entry Route

The National Commission on Agriculture (1976) had recommended a separate Department of Agricultural Meteorology in all State Agricultural Universities (SAUs) and ICAR research institutes to strengthen teaching, research and extension in Agricultural. Meteorology and to train the technical personnel.

6.3.3 Skills/Specialisation

Agriculture Meteorologists are trained to deal with soil, water weather, crops and meteorological principles to agriculture. As the success or failure of agriculture depends upon the chains of five factors viz, seeds, soil, weather, technology and farmers skills. Any weak link in the chain finally determines the agricultural production.

6.3.4 Job Opportunities

Meteorologists can work in academia for research and development activities in private and government agencies such as Central and State Agril. Universities, Indian Council of Agricultural Research (ICAR) Indian Space Research Organization (ISRO), Space Application Center (SAC) National Remote Sensing Agency (NRSA), Department of Science and Technology (DST), food and Agriculture Organization (FAO). In private sector Agril. Meteorologists work as consultants to many Organizations including NGOs involved in water shed management, command area and rural development programmes. The job opportunities in government sector includes teaching research and development and extension activities as Scientists Assistant Professors, Research Officials, Subject Matter Specialists and Agril. Meteorologists at senior level in various universities, SAUs, KVKs, ICAR, DST, ISRO, NRSA, SAC, FAO and other organizations involved in high level research development extension consultancies, planning and policy framing activities.

6.3.5 Universities/Colleges/Institutes Offering Courses

Address and Phone Numbers of Institutes, Universities and State Agricultural Universities offering PG and Ph. D Programme in Agril. Meteorology:

Sl. No.	Name and Email Address	Address	Fax No.
1	Anand Agricultural University (AAU) Email: vc@aau.in	Anand, Gujarat Pin-388 110	02692-261520
2	Andhra University Email: aulibra@md2.vsnl.net.in	Waltair, Visakhapatnam AP Pin-530 003	0891-555547
3	Assam Agriculture University (AAU) Email: vc@aau.ren.nic.in	Jorhat, Assam Pin-785 013	0376-340001

4	Bidhan Chandra Krishi Vishva Vidyalaya (BCKVV) Email: rrot@bckv.wb.nic.in	Haringhatta PO Mohanpur Nadia West Bengal Pin-741 246	03473-33275
5	CCS Haryana Agricultural University (HAU) Email: root@hau.pnp.nic.in	Hissar, Haryana Pin-125 004	01662-34952
6	Govind Ballabh Pant University Agriculture and Technology (GBPAU&T) Email: root@gbpuat.ernet.in	Pantnagar Uttarakhand Pin-263 145	05944-33473, 33608
7	Indira Gandhi Krishi Vishwa Vidyalaya (IGKVV) Email: adr@zremp01.mp.nic.in	Krishak Nagar Raipur, Madhya Pradesh Pin-492 012	0771-424532
8	Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV) Email: root@jnau.mp.nic.in	Jabalpur Madhya Pradesh Pin-482 004	0761-343382, 342719
9	Kerala Agricultural University (KAU) Email: kauhqr@ren.nic.in	Vellanikkara, Trichur, Kerala Pin-680 654	0487-370 019
10	Mahatama Phule Krishi Vidyapeeth (MPKV) Email: kvmp@ren.nic.in	Rahuri Maharashtra	0246-43302
11	Narendra Dev University of Agriculture and Technology (NDUAT)	Faizabad, Uttar Pradesh Pin-224 229	05270-62118, 62023
12	Punjab Agricultural University (PAU) email: root@pau.chd.nic.in	Ludhiana, Punjab Pin-141 004	0161-400945
13	Tamil Nadu Agricultural University (TNAU) Email: root@tnau.tn.nic.in	Coimbatore, Tamil Nadu Pin-641 003	0422-431672, 454186

(The above List is only indicative).

6.4.1 Career in Agri-Business – the concept

Agriculture is the lifeline of the Indian economy. An agrarian country like India provides livelihood directly or indirectly to 70%of her population through agriculture and allied activities. At present, 32 state agricultural universities, 28 general and deemed universities as well as central institutions and projects of ICAR offer agricultural education and generating farm technology in India. It is estimated that in India the annual turnout of the agro graduates is around 17,000 out of which hardly 10% are absorbed in the public sector.

6.4.2 Requisite Educational Background/Entry Route

For a graduate course in Agriculture one should possess a good academic career up to Higher Secondary level with science as a core subject. Leading Universities and

Institutions related to this course conduct common entrance test before the commencement of every academic year.

6.4.3 Skills/Specialisation

Managerial functions like purchasing, marketing, selling; Study marketing strategy; Agricultural commodity export & import trading; Processing, Preservation & Development quality; Value added products; Hygienic food preparation; Packaging & designing; Home Science; Teaching & Research in agriculture & allied activities; Conducting field trials, experiment and demonstration; Bio-technology & laboratory analysis; Arrangement of training and group meetings; Programme Planning evaluation of project; Social mobility Liaison with public & private sectors officials; Loan sanction for agriculture & allied activities; Recovery from farmers & entrepreneurs; Providing technical support to progressive farmers & entrepreneurs; Financial Management; Rural Management Industrial & Entrepreneurship Management; Export/ Import Management; . Farm Reporting; Agriculture Publication; Talks for TV & Radio; Agro Information; Anchoring/Supporting staff; Sale promotion of related products; Agro Consultancy; Fixing marketing price; Consultancy on agro-technology; Disease, pest & weather forecasting; Liaison with public & private sectors officials, Exclusively to respond to farmers call; Seed grower, Agro & allied farming; Farm Entrepreneurship; Agro-clinics & agri-service centres.

6.4.4 Job Opportunities

Public & Private Sector Companies, Multinational Companies, Agro Enterprisers, Leading NGOs, Cooperatives Institutes & Organisations, FMCG Sector, SAUs, ICAR Institutes, KVKs, NRCs, Fertilizers & Pesticide Companies, Seed Companies, Voluntary Organizations, Charitable Trusts, Funding Agencies, Nationalized (ADB) Banks, Cooperative Financial Institutions, Regional Rural Banks, Land Development Bank, NABARD & TDCC, State Cooperative Banks, MNCs, Rural Entrepreneurs, Leading TV/Radio/Journals/Newspaper Agencies etc., Mass media & broadcasting Centres Food & Beverage Industries.

Fellowships are also available for Research Scholars from ICSSR, UGC, CSIR, DST, DBT, DRDO, Swaminathan Research Foundation, Nehru Memorial Trust, UNDP, DFID, UNICEF, WHO and other leading NGOs and Funding Agencies.

6.4.5 Universities/Colleges/Institutes Offering Courses

Course Name	Name of the Premier Institute
Biotechnology (Bio-Chemistry, Bio-Informatics and Tissue Culture)	. Indian Agricultural Research Institute, New Delhi . Institute of Biotechnology & Applied Science, Bangalore . Institute of Genomics & Integrated Biology, Delhi . University of Agricultural Science, Bangalore . International Institute of Agro Informatics & Management Noida . Assam Agricultural University
Vocational Training	. Respective SAUs and ICAR Institutes

Agri-business, Extension and Management	. National Institute of Agricultural Extension Management (MANAGE), Hyderabad . Indian Institute of Management
Fishery	. Central Institute of Fishery Education, Versova, Mumbai . Central Marine Fishery Institute, Mumbai
Dairy Technology & Animal Science	. National Dairy Research Institute (NDRI), Karnal . Indian Veterinary Research Institute (IVRI). Izzatnagar
Agri & Rural Management	. Indian Institute of Management . Indian Rural Management Institute (IRMI), Anand
Gender Studies	. Kerala Agricultural University (KAU), Trissur . CCS, Haryana Agricultural University, Hisar
Agriculture Cooperatives & Marketing	. Kerala Agricultural University (KAU), Trissur . National Institute of Agriculture Marketing (NIAM) Jaipur
Agriculture Journalism	. Jawaharlal Nehru Krishi Viswa Vidyalaya, Jabalpur . National Institute of Rural Development, Hyderabad
Agriculture Project Planning, Management, Monitoring & Evaluation	. Xavier's Institute of Management . Institute of Management . TATA Institute of Social Science . National Institute of Rural Development . TATA Dhan Foundation
Entrepreneurship & Business Management	. Entrepreneurship Development Institute of India Ahmedabad
Environment & Natural Resource Management	. IGNOU . Indian Institute of Forest Management, Bhopal
Remote Sensing & GIS Technology in Agriculture	. National Academy of Agriculture Research and Management, Hyderabad . Utkal University, Bhubaneswar
Correspondence/ Distance learning courses in Sociology, Anthropology, Environmental Study & Water Management etc.	. IGNOU
Food Technology	. Allahabad Agricultural University, Allahabad . JNTU College of Engineering, Andhra Pradesh
Agriculture Meteorology	. Indira Gandhi Krishi Vishwavidyalaya, Raipur . G.B. Pant University of Agriculture Science, Pantnagar

(The above list is only indicative).

6.5.1 Career Opportunities in Agronomy – the concept

Agronomy is the branch of agricultural sciences dealing with crop production, soil management and the application of scientific principles to the art of crop production. In India, modern and scientific agronomy began in 1929 when the Imperial Council of Agricultural Research, later named as Indian Council of Agricultural Research was constituted. Research Centers were established through this Council in almost every State of India. Research work is being carried out at every Center of the ICAR as well as State Agricultural Universities.

6.5.2 Requisite Educational Background/Entry Route

A graduate degree in Agriculture is generally essential to pursue postgraduate course. A post graduation in Agronomy or a PH.D in Agronomy is preferred. These courses are offered exclusively in the agricultural colleges.

6.5.3 Skills/Specialisation

At present in most of the State Agricultural Universities (SAUs) the subject matter of the agronomy at Postgraduate (PG) level consists of sub-disciplines of crop production, irrigation management, weed management and agrostology. At PG level during the specialization in one of these sub-disciplines, the agronomist normally completes his sub-specialisation by offering some minor and supporting courses in the disciplines of soil science, plant physiology, genetics and plant breeding, agricultural meteorology, statistics and environmental sciences.

PG research is generally directed towards national/local priorities, institutional mandates and stakeholders' needs. A greater emphasis is given to the fields of ecology, organic farming, soil microbiology, crop root systems, residue chemistry, seed technology, agro-horticulture, agroforestry, resource optimization and other need based components of alternate enterprises with the changing scenario in agriculture.

6.5.4 Job Opportunities

Many jobs in agronomy require diploma or degree in agronomy or agriculture. College education, especially post-graduate and Ph.D degree provides more in depth knowledge of the field and offers job opportunities at supervisory or managerial levels and to conduct research. Following are some of the job opportunities available in Agronomy:

1. **Government Organizations**

    (a) **For Graduate (Agriculture)**

    (i) Civil Services Examination conducted by Union Public Service Commission (UPSC) for IAS/IFS (Civil Services & Allied)

    (ii) As District Agriculture Officer through Examination conducted by different State Public Service Commissions.

     (iii)   Technical Assistant/Technical Officer in Agricultural Universities, ICAR Institutes, DRDO & CSIR.

     (iv)   Agriculture Inspector/Sugarcane Inspector/Marketing Inspector.

     (v)   Training Assistant in Krishi Vigyan Kendras (KVKs).

     (vi)   Farm Supervisor/Manager

     (vii)   Agriculture Development Officer

     (viii)   Village Level Worker

     (ix)   Agriculture Inspector

(b) For M. Sc. Ag. and Ph.D (Agronomy)

     (i)   Examination conducted by the Agricultural Scientist Recruitment Board (ASRB), ICAR, New Delhi offers opportunities to become a Scientist. In addition to this almost all the State Agricultural Universities (SAUs) are recruiting M. Sc and Ph.D in agronomy graduates as Junior Scientists/Agronomist. Council of Scientific and Industrial Research (CSIR) also appoints agronomy graduates in research institutes/centres.

     (ii)   Job as Educationists such as Lecturer, Reader, Assistant Professor, Associate Professor, Professor, Dean College of Agriculture, Dean Postgraduate Studies, Dean & Joint Director Education in Deemed to be University (IARI) and in Agriculture Universities and Colleges.

     (iii)   Training Organizer and Training Assiociate in Krishi Vigyan Kendras (KVKs).

     (iv)   Agriculture/Field Officers in different nationalized Banks including National Bank for Agriculture & Rural Development (NABARD).

2.   Private Sector

     (i)   As an Agronomist/Junior or Senior Research Officer or Supervisor in Industries, Farmhouses, Golf Courses, Contract farming at the farmers field etc.

     (ii)   As an Agronomist/Officer in processing companies of Agriculture Production.

     (iii)   Marketing job in pesticides and insecticides companies.

3. **Self Employment in Agriculture**

   (i)   An Agronomist Consultant provide advice, design, evaluation, supervision of farm or land use planning, cropping systems and cropping intensities etc.

   (ii)   An Agronomist can start a Agriculture clinic. Government provides money (up to Rs 10.00 Lakh) for this work.

   (iii)   Raising of commercial nursery of plantation sapling.

   (iv)   Seed producer of cereals, pulses, oil seeds and other commercial crops like potato, tobacco, sugarcane, cotton etc.

   (v)   Vegetable grower.

   (vi)   Agriculture Services Contractor

   (vii)   Seed dealer/Merchant

   (viii) Proprietor-cold storage.

   (ix)   Processing work of Horticultural production

   (x)   Agronomist can start/establish an institute for vocational education (Agriculture/Land use planning)

4. **Indirect Jobs**

The agriculture industry has spawned a number of supporting or service industries:

Research: Many scientists are engaged in developing new and improved types of cereals, oil seeds, pulses, commercial crops, minor millets and vegetables. The improved agronomic packages are being developed by the agronomists through conduct of field trials at different locations for final recommendations.

Chemical Industry: The agriculture industry depends on large amounts and varieties of chemicals, including fertilizers, pesticides and growth hormones. Many companies are involved in producing chemicals that are used to enhance plant production and the quality of produce. The sale outlet of these products is generally being done by the agronomists.

Machinery: The engineers design and produce tools and machinery for use in the production of agricultural crops/plants. Machinery and implements are available for preparing, harvesting storing and packaging. These aids enable large-scale production of agricultural crops/plants to be undertaken.

Distribution: Agricultural products are transported from the areas of production to marketing outlets. Because of their largely perishable nature, agricultural produce and product require special handling of transportation to retain their quality for a long time.

Computer in Agriculture: Now computers are widely used in the agricultural field. Special areas of computer application in agriculture include: Designing plans, crop modeling, soil modeling, equipment automation, public information, record keeping and databases, expert systems, communication, sensor technology

and internet service etc. Computer technology has significant applications in agriculture. Green house automation and equipment calibration for automatic application of chemicals such as in precision farming and protected agriculture. Agronomists having knowledge of above mentioned subjects have a bright future in gaining meaningful/remunerative jobs.

6.5.5 Universities/Colleges/Institutes Offering Courses

There are 34 State Agricultural Universities (SAUs) offering Postgraduate courses in Agronomy. These are:

1. Acharya N.G. Ranga Agricultural University (ANGRAU), Hyderabad, Andhra Pradesh.
2. Anand Agricultural University (AAU), Anand, Gujarat.
3. Assam Agricultural University (AAU), Jorhat, Assam.
4. Bidhan Chandra Krishi Vishva Vidyalaya (BCKVV), Haringhatta, Nadia, West Bengal.
5. Birsa Agricultural University (BAU), Kanke, Ranchi, Jharkhand.
6. Central Agricultural University (CAU), Iroisemba, Imphal, Manipur.
7. Ch. Sarwan Kumar Krishi Vishva Vidyalaya (CSKHPKV), Palampur, Himachal Pradesh.
8. Chandra Shekhar Azad University of Agriculture & Technology (CSAUT), Kanpur, Uttar Pradesh.
9. Ch. Charan Singh Haryana Agricultural University (HAU), Hisar, Haryana.
10. Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, (KKV), Dapoli, Maharashtra.
11. Dr. Panjabrao Deshmukh Krishi Vishwa Vidyalaya (PKV), Krishi Nagar, Akola, Maharashtra.
12. Dr. Yashwant Singh Parmar University of Horticulture & Forestry (YSPUH&F), Solan, Himachal Pradesh.
13. Govind Ballabh Pant University of Agriculture and Technology (GBPAU&T), Pantnagar, Uttarakhand..
14. Indira Gandhi Krishi Vishwa Vidyalaya (IGKVV), Krishak Nagar, Raipur, Chhattisgarh.
15. Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur, Madhya Pradesh.
16. Junagadh Agricultural Univesity (JAU), Junagadh, Gujarat.
17. Kerala Agriclutral University (KAU),Vellanikkara, Trichur, Kerala.
18. Maharana Pratap Univesity of Agriculture & Technology, Udaipur, Rajasthan/
19. Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri, Maharashtra.
20. Marathwada Agricultural University (MAU), Parbhani, Maharashtra.
21. Narendra Dev University of Agriculture & Technology (NDUAT), Faizabad, Uttar Pradesh.
22. Navsari Agricultural University (NAU), Navsari, Gujarat.
23. Orissa University of Agriculture & Technology (OUAT), Bhubaneswar, Orissa.
24. Punjab Agricultural University (PAU), Ludhiana, Punjab.
25. Rajasthan Agricultural University (RAU), Bikaner, Rajasthan.
26. Rajendra Agricultural University (RAU), Pusa, Samastipur, Bihar.
27. Sardar Vallabh Bhai Patel University of Agriculture & Technology (SVBPUAT), Modipuram, Meerut, Uttar Pradesh.

28. Sardar Krishinagar – Dantiwada Agricultural University (SDAU), Sardar Krishi Nagar, Banaskantha, Gujarat.
29. Uttar Banga Krishi Vishwavidyalaya (UBKV), P.O. Pundibari, Distt. Cooch Behar, West Bengal.
30. University of Agricultural Sciences (UAS), Krishi Nagar, Dharwad, Karnataka.
31. University of Agricultural Sciences (UAS), Bangalore, Karnataka.
32. Tamil Nadu Agricultural University (TNAU), Chennai, Tamil Nadu.
33. Sher-e-Kashmir University of Agricultural Sciences & Technology (SKUAS&T, Jammu), Camp Office, Railway Road, Jammu, Jammu & Kashmir.
34. Sher-e-Kashmir University of Agricultural Sciences & Technology (SKUAS&T, Kashmir), Shalimar Campus, Srinagar, Jammu & Kashmir.

(The above List is only indicative).

Besides these State Agricultural Universities (SAUs), Agriculture is taught in Institutes Deemed to be Universities such as Indian Agricultural Research Institute, New Delhi and other Institutions namely BHU Varanasi, AMU Aligarh, Vishwa Bharti and AAI DU, Allahabad.

A number of scholarships are also available to pursue graduation and post graduation in the discipline of Agronomy.

6.6.1 Career in Aromatherapy – the concept

The 'aroma' is derived from Greek word meaning 'spice'. However, today it is more broadly recognized as fragrance. The word therapy, as the name suggests, is treatment. Therefore, Aromatherapy literally means curative treatment by means of fragrance. It refers to a particular branch of herbal medicine that uses concentrated plant oils called essential oils to improve physical and emotional health and to restore balance to the whole system.

6.6.2 Requisite Educational Background/Entry Route

Minimum eligibility for the course is Graduate with Chemistry as the main or subsidiary subject or Graduate in any subject with two years experience in the related field.

6.6.3 Skills/Specialisation

The Indian scenario of Aromatherapy and allied activities is encouraging with the emergence of the awareness for natural products. The person should have interest and skills for treating the sick people and rejuvenating the fading beauties. A course in Aromatic from a reputed institute makes one eligible for working as an Aroma Therapist, Aroma Chemist, Consultant and even as an Entrepreneur and Trader. By working as an Entrepreneur, one can reach the heights of the unfading glory and fame because the Indian scenario of this field is calling upon the entrepreneurs to explore the talent.

6.6.4 Job Opportunities

For Aromatherapy, following are the Potential Employers:

- Hospitals (having aromatherapy as a part of alternative medicine).
- Research and Development organizations (working on aromatics, perfumery etc.).
- Essential oils manufacturing companies.
- Spas
- Five Star hotels
- Perfume industry
- Food industry
- Pharmaceuticals and Nutraceuticals.
- Cosmetic industry

6.6.5 Universities/Colleges/Institutes Offering Courses

At present the number of institutions offering courses in Aromatherapy and Perfumery is very limited. The responsibility of catapulting this art to the soaring heights of an industry lies with the educational institutions offering related courses. However, there are some institutions, as mentioned hereunder, which have come up with different types of courses having a professional outlook in this field:

- FFDC, Ministry of SSI, Government of India, Markand Nagar, Kannauj – 209726 (U.P.) Ph: 05694-237491, 234465, Fax: 05694-2352, Web-site: www.vazecollege.net E.mail: katvaze@bom3.vsnl.net.in

  The institute offers two years fulltime **Post Graduate Diploma** in Perfumery and Cosmetic Management (PGDPCM) covering different dimensions of aromatic art and perfumery.

Certificate Courses

- Pivot Point India, Delhi, Website: www.pivotpointindia.com
- Delhi School of Management Service, A – 3, Akashdeep, New Delhi.
- New Lifestyle Clinic Academy, 259, 2nd Floor, Abhishek Complex, 17th cross, Sampige Road, Malleswaram.
- Shahnaz Hussain Women's World International School of Beauty, M-106, Greater Kailash, New Delhi.

Foreign Institutes

- Regent Academy, 6 John Street, London. info@regentacademy.com
- College of the Botanical Healing Arts, 1821 – 17th Ave. (Near Capitola), Santa Cruz CA Post Box 3621, Santa Cruz CA Website: cobha@cruzio.com

Research Institutes

- Organica Aromatics Pvt. Ltd., Plot # 407, 11th cross, 4th Phase, Peenya, Bangalore – 560058 Website: organicaaromacom

(The above list is only indicative).

6.7.1 Career in Automobile Engineering – the concept

Career Applications in Automobile Engineering are available in research, manufacturing and service fields. It is a branch of engineering dealing with self-powered vehicles, used for the transportation of passengers and goods on the ground. Automobiles are classified into passenger vehicles like cars, buses, motorcycles and goods vehicles like trucks, trailers etc. on the basis of their use.

6.7.2 Requisite Educational Background/Entry Route

The candidate must possess Degree/Diploma/ITI Training in Automobile Engineering which provide the requisite technical ability and the problem-solving skills in order to diagnose faults and repair them. A knowledge of computers and a scientific approach to work is an added advantage.

6.7.3 Skills/Specialisation

Automobile Engineers deal mainly with vehicle design, planning, manufacture and repair, maintenance and up-gradation. They test the performance and efficiency of the engine chassis and transmission system. They look into the upkeep of vehicles to ensure their proper, efficient and economical running. With increasing concern over pollution and fuel efficiency, these engineers also set standards of quality. They work on all types of vehicles including cars, vans, tempos, motorcycles, scooters, buses, tractors, trucks, forklift trucks, bull dozers and loaders.

6.7.4 Job Opportunities

Job opportunities are available in the form of Motor Vehicle Inspectors and Regional Transport Officers in the Government Transport Department. The Defence Services also offer exciting job options. Automobile Engineers can also work in State owned Transport Corporations. Excellent opportunities are available with all the automobile giants like Tata Motors, Eicher, Ashok Leyland, Volvo, Maruti Udyog, General Motors, Hyundai, Mahindra, L & T, Bajaj Auto and Hero Honda. Automobile repair and maintenance stations, garages and workshops also hire Automobile Engineers. Jobs are available with various ancillary automobile companies, manufacturers of accessories, security and safety devices, the Marketing and Sales division of major automobiles and spare part companies and insurance companies, among other places.

6.7.5 Universities/Colleges/Institutes Offering Courses

- Dr. P. G. Halakatti College of Engineering & Technology, Bijapur: www.bldea.org
- M. H. Saboo Siddik College of Engineering, Byculla, Mumbai: http://mhssce.org

- B.V. Bhoomareddi College of Engineering & Technology, Vidyanagar, Hubli
- Pooja Doddappa Appa College of Engineering, Gulbarga

  Course: B. Tech (Automobile Engineering)

- Madras Institute of Technology, Chrompet, Chennai: www.annauniv.edu/mit

  (The above List is only indicative).

6.8.1   Career in Ayurveda – the concept

Ayurveda is one of the oldest medical systems in India and finds its origin in Vedic times. According to Ayurveda, health is conditioned by the balance to three essential humours of tridoshas (doshas, literally mean defects) in the body viz. vata (wind), pitta (bile) and Kapha (mucous or phlegm). When these humours/doshas are in balance, that is, in a state of equilibrium, one remains healthy. The disruption of the equilibrium or imbalance of these three humours/doshas in the body causes diseases/disorders.

6.8.2   Requisite Educational Background/Entry Route

Students who have completed 10+2 with Physics, Chemistry and Biology can opt for B.A.M.S. course, which is equivalent to an M.B.B.S. degree. Generally, admission/selection for this course is made based on a Common Entrance Test/Exam conducted at University/State/National level. Knowledge of Sanskrit or Hindi is essential to study any course in Ayurveda.

In order to become an Ayurvedic medical practitioner, a formal medical education is mandatory. There are hundreds of medical colleges in India, which offer an undergraduate degree of Ayurvedic, viz., Bachelor of Ayurvedic Medicine and Surgery (B.A.M.S.), a 5.5 years course inclusive of a 6 months/one year compulsory internship period. After completion of this course, one can opt for a Postgraduate degree i.e. Doctor of Medicine in Ayurveda, M.D. (Ay.), a 3 year course.

6.8.3   Skills/Specialisation

Ayurvedic physicians mainly diagnose the diseases with the help of pulse, urine, faeces (stool), tongue, eyes and skin. In Ayurvedic system of medicine, mainly herbals/plant-parts are used as curative agents in the form of powders, tablets, medicated oils etc. to reestablish a balanced humoural constitution in the body.

6.8.4   Job Opportunities

There are various avenues of job opportunities for those who opt for Ayurvedic system of medicine as a career. Depending upon one's qualification and experience, one can find a job in Hospitals (both government and private), Dispensaries, Clinics, Nursing Homes, Health Departments and Pharmaceutical Industries, among others. Also one can practice privately as Ayurvedic Physician/Consultant by opening an Ayurvedic clinic from his/her residence or from an easily accessible and well-populated neighbourhood.

Also, one can choose a career in teaching and research in this field. One can work as Lecturer, Reader, Professor etc. in Ayurvedic Medical Colleges and as Research Officer, Project Officer etc. in Central Research Institutes, Regional Research Institutes of CCRAS (Central Council for Research in Ayurveda and Siddha) that are located throughout India.

Ayurvedic medicine is gaining popularity both within the country and abroad due to its holistic approach and lesser side effects when compared to Allopathic medicine. Hence, there is a growing demand and bright future for Ayurvedic professionals.

6.8.5 Universities/Colleges/Institutes Offering Courses

Some of the Medical Colleges that offer both undergraduate course (B.A.M.S.) and Postgraduate course M.D. (Ay.) in Ayurveda are:

1. Ayurved & Unanai Tibbia College, Ajmal Khan Road, Karol Bagh, New Delhi – 110005.
2. Dr. BRKR Ayurved College, SR Nagar, Hyderabad – 500038 (Andhra Pradesh)
3. Gopabandhu Ayurved Mahvivdyalaya, V.I.P. Road, Puri – 752002 (Orissa)
4. Government Akhandanand Ayurved Mahavidyalaya, Ahmedabad – 380001 (Gujarat)
5. Government Ayurved College, Rajpur-492001 (Chattisgarh).
6. Government Ayurved College, M.G. Road, Thiruvananthapuram – 695001 (Kerala).
7. Government Ayurved College, Jalukbari, Guwahati – 781004 (Assam).
8. Government Ayurveda College & Hospital, Vishweshwariah Circle, Sayal Rao Road, Mysore – 570021 (Karnataka).
9. Government Ayurveda College, Dhanwantri Road, Bangalore – 560009 (Karnataka).
10. Government Dhanwantri Ayurveda College, Mangainath Road, Ujjain – 465001 (Madhya Pradesh).
11. Government Taranth Ayurveda College, Anantapur Road, Ballary – 583101 (Karnataka).
12. Government Rishikul Ayurveda College, Haridwar -249401 (Uttarakhand).
13. National Institute of Ayurveda, Madhav Vilas Palace, Ajmer Road, Jaipur - 302002 (Rajasthan).
14. State Ayurved College, Tulsidas Marg, Lucknow – 226004 (Uttar Pradesh).

(The above list is only indicative. For more information, log on to www.ccimindia.org or www.indianmedicine.nic.in).

6.9.1 Career in Bioinformatics – the concept

Bioinformatics of computational biology is the use of information technology in the field of molecular biology, or the application of computer technology to the management and analysis of biological data. It is an emerging interdisciplinary research area and is increasingly being used to improve the quality of life.

The ultimate goal of bioinformatics is to uncover the wealth of biological information hidden in the mass of sequence, structure, literature and other biological data and obtain a clearer insight into the fundamental biology of organisms and to use this information to enhance the standard of life for mankind.

Bioinformatics could have profound impact on human health, agriculture, the environment, energy and biotechnology to advance biomedical research and development. It is being used now in the areas of molecular medicine to help produce better and more customized medicines to prevent or cure diseases. It has environmental benefit in identifying waste cleanup bacteria and in agriculture it can be used for producing high yield lows maintenance crops.

6.9.2 Requisite Educational Background/Entry Route

A course in Bioinformatics is suitable for those with a graduation or post graduation in molecular biology, genetics, microbiology, chemistry, pharmacy, veterinary sciences, Physics, Mathematics and also Engineers, IT Professionals, Ph. Ds. Programmes at different levels are available in the field such as B. Tech, Master Degree, Advanced Diploma and M. Tech. Study of Bioinformatics begins at the undergraduate level. The basic educational qualification to enter program in Bioinformatics is 10+2 with science. The details of the educational qualifications for different courses in this field are listed below:

Name of the Course	Educational Qualifications Required
B. Tech in Bioinformatics	Candidate should complete 10+2 with Physics, Chemistry, Biology and English.
M. Sc Degree in Bioinformatics	Candidate should complete their graduation in any of the following subjects such as B. Sc/B.Sc (Agriculture)/ B.E./ B. Tech/ M.B.B.S/ B. Pharma/BHMS/B.V. Sc
Advances Diploma in Bioinformatics	Candidate having a good graduation in any of the following subjects such as M. Sc in Life Sciences, Physics, Chemistry, Mathematics, Biotechnology, Biophysics, Botany, Zoology, Biochemistry, Microbiology, Pharmacology, Computer Science, M. Sc (Agriculture) or M. Tech or MBBS are eligible for advances Diploma course.
M. Tech in Bioinformatics	Pharmacy graduate, medical, dental and veterinary sciences, graduates as well as Post Graduates in science are eligible for the admission to M. Tech programme.

Other than this eligibility for the course in Bioinformatics in different colleges varies with the university.

6.9.3 Skills/Specialisation

The current trend in seeking potential employees seems to be looking for those that have firstly been trained in the biological sciences and have acquired computational skills. However, there is room for those with an IT background with strong interest and knowledge in the biological sciences, especially molecular biology.

6.9.4 Job Opportunities

The career prospects in Bioinformatics have been steadily increasing with more and more use of information technology in the field of molecular biology. Job prospects are in all sectors of biotechnology, pharmaceutical and biomedical sciences, in research institutions, hospital and industry.

Some of the specific career areas that fall within the scope of bioinformatics include Sequence assembly, Database design and maintenance, Sequence analysis, Proteomics (study of Protein, particularly their structures and functions), Phamacogenomics, Pharmacology, Clinical Pharmacologist, Informatics developer, Computational Chemist, Bio-analytics and Analytics etc.

The work involved in the specific utilizing 3-D Structure modeling and computational chemistry (Cheminformatics), Comparing genetic data between and within species (Genomics). Genomic analysis is an attempt to find drug targets (Pharmacogenomics),charcterization of proteins and their interactions (Proteomics), Prediction of the function of genes and proteins based on sequence and structural data etc

Bioinformatics has also many broad areas for career movement. Some of these include Bioinformatician, Biomedical Computer Scientist, Geneticist, Computational Biologist, Biostatistician etc.

6.9.5 Universities/Colleges/Institutes Offering Courses

1. Karunya University, School of Biotechnology, Karunya Nagar, Coimbatore – 641114, Tamil Nadu, Phone – 0422-2614614 Web – www.karunya edu.
2. Calcutta University, Senate House, 87/1, College Street, Kolkata – 700073, Phone 0332241 0071 Web: www.caluniv.ac.in
3. Bharathiar University, School of Biotechnology, Coimbatore – 641046, Tamil Nadu, Phone – 0422-242222 Web: www.bharathiaruniv.ac.in
4. Institute of Bioinformatics and Applied Biotechnology, G-05, Tech Park Mall, International Technology Park, Banagalore)ITPB), Whitefield Road, Bangalore – 560066 Phone 080-28410029, 2841, 2769, 2841, 6034, Web. www.ibab.ac.in
5. Indian Institute of Information Technology, Deoghat, Jhalwa Campus, Allahabad – 211011, Phone 0532-2552380, Web. www.liilta.ac.in
6. Jamia Millia Islamia University, Department of Computer Science, Jamia Nagar, New Delhi 110025, Phone -011-26980014, 26981717 Web: www.jmi.nic.in
7. Madurai Kamaraj University, School of Biotechnology, Madurai, Tamil Nadu, Phone 0452-2459166, 2459455, Web: www.biopu.edu.in
8. Pondicherry University, Bioinformatics Centre, School of Life Sciences, Pondicherry 609014, Web: www.biopuedu.in
9. SRM University, 3, Veera Swamy Street, West Mambaiam, Chennai – 600033. Phone -044-24742836, 24747231. Web: www.srm.univ.ac.in
10. University of Hyderabad, Hyderabad, Andhra Pradesh, Phone – 040-3010500, 23010245, Web: www.uohyd.ernet.in
11. University of Pune, The Director, Bioinformatics Centre, Pune 411007, Phone 020-25692039, Web: www.bioinfo.enet.in

6.10.1 Career in Biotechnology – the concept

Biotechnology uses living cells and materials produced by cells to create pharmaceutical, diagnostic, agricultural, environmental and other products to benefit the society. It is applied to living cells, with the possibility of producing from widely available renewable resources, substances and compounds essential to life. It is an interdisciplinary science encompassing not only biology, but also other subjects, including physics, chemistry, mathematics and engineering. Specially designed micro-organisms are now used to produce a wide variety of drugs and other chemicals, to refine ores and clear up oil slicks. Crops too have been engineered to produce high yielding varieties. The science of biotechnology is also used to alter genetic information in animals and plants to improve them to benefit the community. These advances in biotechnology have brought to market life-saving health care products and microbial pesticides, disease and insect resistant crops, additional energy resources, environmental clean-up techniques and more.

6.10.2 Requisite Educational Background/Entry Route

Biotechnology as a subject has already been introduced in schools. At present there is a shortage of trained people in this field. The Department of Biotechnology, Government of India, is trying to promote the subject in schools and colleges. A short-term training for biotechnologists, who wish to work in the industry, is organized by Biotech Consortium India Ltd.

Students wanting to join a course in biotechnology must have a background of science, though engineers are also preferred. Since the career involves research, one must have an academic bent of mind. A background of biology, chemistry, physics or agriculture would be essentially required. Some universities offer B.Sc in biotechnology, which could be joined after class 10+2. Five-year integrated M.Tech course is also available at the IITs after class 10+2. To enter in the specialized field, one must be post-graduate, although there are some under graduate courses also.

At the post-graduate level, one can do M. Sc or M. Tech in agriculture biotechnology, animal biotechnology, industrial biotechnology, environmental biotechnology, and marine biotechnology etc. About 28 universities offer these programmes and admit science graduates through a Combined Biotechnology Entrance Exam conducted by the Jawaharlal Nehru University.

6.10.3 Skills/Specialisation

Biotechnology is a young science with limitless possibilities. Since it is a new science, there is possibility of fruitful research which may yield benefits to the human race in times to come. It combines two or three sciences and is concerned with several fields like health and medicine, agriculture, animal husbandry, industry and environment etc. It is an emerging field all over the world, which will yield the wonder drugs of tomorrow as also new varieties of plants and animals. Since scientists can patent their innovations, the possibility of making a name and large fortune is also not ruled out. This the area is very exciting and has tremendous possibilities. The phenomenal growth of the biotechnology industry has also led to a number of high paying opportunities.

6.10.4 Job Opportunities

The biotechnology sector offers career opportunities, both in research and industry. It offers excellent prospects, particularly in the area of medicine and agriculture. Employment opportunities exist in research, production and marketing in the areas of medicine and healthcare, agriculture, animal husbandry, environment and industry etc. The work of biotechnologists is essentially scientific and research oriented. Main areas of work are production of various bio-processed materials, marketing of biotechnology products and processes in various areas, research and bioinformatics – application of information technology to the management of biological information etc.

6.10.5 Universities/Colleges/Institutes Offering Courses

University of Allahabad, Annamalai University, Banaras Hindu University, University of Calicut, Devi Ahilya Vishwavidyalaya, Goa University, Gulbarga University, Guru Nanak Dev University, Himachal Pradesh University, University of Hyderabad, University of Jammu, Jawaharlal Nehru University, Kumaun University, University of Lucknow, Madurai Kamaraj University, M. S. University of Baroda, University of Mysore, University of North Bengal, Pondicherry University, University of Pune, Punjabi University, RTM Nagpur University, Sardar Patel University, Tezpur University, Thapar Institute of Engineering Technology, Utkal University and Visva-Bharati University.

The programmes are promoted by the Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India. Those who have done B. Sc in physics, biological, agricultural veterinary and fishery sciences, pharmacy, engineering, biosciences, technology or medicine, can take this test.

National Institute of Immunology, National Dairy Research Institute, Indian Agricultural Institute of Science, Vellore Institute of Technology, Amity Institute of Biotechnology, Institute of Bioinformatics, Rajiv Gandhi Institute of IT & Biotech, Institute of Bioinformatics and Applied Biotechnology and Institute of Clinical Research.

6.11.1 Career in Dairy Technology – the concept

Indian Dairy Industry is one of the fastest growing sectors in India. The main aim of Dairy Education is to give proper recognition and value to HRD to sustain the growth of Dairy Industry by developing suitable trained personnel. Dairy education aims at developing new technologies for the betterment of the society and dairy industry. New Research & Development programmes in milk production, processing and export business promotion in total perspective will generate new jobs in direct and allied activities.

6.11.2 Requisite Educational Background/Entry Route

Dairy education and research have gained distinct momentum for the last few decades. Degree programme in dairy Technology has drawn major attention. Scholars and Scientists are also becoming more fascinated in the areas of dairy technology education and research.

For B. Tech (Dairy Tech): Required 10+2 at Intermediate level with PCM.

For M. Tech (Dairy Tech): Required B. Tech Dairy Tech/Food Tech/Chem Eng.

Admissions are based on merit thus encouraging competitiveness. Degrees offered by the colleges are accepted and recognized at national and international levels.

All India Entrance/State University starts in the month of July-August. Date of advertisement: October/ November. All India quotas fill 100% seats of NDRI, 15% seats for UG and 25% of PG seats of SAUs.

6.11.3 Skills/Specialisation

Adequate infrastructural support such as trained manpower, various types of equipments and appropriate system for collecting information and monitoring the activities. There is ample scope for employment opportunities for dairy technologists from dairy institutions with intellectually stimulating environment, high quality education, outstanding research and extension programme. The dairy technology graduates are mainly employed for procurement, production, quality control, maintenance, marketing and management of dairy industry.

6.11.4 Job Opportunities

Dairy Technologists get job in various Government and private organizations as well as multinationals. Some of these are as under:

Government Organizations: State Dairy Development Department, Milk Scheme, Banking and Insurance Sectors, Teaching and Research Organizations (SAUs) NABARD, NDDB, NDC and AGMARK.

Cooperative Sector: Mother Dairy, State Dairy Cooperative Federation (Amul; GCMF. Punjab Milk Fed. PRAG, COMFED, HMMFDS. MILMA etc)

Private Sector: Bikanerwala, Kwality Walls, Ved Ram & Sons, Mahaan Protein, Dynamix India Ltd., Cipham Sterling Agro India Ltd., Modern Dairy, Heins India Ltd.

Multinational: Pepsi, Coca-cola, Nestle, GSK. Cadbury, Hindustan Lever, Wockhard etc.

<u>**Posts Offered:**</u>

Entry Level: Agriculture Officer, Dairy Development Officer, Supervisor, Production Executive, Quality Control Executive, Procurement Officer, Marketing Executive.

Middle Level: Shift Incharge, Production Manager, Quality Control Manager, R & D Manager, Team Manager.

Top Position: General Manager, Factory Manager, Vice President and President, Scientist, Professors.

Perks/Salary: It varies from 6,000 to 1,25,000 Rupees per month as per the candidate's abilities and experience. The starting salary varies from 6,000 to 40,000 Rupees per month.

6.11.5 Universities/Colleges/Institutes Offering Courses

At present 13 Dairy Science Colleges impart specialized education in Dairying offering B. Tech, M. Tech and Ph. D degrees. With a total intake of 20-30 students per Dairy Science college, an average of 250-300 graduates, 30-40 post-graduates and 3-5 Ph. D scholars pass out every year.

Name of College	University Affiliation	Eligibility	Course Offering
NDRI, Karnal	Deemed Univ.	10+2 (PCM)	B. Tech (DT), M. Tech (DT & DE), DM, DC, Ph. D (DM, DC, DT, DE, DEC, DEX)
NDRI, Bangalore	Deemed University	10+2 (PCM)	M. Tech (DT & DE), DM, DC, Ph. D. (DM, DC, DT, DEC)
SMC College of Dairy Science, Anand	Gujarat Agriculture University	10+2 (PCM)	B. Tech (DT), M. Tech. (DT & DE) M. Sc., DM, DC
Dairy Science College, Hebbal	UAS, Bangalore	10+2 (PCM)	B. Tech (DT) M. Tech (DT) M. Sc., DM, DC
Dairy Science College, Udaipur	Indira Gandhi Agriculture Univ.	10+2 (PCM)	B. Tech (DT) M. Tech (DT)
Dairy Science College, Raipur	JNAU	10+2 (PCM)	B. Tech (DT)
SGIDT, Patna	RAU	10+2 (PCM)	B. Tech (DT)
College of Dairy Science & Tech., Kerala	KAU	10+2 (PCM)	B. Tech (DT)
Dairy Science College, Tirupaty	General University	10+2 (PCM)	B. Sc. (DT)
Osmania College of Dairy Science, Hyderabad	General University	10+2 (PCM)	B. Sc. (DT)
Dairy Science College, Kalyani	SAUs	10+2 (PCM)	B. Tech (DT)

College of Dairy Tech, AAI-DU, Allahabad	Deemed University	10+2 (PCM)	B. Tech (DT) M. Tech (DT)
College of Dairy Tech. Pusad	MAFSU	10+2 (PCM)	B. Sc (DT)

B. Tech / B. Sc (DT) – 4 years course, M. Tech . M. Sc (DT, DM, DC) – 2 years
M. Tech (DE) – 3 years.

6.12.1 Career in Energy Management – the concept

The Government of India has enforced The Energy Conservation Act, 2001 with effect from 1st March, 2002. The Act provides mainly for efficient use of energy and its conservation and for matters connected therewith or incidental thereto. As per the Energy Conservation Act 2001, it is mandatory for all the designated energy consumers to get energy audit conducted by an Accredited Energy Auditor and to designate or appoint an Energy Manager.

6.12.2 Requisite Educational Background/Entry Route

The Government of India has specified the passing of the National level certification examination as the qualification for a Certified Energy Manager & Certified Energy Auditor.

The eligibility criteria for appearing in certification examination as **Energy Managers** is that the candidates should have one of the following qualification and requisite work experience to write the Certification examination., which is conducted under the aegis of Bureau of Energy Efficiency (www.beeindia.gov.in), a statutory body under the Ministry of Power:

    i)   Graduate Engineer (B.E/B.Tech) or equivalent with 3 years of work experience.

    ii)   Post Graduate Engineer (M.E./M.Tech) or equivalent with 2 years of work experience.

    iii)   Graduate Engineer with Post Graduate Degree in Management with 2 years of work experience.

    iv)   Diploma Engineer or equivalent with 6 years of work experience.

    v)   Post Graduate in Science with 5 years of work experience.

Candidates appearing for **Energy Auditors** certification examination which is conducted by National Productivity Council (www.aippc.com), Chennai, should possess any one of the following qualifications:

    i)   Graduate Engineer (B.E./B.Tech) or equivalent with 3 years of work experience.

ii) Post Graduate Engineer (M.E./M.Tech) or equivalent with 2 years of work experience.

iii) Graduate Engineer with Post Graduate Degree Management with 2 years of work experience.

For more details about certification examination visit website http:/www.energymangertraining.com.

6.12.3 Skills/Specialisation

Energy Manager occupies an important position and is a focal point of all the activities pertaining to energy management in the organization. The energy manager provides leadership in the development of policy on energy management action plan and plays a key role in the formulation of corporation energy policy. Energy managers also perform the activities related with plant Energy Management, project management, personnel management and financial management at the plant level. He also prepares the information to be submitted to the Designated Agency with regard to the energy consumed and action taken on the recommendation of the accredited energy auditor.

The responsibilities and duties of **Energy Auditors** are as under:

- Carry out a detailed energy audit
- Quality energy consumption and establish base line energy information
- Construct energy and material balance
- Perform efficiency evaluation of energy & utility systems
- Compare energy norms with existing energy consumption levels
- Identify and prioritization of energy saving measures
- Analysis of technical and financial technologies and alternate energy sources
- Report writing, presentation and follow up for implementation

6.12.4 Job Opportunities

Career opportunities in Energy Management are available in several government and private sector organizations. Those who have acquired certification as Energy Manager and /or as Energy Auditor are in great demand as Government of India plans to initiate several energy management projects during the 11th Five Year Plan.

6.12.5 Universities/Colleges/Institutes Offering Courses

1. Annamalai University, Annamalai Nagar, Tamil Nadu
2. Banaras Hindu University, Varanasi – 221005 (Uttar Pradesh.)
3. Bharatidasan University, Tiruchirapali- 624024 Tamil Nadu
4. College of Engineering, Anna University, Guindy, Chennai -600025 Tamil Nadu
5. Devi Ahilya Vishwavidyalaya, Nalanda Parisar, R.N.T. Marg, Indore – 452001 (Madhya Pradesh)
6. Indian Institute of Social Welfare and Business Management, Kolkata – 700072 West Bengal
7. Indian Institute of Technology (IIT-Delhi) Delhi Hauz Khas, New Delhi-110016

8. Jadavpur University 188, Raja S.C. Mullick Road, Kolkata 700 032 West Bengal
9. JNTU College of Engineering, Mahavir Marg, Hyderabad – 500028 Andhra Pradesh
10. Kumaraguru College of Technology, Chinnavedampatti (P.O) Coimbatore – 641006 Tamil Nadu
11. Maulana Azad College of Technology (Regional Engineering College), Bhopal- 462007 Madhya Pradesh
12. National Institute of Technology, Kozhikode (Formerly Regional Engineering College, Calicut)
13. Punjab University, Chandigarh – 160014
14. Rajiv Gandhi Prodyogiki Vishwavidyalaya, Airport Bypass Road, Gandhi Nagar, Bhopal - 462036 Madhya Pradesh
15. National Institute of Technology, Tiruchirappalli - 620015 Tamil Nadu (Formerly Regional Engineering College, Tiruchirappali)
16. School of Energy Studies Department, University of Pune, Ganeshkind, Pune - 411007 Maharashtra
17. Tezpur (Central) University, Napam, Tezpur, Assam – 784028 Assam
18. Vellore Engineering College. Katpadi – Tiruvalam Road, Vellore North Arcot- Ambedkar District 632007 Tamil Nadu

Correspondence course in Energy Management/Energy Conservation are offered by following Institutes:

1. Annamalai University, Annamalai Nagar, Tamil Nadu
2. Devi Ahilya Vishwavidyalaya, Nalanda Parisar, R.N.T. Marg, Indore – 452001 (Madhya Pradesh)
3. Distance Education Department, University of Hyderabad.

(The above list is only indicative).

6.13.1 Career in Engineering – the concept
This Title applies to all the Engineering Options discussed hereunder:

Engineering is a vast field that offers infinite specialisation. All fields in the modern economy have been invigorated by engineering technology. This field deals with designing and its application. The three traditional branches of engineering are civil, mechanical and electrical. Apart from these, there are various other branches like Aeronautical engineering, Ceramic engineering, Chemical engineering, Computer engineering, Automobile engineering, Industrial engineering, Environmental engineering, Marine engineering and Textile engineering etc.

6.13.2 (i) Requisite Educational Background/Entry Route

For B.E. (Bachelor of Engineering) the requisite qualification is 10 + 2 in Science with high percentage of marks in Science subjects. **Duration** : 4 years

6.13.3 (ii) Skills/Specialisation

Civil, Mechanical and Electrical Engineering: Civil engineering deals with construction activities including building roads, bridges, tunnels etc. Mechanical engineering deals with design and production of tools, machines etc. to be used in industries. Electrical engineering deals with production of electrical equipments.

6.13.4 (iii) Job Opportunities

They can find job in Government departments, private and public sector industries, research and teaching institutions etc.

6.13.2 (i) Requisite Educational Background/Entry Route

For B.E. (Bachelor of Engineering) the requisite qualification is 10 + 2 in Science with high percentage of marks in Science subjects and qualifying exam. JEE. **Duration** : 4 years

6.13.3 (ii) Skills/Specialisation

Aeronautical/ Aerospace Engineering : This field deals with development of new technology in the field of aviation, space exploration and defence systems. It specialises in the development and research of commercial and military aircraft, missiles, spaceships etc.

6.13.4 (iii) Job Opportunities

Jobs are available with the airline services and aircraft manufacturing units. The defence services and Indian Space Research Organisation (ISRO) are two other important employers.

6.13.2 (i) Requisite Educational Background/Entry Route

For B.E. (Bachelor of Engineering) the requisite qualification is 10 + 2 in Science with high percentage of marks in Science subjects. **Duration** : 4 years

6.13.3 (ii) Skills/Specialisation

Ceramic Engineering: They specialise in production of ceramic products like glass, electric power line insulators, semi conductors etc.

6.13.4 (iii) Job Opportunities

They can find employment in ceramic industry.

6.13.2 (i) Requisite Educational Background/Entry Route

For B.E. (Bachelor of Engineering) the requisite qualification is 10 + 2 in Science with high percentage of marks in Science subjects. **Duration** : 5 years

6.13.3 (ii) Skills/Specialisation

Computer Engineering: Deals with computer hardware and software. Manufacture and research, development of new design, technical improvements, alterations etc.

6.13.4 (iii) Job Opportunities

The scope of the job is directly related to the growth and development of computer industry. They can get employment in computer fields and also work as maintenance consultants.

6.13.2 (i) Requisite Educational Background/Entry Route

For B.E. (Bachelor of Engineering) the requisite qualification is 10 + 2 in Science with high percentage of marks in Science subjects. **Duration** : 4 years

6.13.3 (ii) Skills/Specialisation

Chemical Engineering: It gives a vast knowledge of production of chemicals and related products.

6.13.4 (iii) Job Opportunities

They can find employment opportunities with chemical industries, refineries, manufacturers of acids, medicines, varnishes, paints, fertilizers etc. They can also find employment in research laboratories.

6.13.2 (i) Requisite Educational Background/Entry Route

For B.E. (Bachelor of Engineering) the requisite qualification is 10 + 2 in Science with high percentage of marks in Physics, Chemistry and Mathematics. . **Duration** : 4 years

6.13.3 (ii) Skills/Specialisation

Automobile Engineering: This field deals with design, development and maintenance of automobile and its spare parts.

6.13.4 (iii) Job Opportunities

They can find employment in automobile industries, service stations, transport companies etc.

6.13.2 (i) Requisite Educational Background/Entry Route

For B.E. (Bachelor of Engineering) the requisite qualification is 10 + 2 in Science with high percentage of marks in Physics, Chemistry and Mathematics plus qualifying exam. **Duration** : 5 years after 10 +2, 1 year after 4 years of mechanical or electrical engineering degree course.

6.13.3 (ii) Skills/Specialisation

Industrial Engineering : The industrial engineers aim is to increase productivity through management of people and methods of business organisation. They are the bridges between management and operations.

6.13.4 (iii) Job Opportunities

They can find the jobs in R & D establishments , Self employment opportunities are also possible as consultants.

6.13.2 (i) Requisite Educational Background/Entry Route

For B.E. (Bachelor of Engineering) the requisite qualification is 10 + 2 in Science with high percentage of marks in Physics, Chemistry and Mathematics plus qualifying exam. **Duration** : 4 years

6.13.3 (ii) Skills/Specialisation

Environmental Engineering : It is concerned with the conservation of environment.

6.13.4 (iii) Job Opportunities

They can find jobs in Government as well as private sector, particularly in chemical manufacturing units, mines etc.

6.13.2 (i) Requisite Educational Background/Entry Route

For B.E. (Bachelor of Engineering) the requisite qualification is 10 + 2 in Science with high percentage of marks in Physics, Chemistry and Mathematics. **Duration** : 1 year for Navigation course, 3 years for B.Sc Nautical science, 4 years for Marine Engineering Research Institute (MERI) course.

6.13.3 (ii) Skills/Specialisation

Marine Engineering : Marine Engineers have the complete responsibility of the ship's engine room. Their responsibilities involve development and designing of the engines related to ships and propulsion system. Ministry of Surface Transport, Government of India, takes care of the training needs and conducts competency exam through the Directorate General of Shipping (DGS).

Selection: Written test / interview (Joint Entrance Examination { JEE}) conducted by the Indian Institute of Technology (IIT), which assesses the candidate's knowledge of physics, chemistry and mathematics. The examination is followed by personal interviews/counseling, where the interviewers assess the degree of alertness, and awareness of the external environment, in the candidates and their suitability for a career in the Merchant Navy. Ministry of Surface Transport, Government of India, takes care of the training needs and conducts competency exam for promotions through the Directorate General of Shipping (DGS).

6.13.4 (iii) Job Opportunities

This is a highly paid job with lots of overseas travel. Jobs are available with Shipping companies in India and other countries.

6.13.2 (i) Requisite Educational Background/Entry Route

For B.E. (Bachelor of Engineering) the requisite qualification is 10 + 2 in Science with high percentage of marks in Physics, Chemistry and Mathematics. . **Duration** : 4 yrs for Engineering degree, 3 years for B.Sc (Tech) degree

6.13.3 (ii) Skills/Specialisation

Textile Engineering : These engineers deal with the development, design, manufacturing and quality control of the fibers and fiber products.

6.13.4 (iii) Job Opportunities

They can find employment in Textile industry.

6.13.2 (i) Requisite Educational Background/Entry Route

10 + 2 with high percentage of marks + qualifying examination and interview.

Duration : 5 years/4 years

6.13.3 (ii) Skills/Specialisation

B.Arch (Bachelor of Architecture) : Architects design and supervise construction of varies types of buildings keeping in view the primary consideration of stability, utility and beauty. An ideal architect needs skill in visualising, designing, engineering and communicating your ideas to the client. In short Architecture is a unique blend of art and science. In Architecture there are several areas of specialisation like industrial design, interior design, town planning, regional planning, housing, transport planning, landscape planning, environmental planning etc.

6.13.4 (iii) Job Opportunities

Job opportunities are available in construction firms, government departments, town planning offices, private architectural firms, landscaping consultants etc.

6.13.5 Universities/Colleges/Institutes Offering Courses

There are a large number of engineering colleges, Indian Instistute of Technologies etc., providing the above engineering courses.

6.14.1 Career for Engineers in the Armed Forces – the concept

An engineer in the Defence Force is responsible for multifarious tasks like construction of bridges, roads, mining and demining operations, construction of bunkers, provision of efficient radio and signal communications, repair and recovery, administrative assignments and so on. In this way, an engineer is exposed to all kinds of technical and administrative duties while serving in the Armed Forces.

6.14.2 Requisite Educational Background/Entry Route

Application Procedure

Applicants are advised to go through the Employment News/Rozgar Samachar published every Saturday. The criteria for age, height, weight, qualifications, etc should be met for applying for the post. Applicants must follow all the instructions given in the advertisement/notification. The applications are likely to be rejected in the case they are incomplete or the instructions mentioned in the notification have not been followed.

Engineering Degree in Army and Navy

There is a facility for young male aspirants in the 16-19 years + 6 months age group to become Army/Navy Officers (Technical), the details of which are given in the succeeding paragraphs.

10+2 Technical Entry (Army and Navy)

Male aspirants on completion of XII Science who are in the age group of 16 + 6 months to 19 years + 6 months are eligible to apply in the Army if they have secured more than 70% marks in aggregate of Physics, Chemistry and Mathematics and would also be eligible to apply in the Navy if they have secured more than 75% marks in aggregate of Physics, Chemistry and Mathematics and above 50% marks in English language. On completion of training, the selected students would become officers (Technical) in the Army/Navy. These applicants would receive an engineering degree on completion of training.

NDA/CDS/ACC Entry

NDA/CDS/ACC students who get commissioned into the Indian Army are eligible to undergo Degree in Engineering provided they have completed their graduation in Science stream. The officers commissioned in the technical arms and services are sent for the Degree engineering course in one of the under mentioned Army establishments:

1. College of Military Engineering (CMS), Pune.
2. Military College of Electronics and Mechanical Engineering (MCEME), Secunderabad.
3. Military College of Telecommunication Engineering (MCTE), Mhow.

Officers from arms and supporting arms can also do the engineering degree provided They are graduates from science stream and have an aptitude for doing Engineering course and have been recommended by their unit commanders for the same.

6.14.3 Skills/Specialisation

Indian Army

Men upto the age of 27 years and women upto 25 years of age can apply for a commission in the Indian Army. The applicants should either be in the final year of engineering or should have cleared the final year in any of the following branches Electrical, Electronics, Electronics and Telecommunication, Computer Engineering, Computer Science, Computer Technology, Information Technology, Mechanical, production, Manufacturing, Industrial, Rubber and Plastic Technology, Metallurgy, Aeronautical, Civil Architecture etc. Males who are in the Third year/Final year can also apply under a special scheme known as the University Entry Scheme.

Indian Navy

Men and women engineers below the age of 25 years can apply for a commission in the Indian navy. The men could be a part of technical branch – submarine cadre, whereas men and women can be a part of an Executive branch of Education branch of the Indian navy. The applicants should have secured an aggregate of above 60% in anyone of the following disciplines of engineering, Mechanical, Electrical, Electronics, Telecommunication, Control, Instrumentation, Marine, Computer, Information Technology, Civil, Architectural Engineering.

Indian Air Force

Engineers can be part of the Indian Air Force in the technical stream as well as ground duties (administration and logistics). For this, the applicants need to be below 28 years of age for technical stream and below 25 years for ground duties and need to secure aggregate percentage of above 60% in the engineering degree. For applying in the technical field, the degree has to be from one of the following disciplines – Electronics, Telecommunication, Electrical Communication, Electrical, Electronics and Telecommunication, Instrumentation, Computer Science, Aeronautical, Mechanical, Production or Industrial Production. For being an officer in Administration of Logistics, the engineering degree could be from any sub branch of engineering.

Engineers can also be a part of the flying branch. For being an officer in the flying branch, men below 23 years of age need to apply for the CDS examination. Women below 23 years of age can apply directly.

6.14.4 Job Opportunities

Selection Procedure

The screened and short-listed candidates are called for an SSB interview at one of the Service Selection Board Centres. The Air Force optees are required to qualify the EKT, CET, PABT for the Technical, administrative and flying branches respectively. The qualified candidates are then subjected to SSB interviews in a similar manner as for the Army and Navy selections. The SSB Stage I is the preliminary screening stage which consists of Intelligence test, Picture perception test and Group Discussion. Only those candidates who qualify Stage I undergo Psychological tests, Group Tests and an Interview which forms Stage II of the SSB selection process. The candidates who are recommended by the Service Selection Board are required to undergo medical examination at the Military hospital. They are then placed in the order of merit. The final selection is based on the number of vacancies available at that point of time.

6.15.1 Career in Environmental Sciences – the concept

A core module course of Environmental Science has been made compulsory throughout the country by the University Grants Commission, New Delhi for the undergraduate students of all streams (Science, Arts, Commerce, Agriculture, Engineering, Medical and Law). University Grants Commission has also established several Departments of

Environmental Sciences in India for imparting post-graduate teaching and research in environment.

6.15.2 Requisite Educational Background/Entry Route

Basic groundwork for entry into the specialized study of Environmental Sciences would be the science stream at 10+2 level. After this, the options are to go through a degree in Physical Sciences, Life Sciences, Agriculture, Engineering and Medical. One can start off with Environmental Sciences as one of the optional subjects at the graduation level after 10+2 in Science group. After graduation in one of the disciplines, options are open to go through a post-graduate degree (M. Sc./M. Tech.) in Environmental Sciences. A Masters in Environmental Sciences has bright prospects in job market in India and abroad.

6.15.3 Skills/Specialisation

Greater attention is increasingly being placed on global environmental change, biodiversity conservation, environmental toxicology, integrated solid waste management, ecological restoration and sustainable development, with particular emphasis on human well-being. Most of the global environmental problems fall, within the gambit of environmental studies and require a thorough understanding of ecological principles for resolution.

6.15.4 Job Opportunities

Career opportunities in Environmental Sciences are expanding rapidly, driven by government regulation and a movement by business and industry to reduce environmental liabilities associated with their operations.

There are number of opportunities in the Environmental Sciences to work as Environmental Biologist, Environmental Officer, Environmental Manager, Environmental Scientists, Environmental Consultant, Environmental Extension Officer, Environmental law Officer, both in the private and government sectors, business establishment etc. **At present, there is a great paucity of skilled environmentalists in the country.** There are a number of organizations in India who employ persons having qualification in Environmental Sciences. However, the following is an indicative list:

1. Central & State Pollution Control and Environmental Protection Boards.
2. Ministry of Environment and Forests & its offices namely Wildlife Institute of India, Forest Research Institute, Zoological Survey of India, Botanical Survey of India, G. B. Pant Institute of Himalayan Environment and Development
3. Private Sector: Sugar mills, fertilizer factories, fish processing companies, rice mills, flour mills, auto manufacturing units, cement factories and mining (limestone, plaster of paris).
4. Universities, Colleges & Schools.
5. Several Non-Governmental Organisations (NGOs).

6.15.5 Universities/Colleges/Institutes Offering Courses

The following universities/institutes are providing education and career opportunities through M. Sc., M. Tech, M. Phil, Ph. D and advance diploma courses in various sub-disciplines of Environmental Sciences:

1. School of Environmental Sciences, Jawaharlal Nehru University, New Delhi – 110067. Tel: 011;26107676; Fax: 011: 26106501, 26165886.
2. Centre for Ecological Sciences, Indian Institute of Sciences, Bangalore – 560012, Karanataka Tel: 080: 23340985; Fax:080: 23341683.
3. Department of Environmental Sciences, H. N. B. Garhwal University, Srinagar – Garhwal – 246174, Uttarakhand. Tel: 01370: 267740; Fax: 01370: 267740.
4. Department of Environmental Biology, University of Delhi. Delhi – 110007 Tel: 011: 27662387, 27667725.
5. School of Environmental Sciences, Dr B. R. Ambedkar University, Vidya Vihar, Raebareli Road, Lucknow – 226025, Uttar Pradesh Tel: 0522: 2440826, 2441515 Fax: 0522: 2440821: 244188.
6. Department of Environmental Sciences, Dr B. R. Ambedkar University, Khandari Campus, Agra - 282002, U..P. Tel: 0562: 2526432, 2520405.
7. Department of Environmental Sciences, Dr R. M. L. Awadh University, Faizabad – 224001, U. P. Tel: 055278: 247581 Fax: 05278: 245209, 246330.
8. Department of Environmental Sciences, Gurukul Kangri University, Hardwar – 249404, Uttarakhand Tel: 01334: 245940.
9. Department of Environmental Sciences, C.C.S. University, Meerut City 250005, U. P. Tel: 0121: 277456: 2763323.
10. Department of Environmental Sciences, C.S.J.M. University Kalyanpur, Kanpur – 208001, U.P. Tel: 0512: 2570301.
11. Department of Environmental Sciences, University of Jammu, Dr. B. R. Ambedkar Marg, Jammu – 180004, J & K Tel: 0191: 2432856, 2456790.
12. Center of Research and Development (CORD), University of Kashmir, Hazaratbal, Srinagar- 190006 J & K Tel: 0194-2102162: Fax: 0194-2421357.
13. Department of Environmental Sciences, Veer Bahadur Singh Purvanchal Vishwa Vidyalaya, Jaunpur, Uttar Pradesh
14. Department of Environmental and Vocational Studies, Punjab University, Chandigarh – 160014, Tel: 0172: 2534212.
15. Department of Environmental Sciences and Engineering. Guru Jambeshwar University, Hisar – 125001, Haryana. Tel: 01662: 263153, 276240.
16. Indira Gandhi Academy of Environmental Education, Research and Ecoplanning. Jiwaji University, Gwalior– 474011, Madhya Pradesh   Tel: 23331865: Email: igaee&e@gwr.net.in.
17. Department of Environmental Biology, A.P.S. University, Rewa – 486003, M.P.
18. Forest Ecology & Environmental Division, Forest Research Institute, P.O. New Forest, Kaulagarh Road, Dehradun – 248195, Uttarakhand. Tel: 0135: 2751826.
19. Department of Zoology and Environmental Sciences, Visva-Bharti University, Shantiniketan – 731235, W.B. Tel: 03463: 253268: Fax: 03463: 252672.
20. Department of Environmental Sciences, Nagarjuna University, Guntur -522510, Andhra Pradesh Tel: 0863:223225; 225555: Fax: 0863: 293328.

21. Department of Environmental Sciences, Osmania University, Hyderabad – 500036 A.P.
22. Bharti Vidyapeeth Institute of Environmental Education and Research, Pune, Maharashtra
23. Centre for Environmental Studies, Anna University, Chennai, Tamil Nadu
24. Department of Environmental Sciences, Gauhati University, Gwahati, Assam
25. Department of Environmental Sciences, University of Kerala, Gandhi Bhavan, Kariavattom, Trivandrum – 69558, Kerala. Tel: 0471: 2415106.
26. Department of Environmental Chemistry, Jiwaji University. Gwalior- 474001 Madhya Pradesh. Tel: 0751: 25016766: Fax: 0751: 2346209.
27. Department of Environmental Studies, University of Kalyani, Kolkata, W.B.
28. Department of Environmental Sciences, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand.
29. Department of Environmental Sciences, Tamil Nadu Agriculture University, Coimbatore – 641003 Tamil Nadu.
30. Department of Environmental Sciences, Utakal University, Bhuneshwar, Orissa
31. Department of Environmental Sciences, Bundelkhand University, Jhansi – 284129, Uttar Pradesh.
32. Department of Environmental Sciences, Maharshi Dayanand Saraswati University, Ajmer – 305009, Rajasthan.
33. Thapar Institute of Engineering & Technology, Patiala – 147004, Punjab
34. Department of Environmental Sciences, Dr. B. R. Ambedkar Marathwada University, Aurangabad – 431004, Maharashtra.
35. Department of Environmental Sciences, Calcutta University, Kolkatta – 700104, West Bengal.
36. Department of Environmental Sciences, Guru Nanak Dev University, Amritsar, - 143005 Punjab.
37. School of Chemical Sciences, Devi Ahilya Bai University, Indore – 452017, Madhya.Pradesh. Tel: 0731: 2460208: Fax: 0731: 2470372.
38. Department of Environmental Sciences, University of Lucknow , Lucknow – 226010, Uttar Pradesh.
39. Department of Environmental Sciences, Maharshi.Dayanand.University, Rohtak - 124001 Haryana.
40. Department of Studies in Environmental Sciences, University of Mysore, Mysore – 570006, Karnataka.
41. Department of Limnology, Barktullah University, Bhopal - 462026 Madhya Pradesh.
42. Department of Environmental Sciences, Mizoram University, Chandmari, Aizawl – 796007, Mizoram Tel: 0389: 2342383: Fax: 0389: 2345810.
    (The above list is only indicative).

6.16.1 Career in Fisheries – the concept

Fisheries, is a term related with the capture of fisheries including inland and sea, aquaculture, gears, navigation, oceanography, aquarium management, breeding, processing, export and import of seafood, special products and by-products, research and related activities.

6.16.2 Requisite Educational Background/Entry Route

To become a fisheries graduate one has to pass 4 years degree from Fisheries College of State Agriculture Universities. For admission in B. F. Sc. (Bachelor of Fisheries Science) course one can apply after 10+2 having PCB group. Admission is given as per merit of candidates and availability of seats. Special quota for outside state candidates are allowed to the candidates who have passed entrance exam of ICAR and are getting fellowship too. Special reserved seats are there for Jammu & Kashmir, Mizoram, Arunachal Pradesh and Nagaland. B. F. Sc. Involves courses such as inland aquaculture, freshwater aquaculture, mariculture, industrial fisheries, fish processing and post harvest technology, fish nutrition, pathology, environment, ecology and extension. Fourth year syllabus contains practical experience like on Sea cruise on Fishing Vessels for data collection and fishing, in processing plants and on acqua farms.

After completion of B. F. Sc., candidates can become M. F. Sc., (Master of Fisheries Science). For taking admission in Central Institutes, one has to appear for all India level Common Entrance Test conducted by ICAR, New Delhi.

6.16.3 Skills/Specialisation

Education in fisheries creates specialized skills in students and enables them to:

1. serve as technically competent extension personnel for transfer of technology;
2. assist in the research and development and to serve as instructors to teach;
3. serve as administrators who can plan, develop and execute fisheries development plan;
4. as aqua culturists, farm managers, exporters, traders, breeders and modern fishermen's etc.

6.16.4 Job Opportunities

1.	State Government	Every state government has a fisheries department in which fisheries graduate can apply for the post of Assistant Fisheries Development Officer (AFDO)/Fisheries Extension Officer (FEO) and District Fisheries Development Officer.
2.	Central Government	One can get job in central agencies like Marine Product Export Development Authority (MPEDA), Fisheries Survey of India (FSI), NIO, WHO, FAO, NACA, NABARD, EIA.
3.	Academic Institutes	Candidates having degree (B.F.Sc) can apply for the post of Research Assistant, Biochemist, Biologist, Technicians, etc. Candidates having Postgraduate degree (M.F.Sc) can apply for the post of Assistant Professor in the Faculty of Fisheries. For the recruitment as scientists in various agricultural and fisheries institutions under the ICAR, ASRB conducts an All India Competitive Exam, Agricultural Research Service (ARS) followed by viva voce.

4.	National Banks	Fisheries graduates can get jobs as a field officer, managers in agriculture loan section in nationalized as well as private banks.
5.	Self Employment	As an entrepreneur, after obtaining the professional degree in B. F. Sc., candidate can start their own enterprise. The financial support can be obtained through NABARD or through other nationalized banks. The main area in which fisheries enterprise can be developed are: Feed manufacturing, Feed sales, ornamental fish culture and breeding, aquaculture, hatchery and seed production, commercial pearl production, fish processing and marketing, net marking, fish disease diagnostic centre, consultancy services and establishment of agriclinics.
6.	Private Sector	Candidates can work as a manager or officers in seafood processing and export units, aquafeed plants, fishing gear industries and in pharmaceutical companies. There is great paucity of skilled manpower in the area of designing, construction, management of fish farms and hatcheries.
7.	Fishing/Ocean	The increasing demand for sea food, sea based medicines and grooming of eco-friendly industries is likely to create a huge demand for oceanographers. Fishing is one of the areas in fishery sector. Participating in deep sea Exploration has tremendous scope. Government and World Bank are always supporting to develop fishing industry by Assistance in terms of subsidies and finance.
8.	Foreign Jobs	Apart from scope for higher education in fisheries in countries such as USA, Canada Australia, Japan, China and in European countries, there are a demand for fisheries professional in the aquaculture and processing sectors in Gulf and African countries also. There are number of fisheries graduates doing business in foreign countries in field of aquaculture, export and import.

6.16.5 Universities/Colleges/Institutes Offering Courses

1. Central Institute of Fisheries Education, Versova, Mumbai – 400 061.Maharashtra
2. Central Institute of Fresh Water Aquaculture, Kaushalyaganga, Bhubaneswar – 751020, Orissa
3. Central Marine Fisheries Research Institute, Kochi – 582014, Kerala
4. Central Institute of Brackish Water Aquaculture, 75 Santhome High Road, R. A. Puram, Chennai – 600 028, Tamil Nadu
5. Central Inland Capture Fisgeries Research Institute, Barrackpore – 743101
6. Central Food Technology and Research Institute, Mysore – 570720, Karnataka
7. Central Institute of Fisheries Nautical and Engineering Training, Kochi - 682016

8. National Research Centre for Cold Water Fisheries, Bhimtal – 263136
9. National Institute of Oceanography, Dona Paula, Goa – 403004
10. Indian Institute of Technology, Kharagpur – 721 302 West Bengal
11. Central Institute of Food Technology, Matsyapuri, Kochi – 682029, Kerala
12. National Bureau of Fish Genetic Resources, Canal Ring Road, Dilkusha Lucknow – 226 002, Uttar Pradesh
13. Andhra University, Telibagh, Waltair – 530 003, Andhra Pradesh
14. Goa University, P. O. Santa Cruz, Teleigao Plateau, Goa – 403002
15. Berhampur University, Bhanja Bihar, Berhampur – 760007, Orissa
16. Cochin University of Science and Technology, Kochi – 682 022, Kerala
17. Mangalore University, University Campus, Mangala Gangothri – 574 199.
18. CAS in Marine Biology, Annamalai University, Annamalai Nagar, T.N.
19. Post Graduate College of Fisheries, Osmania University, Saifabad, Hyderabad – 500 004 Andhra Pradesh

Different Fisheries College under State Agriculture Universities in India:

1. College of Fisheries, Shirgaon, Ratnagiri – 415629, Maharashtra
2. College of Fisheries Science, Telangkhedi, Nagpur - 440001 Maharashtra
3. College of Fisheries, Mangalore – 575002, Karnataka
4. College of Fisheries, Panangad, Kochi – 682506, Kerala
5. College of Fisheries Science, Pantnagar – 263145, Uttarakhand
6. College of Fisheries Science, Nellore – 524004, Andhra Pradesh
7. College of Fisheries, Tuticorin – 628008, Tamil Nadu
8. College of Fisheries Science, Kulia, West Bengal
9. College of Fisheries, Rangailuna, Berhampur, Orissa
10. College of Fisheries, Veraval – 362001, Gujarat
11. Punjab Agriculture University, Ludhiana – 141004, Punjab
12. Rajasthan Agriculture University, Bikaner – 334006, Rajasthan
13. College of Fisheries, Raha, AAU, Assam
14. College of Fisheries, Dholi, RAU, Bihar
15. College of Fisheries, CAU, Agartala, Tripura

(The above list is only indicative).

6.17.1 Career in Graphic Arts Technology – the concept

Printing means presentation. It is the presentation of our ideas, views, thoughts, expressions and skills in the form of printed text or graphic format in any number of copies for the people at large. The same can be stored effectively for the future generations. In a layman term, it is the reproduction of "n" number of copies of the original.

In first generation printing, letterpress and gravure forms of printing were used. Gradually offset, flexography, silkscreen and digital printing systems have been added to it along with numerous refinements and additions. Later half of twentieth century had witnessed the fine quality print products with automation and high speed machine. Printing presses became sophisticated and the level of automation is also increased over

the years. Introduction of digital electronics, high end colour scanners, colour management systems, lasers, digital photography and multi colour printing have changed the face of the traditional printing. Computer controlled pressed with customized setting and remote operated pressed are the latest happenings in this sector.

6.17.2 Requisite Educational Background/Entry Route

Most of the polytechnics conduct entrance test for admission for three years Diploma Course in Printing Technology. Students with minimum aggregate of 50 percent in 10th are eligible for appearing in the test. The intake capacity of these polytechnics varies from state to state. For B. Tech/ B.E course, students are required to appear at the state level engineering competitive examination or all India level tests (like AIEEE). Eligibility to appear in such tests is 50percent in PC.M. in 12th Science. The duration of this course is four years. Students after completion of Diploma can also enter directly into second year of engineering through LEET. For admission into M. Tech/M.E./M.S. course, students with minimum of 50 percent aggregate in engineering should appear in the test conducted by the University Teaching Departments. The duration of the course is two years. For the Ph.D research, students can directly register themselves into it after Master or Bachelor degree in Engineering as per the ordinance of the University. The duration of the research work may vary from three years to five years. In short, there are various levels of courses which are available in India and abroad to suit a specific need and purpose. These are:

➤ Short term courses ranging from few weeks to six months;
➤ Vocational training course (by Industrial Training Institutes);
➤ Diploma Engineering (by Polytechnic)
➤ Degree course (by University Teaching Departments & Engineering Colleges)
➤ Master in Printing Technology (by University Teaching Departments)
➤ Ph.D. in Printing Technology (by University teaching Departments)

6.17.3 Skills/Specialisation

Advancement in the printing industry is based on performance. The most skillful managers and technicians gradually assume more responsibility through practice and additional training. This industry is made up of a vast group of people, all devoted to the goal of fulfilling the print communication needs offprint communication world. Most of the diploma holders students start their career as Junior Engineer Trainee, and then gradually move to Supervisor. Foreman, Assistant Manager, Deputy Manger and Manager and so on. Likewise the degree engineers start their career as Graduate Engineer Trainee (G.E.T.) and move to Assistant Manager, Deputy Manager, Manager and General Manager, Printing industry provides an excellent career opportunity and advancement to the deserving and hardworking people, and it is rightly told that sky is the only limit for them.

6.17.4 Job Opportunities

Both private and public sector accommodate print technologists into their organizations. Number of printing presses are spread all over the country and in addition to that are print shops belonging to publishing houses like The Times of India, Hindustan Times, Indian

Express, The Hindu, The Telegraph, The Tribune, Dainik Jagran, The Bhaskar Group, etc. that have very high speed web offset machinery. At the government level the opportunities exist in postal presses, currency presses, university presses, bank owned presses, test book presses, stationery printing presses, etc. Almost all-printing institutes organize campus interviews much before the final examination. There are some institutes where the students are offered multiple jobs through campus placement. This clearly indicates the demand of printing technologies in India and abroad. Monthly package varies from course to course and is certainly very high.

In India there are more than 1.5 lacs of registered printing presses, employing a workforce of 1.4 million directly or indirectly into it. The printing industry is a growing industry in India and at present its growth rate is 12 percent per annum and a 60 percent growth is expected by 2010 There is a dearth of skilled and trained manpower imprinting industry in India and there is a tremendous scope for making a career in this sector. Printing industry does not stand alone, it is carried by people, and there is a need for skilled and professional people.

6.17.5 Universities/Colleges/Institutes Offering Courses

Institutes awarding Diploma Courses in India are:

1. NR Institute of Printing Technology
   Teliar Ganj, Allahanbad – 211 004 Uttar Pradesh

2. Southern Regional Institute of Printing Technology
   Adyar, Chennai - 600 113 Tamil Nadu

3. Western Regional Institute of Printing Technology
   J.J. School of Arts Campus, Opp. V. T. Station, Mumbai   Maharashtra

4. Maharashtra Institute of Printing Technology
   1786 Sadashiv Peth, Pune, Maharashtra

5. Department of Printing Technology
   Pusa polytechnic, Pusa, New Delhi- 110 002

6. Department of Printing Technology
   Government of Kalaniketan, Jabalpur   Madhya Pradesh

7. Department of Printing Technology
   Government Polytechnic, Gandhi Nagar, Ahmedabad   Gujarat

8. Department of Printing Technology
   Government Polytechnic, Gulzar Bagh, Patna – 800 007 Bihar

9. Department of Printing Technology
   Institute of Printing Technology, Shoranur   Kerala

10. Government Institute of Printing Technology
    East Nehru Nagar, Secunderabad – 500 026   Andhra Pradesh

11. Institute of Printing Technology,
    Sivakasi- 626 123   Tamil Nadu

12. Times Institute of Printing Management
    Times of India Press. Opp. V.T. Station, Mumbai   Maharashtra

13. Don Bosco School of Printing
    Okhla Road,   New Delhi- 110 025

14. Government Institute of Printing Technology
    Bangalore, Karnataka

15. Salesian Institute of Graphic Arts
    22A, Taylors Road, Chennai – 600 010   Tamil Nadu

16. Graphic Arts Technology & Education
    12 Shree Mills, Mumbai – Agra Road, Kurla, Mumbai – 400 070 Maharashtra

17. Ingole Institute of Printing Technology
    272, Central Bazar Road, New Ramaspeth, Nagpur – 440 010 Maharashtra

18. Institute of Printing Technology, Chennai, Tamil Nadu

19. Institute of Printing Technology, Hyderabad,   Andhra Pradesh

20. School of Printing Technology, Bangalore, Karnataka

21. Thomson Press Training Centre, Delhi-Mathura Road, Faridabad, Haryana

22. Government Polytechnic College,
    Department of Printing Technology, Makhupura, Ajmer,   Rajasthan

23. The Regional Institute of Printing Technology
    Jadavpur,   Kolkata,   West Bengal

Institutes awarding Degree Courses in India are:

1. Department of Printing & Media Engineering
   Manipal Institute of Technology, South Kanara. Distt. Manipal – 576 119,
   Karnataka, Website: www.mit.printing.org

2. Department of Printing Engineering
   Jadavpur University, Kolkata – 700 032,   West Bengal

3. Department of Printing Technology
   Anna University, Guindy, Chennai , Tamil Nadu

4. Department of Printing Technology
   BMS College of Engineering, Bangalore, Karnataka

5. Department of Printing Technology
   Guru Jambheswar University of Science & Technology, Hisar, Haryana

6. Department of Printing Technology
   JNTU College of Engineering, Kukatpally,   Hyderabad,   Andhra Pradesh

7. Department of Printing Technology
   PVG College of Engineering & Technology, 44, Vidyanagari,   Shivdarshan,
   Parvati, Pune – 411 009,   Maharashtra

8. Department of Printing Technology
   Avinashi Lingam University for Women, Faculty of Engineering,Varapalyam, Thadagam P.O., Coimbatore – 641 043,   Tamil Nadu

9. Department of Printing Technology
   Kurukshetra University, Kurukshetra,   Haryana

Institutes awarding Masters & Ph.D courses in India are:

1. Department of Printing Technology
   Guru Jambheshwar University of Science & Technology, Hisar, Haryana

2. Department of Printing Technology
   Anna University, Gunidy, Chennai, Tamil Nadu

Following are few reputed Institutes abroad offering various levels of education and research on printing technology:

1. School Offprint Media
   Rochester Institute of Technology, One Lomb Memorial Drive, Rochester, New York - 14623-5603, Website: www.rit.edu

2. London College of Printing
   Elephant & Castle, London SE1 6 SB Storbritannien   Email b.dali@dali.linst.ac.uk

3. Print Media Academy
   Heidelberger , Druckmasschinen AG, Kurforsten – Anlage 52-60 69115 Heidelberg (Germany), Email: pma-info@heidelberg.com

6.18.1 Career in Horticulture – the concept

Horticulture comprises production and post harvest management of fruits, vegetables, flowers, spices, nuts, mushrooms, tuber crops, medicinal and aromatic plants and plantation crops. The discipline includes sub-subjects namely "pomology" "Vegetable Science", "Floriculture and Landscaping", and "Plantation Crops".

6.18.2 Requisite Educational Background/Entry Route

Candidates who have passed 10+2 examinations conducted by Central or State Boards with agricultural or biology as one of the subjects besides Physics and Chemistry (Science in case of Agriculture) are eligible for the admission in B.Sc. in Horticulture. Most of the Agriculture Universities conduct their own (or state level) entrance tests for admissions. For M.Sc. in Horticulture, the candidates should have degree in B.Sc. (Agriculture) or B.Sc. (Horticulture). The Indian Council of Agricultural Research (ICAR) conducts All India Competitive Examinations for admissions to fill 15% seats in B.Sc. Programmes in the State Agricultural Universities, Central Universities with Agricultural faculty, and Central Agricultural University Including B.Sc. in Horticulture. ICAR provides 25% seats in M.Sc. programmes of these universities in agriculture and allied science subject including Horticulture. Besides, all the seats in ICAR Institute based Deemed-to-be-University are also filled through ICAR's All India Competitive

Examination based on merit. For Ph.D., in various sub-subjects of horticulture, the candidates should have passed M.Sc. degree in concerned subject. Most of the state Agriculture Universities and ICAR institutes conduct entrance examinations for Ph.D. admissions.

6.18.3 Skills/Specialisation

The persons with background of Agriculture or Biology besides Physics and Chemistry are trained up during their education to acquire special skills to enter into the field of Horticulture. Skills/Specialisation are acquired in the sub-areas mentioned under the title of "Job Opportunities".

6.18.4 Job Opportunities

Graduates and Post Graduates have employment opportunities mainly in the following sectors.

(a) Vegetable and Flower Seed Production

Seed companies namely Syngenta, Mahyco, Namdhari, Nunhems, Century, BejoSheetal, J.K. Seeds are some of the leading commercial organizations engaged in specialized seed production and export of vegetable and ornamental crops besides many smaller companies.

(b) Tissue Culture

Tissue cultured plants of banana, strawberry, cardamom, black pepper and many of the ornamental plant species have been in demand in domestic as well as international markets. Organizations like TERI, Jain Irrigation Pvt. Ltd., Reliance Agro-Tech., Shivashakti Plant Biotech. etc. are some of the leading names engaged in specialized business of tissue cultured plants.

(c) Specialized Crop Production Export Oriented Contract Farming

Central and State governments have been in a process of setting up of specialized production and agri-export zones for vegetable, fruits, flower, spices etc. with the active participation of private sector such as Reliance Agro Tech., Adani Group, Air-Tel and so on.

(d) Protected Cultivation

Cultivation of the horticultural crops in poly houses, net houses and low tunnels ensure of-season (too early and too late) and round-the-year supply of vegetables and flower crops. Hilly areas are being mainly utilized by the growers for this Purpose.

(e) Organic Horticulture

Organically Produced fruits and vegetables have been in good demand in domestic and international markets.

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(f)   Landscape Designing And Beautification

Township construction, tourism and hotel industry has been expanding rapidly all over the country. The sector has been employing graduates and post Graduates in horticulture.

(g)   Research Development and Extension

Post Graduates and Ph.D. Degree holders in horticulture have greater job opportunities as scientists, teachers, subject matter specialists and extension experts in various traditional and agricultural universities, Krishi Vigyan Kendras, and Research Institute.

(h)   Self-Employment in Horticulture

The Indian council of Agriculture Research and State Agricultural Universities have been promoting the cause of self employment by graduates in horticulture and other sciences. For this purpose, Programmes such as experiential Learning Model Farms and Pilot Plants have been launched. The Scheme of the Government of India for establishment of "Agri-Clinics" also trains and promotes the graduates for starting their own business units including farm services.

6.18.5 Universities/Colleges/Institutes Offering Courses

Agriculture Universities and Institutes Offering Degree in Horticulture and their approximate Annual Intake Capacity.

S. No.	University/ Institute	B.Sc. (Horticulture)	M.Sc. (Horticulture)
1	Acharya N.G. Ranga Agricultural University, Rajendranagar, Hyderabad-500 030 (A.P.)	60	12
2	Bidhan Chandra Krishi Vishwavidyalaya, P.O. Krishi Vishwa Vidyalaya Mohanpur Distt. Nadia - 741 252 (W.B.)	20	40
3	Central Agricultural University, Iroisemba, P.B. No. 23, Lamphel, Imphal-795 004 (Manipur)	20	4
4	Jawaharlal Nehru Krishi Vishwavidyalya Krishinagar, Adhartal, Jabalpur-482 004 (M.P.)	40	24
5	Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli (Distt. Ratnagiri)-415 712 (M.S.)	33	4
6	Marathwada Agricultural University, Parbhani -431 402 (M.S.)	33	12
7	Mahatma Phule Krishi Vidyapeeth, Rahuri - 413 722, (Dist. Ahmednagar) (M.S.)	33	16

8	Navsari Agricultural University, Navsari- 396 450 (Gujarat)	26	16
9	Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Krishinagar, Akola - 444 104 (M.S.)	33	20
10	Tamil Nadu Agricultural University, Coimbaatore – 641003, Tamil Nadu	46	16
11	University of Agricultural Sciences, GKVK, Bangalore-560 065 (Karnataka)	40	24
12	University of Agricultural Sciences, Yeltinagudda Campus, Krishinagar, Dharwad - 580 005 (Karnataka)	40	44
13	Uttar Banga Krishi Vishvavidyalya, P.O. Pundibari, Dist. Cooch Behar - 736 165 (W.B.)	15	-
14	Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni (Dist. Solan) -173 230 (H.P.)	33	16
15	Allahabad Agricultural Institute Deemed University Naini, Allahabad-211 007 (U.P.)	-	60
16	Assam Agricultural University, Jorhat-785 013 (Assam)	-	8
17	Birsa Agricultural University Kanke, Ranchi-834 006 (Jharkhand)	-	8
18	Banaras Hindu University, Varanasi-221 005 (Uttar Pradesh)	-	8
19	CCS Haryana Agriculture University, Hisar-125 004 (Haryana)	-	12
20	C.S. Azad University of Agricultural & Technology Kanpur - 208 002 (U.P.)	-	20
21	Govind Ballabh Pant University Of Agriculture & Technology, Pantnagar - 263 145 (Uttarakhand)	-	32
22	Indian Agricultural Research Institute, Pusa Campus, New Dellhi-110 012	-	8
23	Kerala Agricultural University, Vellanikkara, Thrissur - 690 654 (Kerala)	-	20
24	Maharana Pratap Unoversity of Agriculture & Technology, RCA Campus, Udaipur-131 001 (Rajasthan)	-	4
25	Narendra Dev University of Agriculture & Technology, Kumarganj, Faizabad-224 001 (U.P.)	-	16

26	Orissa University of Agriculture & Technology, Bhubaneshwar - 751 003 (Orissa)		-	12
27	Punjab Agricultural University , Ludhiana-141 004 (Punjab)		-	28
28	Rajasthan Agriculture University, Bikaner - 334 006 (Rajasthan)		-	8
29	Rajendra Agriculture University, Pusa , Samastipur - 848 125 (Bihar)		-	8
30	Sher-E-Kashmir University of Agricultural Science & Technology (J), Railway Road, Jammu-180 044 (J&K)		-	8
31	Sher-E-Kashmir University of Agricultural Science & Technology (K), Shalimar Campus, Srinagar-191 121 (J&K)		-	16
32	Visva Bharati, Palli Siksha Bhavana, Shantiniketan (W.B.)		-	8

General University, Affiliated College and their approximate Annual Intake Capacity:

S. No.	University	Affiliated College	B.Sc. (Horticulture)	M.Sc. (Horticulture)
1	V.B.S. Purvanchal University, Jaunpur - 222 002 (U.P.)	P.G. College, Ghazipur (U.P.)	-	13
	V.B.S. Purvanchal University, Jaunpur - 222 002 (U.P.)	Shri Durgaji Degree College Chandesar, Ajamgarh (U.P.)	-	15
2	Chhatrapati Shahu Ji Maharaj University Kanpur - 208 024 (U.P.)	Kulbhaskar Asharam College, Allahabad, (U.P.)	-	12
3	Bundelkhand University, Jhansi, (U.P.)	Department of Biological Sciences, Jhansi, (U.P.)	-	22

4	Dr. B.R. Ambedkar Central University Lucknow - 226 025 (U.P.)		-	15
5	Dr. B.R. Ambedkar University, Agra-282 004 (U.P.)	B.R. College Agra (U.P.)	-	10
6	Indira Gandhi Krishi Vishwavidyalaya, Raipur - 492 006, (Chhattisgarh)	Dhanteshawari College of Horticulture (Chhattisgarh)	48	-
	Indira Gandhi Krishi Vishwavidhayalaya, Raipur-492 006, (Chhattisgarh)	K.L. College of Horticulture, Dhamtari, (Chhattisgarh)	48	-
	Indira Gandhi Krishi Vishwavidhayalaya, Raipur - 492 006, (Chhattisgarh)	Gayatri College of Horticulture, Dhamtari, (Chhattisgarh)	48	-
	Indira Gandhi Krishi Vishwavidhayalaya, Raipur-492 006, (Chhattisgarh)	College of Horticulture Bilaspur (Chhattisgarh)	48	-
7	Annamalai University Annamalainagarn - 608 002 (Tamil Nadu)		50	10
8	Tamil Nadu Agriculture University Coimbatore- 641 003 (Tamil Nadu)	Pt. Jawahar Lal Nehru Agriculture College and Research Institute Karaikal, (Tamil Nadu)	-	5
9	Hemwati Nanadan Bahuguna Garhwal University Dehradun- 246 174 (Uttarakhand)	Hemwati Nanadan Bahuguna Garhwal University, Srinagar College Campus (Uttarakhand)	-	30

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6.19.1 Career in Hospital Management – the concept

Professional management of the hospitals, i.e. hospital management is a nascent filed. Hospital management is the management of various activities taking place in the hospitals in a very systematic manner. It demands a perfect co-ordination of the activities taking place in the hospitals so that the patients are provided with the best nursing care. For this purpose, the hospitals require distinct professionals who could take up the task of managing the hospital on professional lines.

6.19.2 Requisite Educational Background/Entry Route

Bachelor's degree in medicine (MBBS/BAMS/BHMS/BDS) or equivalent or allied recognized by the university or bachelor's degree in nursing with 50% marks (recognized by University) and five years experience/Bachelor's Degree in Arts/Commerce or Science with 50% marks and five years' experience in health care field/hospitals.

Options are available for both medical as well as non-medical graduates:

- 3 years in hospital management meant for medical graduates
- Post-graduate Diploma in Hospital management and Health Care
- Two years part time (4 semesters)

Management practices, resources management, health economics, quantitative research techniques, health and development organizational behavior, Institutional management behavioral science etc are some of the topics especially covered under the hospital management course in order to make it a perfect package of theories and practices required to run a hospital efficiently.

6.19.3 Skills/Specialisation

To run a hospital efficiently, one should have the skills to undertake following activities of hospital management

- Planning
- Execution
- Organization
- Co-ordination
- Monitoring and Evaluation

6.19.4 Job Opportunities

The major employers for qualified persons in Hospital Management are:

- Hospitals
- Nursing Homes
- Educational Institutions offering courses in this field

6.19.5 Universities/Colleges/Institutes Offering Courses

- AIIMS, Ansari Nagar, New Delhi – 110029 (Non-medical/sponsored graduates with 60% marks and seven years work experience in administrative position in a hospital are eligible to apply.
- Armed Forces Medical College, Sholapur Road, Pune – 411040.
- Kasturba Medical College, Manipal – 576119
- Nizam's Institute of Medical Sciences, Panjagutta, Hyderabad – 500082
- The National Institute of Health and Family Welfare, New Mehrauli Road, Munirka, New Delhi – 110067 (It offers P.G. Certificate courses in Health and Family Welfare Management through Distance Learning)
- University of Delhi. Faculty of Management Studies, New Delhi -110007 www.fms.edu

(The above list is only indicative).

6.20.1 Career in Information Communication & Technology – the concept

Information and Communication Technologies (ICTs) are vital in the development of nations, particularly developing countries. It allows nations to achieve development goals by speeding up the production process, enhancing creation and sharing of knowledge and connecting individuals, groups, enterprises and governments in speedy and cost effective manner. Information and Communication Technology (ICT). ICT is emerging as a big industry in India, besides providing and creating large-scale employment opportunities for the ICT professional. It is primarily concerned with the processing of information, which is found in many forms including information required for business transactions, booking seats for travel, management or materials and products during manufacturing process controlling and coordinating satellite systems, content development and public, material and process management.

Change in socio-economic and technological developments are compelling organizations to adopt ICT in order to develop solutions pertaining to problems arising from new organizational forms and work arrangements. ICT professional have a crucial and challenging part to play in the effective application of computers and computing technology to achieve effective processing of information.

6.20.2 Requisite Educational Background/Entry Route

First Entry Level

In order to start ICT career there are two entry points. FIRST ENTRY POINT would be the science stream mathematics at 10+2 level. At this level various options are BE (Computer Science), B.Tech (Computer Science), B. Tech (Computer Science), Bachelor in Computer Science (BCA), Bachelor in Science with Information Technology (B.Sc-IT). Diploma courses or certificate courses.

Second Entry Level

It starts after graduation in Science with mathematics up to graduation level. Here one can go for Master in Computer Science (MCA), Master of Technology (M.Tech), Master in Science with Information Technology (M.Sc-IT), Master in Computers management (MCM), Post Graduate Diploma in Computer Applications (PGDCA) etc. In addition to the pre-requisites mentioned above, their will be entrance test for entry in ICT career at both levels. Mathematics remains one of the prerequisite at both levels for entry into ICT career. However, various Universities especially Open Universities and those, offering the above courses through distance mode of learning are keeping admission open for other streams like Commerce, Biology and Arts.

6.20.3 Skills/Specialisation

Releasing the potential for development in ICT sectors, Ministry of Information Technology, Government of India, has implemented various schemes/programmes for the promotion of ICT and to create sufficient human resource. Some of these schemes are Communication and Strategic Electronics, Component and Material Development, Centre for Development of Advance Computing (C-DAC), Technology Development for Indian Languages (TDIL), E-commerce and Information Security, Software Technology Parks (STPs), Digital DNA Parks, E-Governance, Department of Electronics Accredited Computer Courses (DOEACC), Education and Research Network (ERNET), National Information Centre (NIC) etc.

DOEACC, Society is engaged in generation of quality manpower and development of skilled professionals in the areas of information, electronics and communication technologies and allied areas. It provides world class education and trainings to learners and trainers through active design and development of innovative curriculum based on changing ICT scenario.

Software Technology Parks of India are rendering services for the software exports. The exports made by STPI units are growing day by day, due to the gradual shift from on-site software development to offshore software development. Centre for Materials for Electronics Technology (C-MET) is engaged in development of viable technology in the area of electronics, ERNET, India is running a nation wide academic and research network., providing contents to the users in the education and research.

6.20.4 Job Opportunities

Job opportunities for ICT professionals can be classified into three broad areas:

➤ Information Systems
➤ Computer System Engineering
➤ Computer Science

Information Systems

The majority of employment can be found in the application of computer to create business information systems. The background of the professionals is desired to be

accountancy or management supplement to the training in compute technology. Job description will be concerned with designing and implementing systems to collect information from customers or business transactions, data validity, handling & management of data on computer systems, report generations, website developments and materials management.

Computer System Engineering

Regardless of whether they develop software or hardware, engineer's job is to repair the computers that are not functioning properly. Software engineers develop computer software systems, such as those that control manufacturing process. These professional have strong programming skills. Most hardware engineers are involved in the development of hardware such as compute chips. However, some hardware engineers put together system in order to handle client's needs. They supervise the installation of the system and monitor its performance. There is another group of engineers who are working on database system for design, development and administrator or developer uses database management system software to organize, store and retrieve data. They are generally well versed with the operating system, database management systems and programming.

Computer Science

In this field, professionals may undertake research for design of sophisticated, hardware or software. They may be providing conceptual or practical ideas about how new hardware or software can be developed, implemented or managed.

6.20.5 Universities/Colleges/Institutes Offering Courses

The following Universities/Institutes are providing education and career opportunities through BE (Computer Science), B. Tech (Computer Science), Bachelor in Computer Science (BCA), Bachelor in Science with Information Technology (B. Sc-IT), Master in Computer Science (MCA), Master of Technology (M. Tech), Master in Science with Information Technology (M. Sc-IT), Master in Computer Management (MCM), Post Graduate Diploma in Computer Applications (PGDCA), Diploma courses or certificate courses:

1.   Department of Computer Science, Alagappa University, Karaikundi – 630003
2.   Department of Computer Science, Andhra University, Visakhapatnam – 530003
3.   Department of Computer Science and Engineering, Annamalai University Annamalainagar – 608002
4.   Department of Computer Science, Bharathidasan University, Tiruchirappali website: http\\www.bduernet.in.
5.   Department of Computer Engineering, Birla Institute of Technology and Science, Pilani – 333031;Website: http\\www.bits-pilani.ac.in
6.   Post-Graduate Department of Computer Science, University of Kashmir, Hazratbal Campus – 190006
7.   Department of Computer Science, University of Delhi, Delhi – 110007
8.   Institute of Computer Science, Guru Ghasidas University, Bilaspur – 495009

9. Department of Computer Science, Guru Jambheshwar University,Hisar – 125001, Haryana

10. Department of Computer Science, University of Hyderabad. P.O. Central University, Hyderabad – 500046

11. Institute of Computer Science and Engineering, Jamia Millia Islamia, Jamia Nagar, New Delhi – 110025

12. Department of Computer Science, University of Jammu, Dr B R Ambedkar Marg, Jammu – 180004

13. Department of Computer Science, University of Mysore, Mysore – 570006

14. Department of Computer Science, Osmania University, Hyderabad – 500036

15. Department of Computer Science. Madurai Kamaraj University, Palkalainagar, Madurai, Tamil Nadu – 625021 Website; http\\mku.ac.in

16. Centre for Computer Science and Engineering, Anna University, Chennai

17. School of Computer Engineering, Jawaharlal Nehru Technological University, Mahaveer Marg, Hyderabad – 500008

18. School of Computer Science, Kakatiya Univesity, Warangal – 506009

19. Department of Computer Science, Kurukshetra University, Kurukshetra – 136119 Website: http\www.kuk/ernet.in

20. Institute of Computer Science, University of Madras, Chepauk, Chennai – 600005

21. Department of Computer Science, Manonmaniam Sundaranar University, Abishakapathi, Thirunelveli – 627012

22. Institute of Computer Science, University of Mumbai, Mumbai – 400098

23. School of Computer Science, Mother Teresa Women's University, Saidapet, Chennai – 600015

24. Centre for Computer Science and Engineering, Osmania University, Hyderabad – 500007   Website: http\\www.ou.org

25. Department of Computer Science, Utkal University, Bhubaneswar – 751004

26. Department of Computer Science, Dr B R Ambedkar Open University, Prof. G Ram Reddy Marg, Road No 46, Jubilee Hills, Hyderabad – 500033

27. School of Computer Science, Indira Gandhi Open University, Maidan Garhi, New Delhi – 110068, Website: http\\www.ignou.ac.in

28. Department of Computer Science, Karnataka State Open University, Manesagangotri, Mysore – 570006

29. Department of Computer Science, Kota Open University, Rawatbhate Road, Akelgarh, Kota – 324010

30. Madhya Pradesh Bhoj Open University, Campus I, Red Cross Bhawan. Shivaji Nagar,   Bhopal – 462016   Website: htpp\\www.mpbou.org

31. Yashwantrao Chavan Maharashtra Open University, Dnyangangotri, Near Gangapur Dam,   Nashik – 422222

32. Department of Electronics Accredited Computer Courses (DOEACC), Centre Kozhikode/Sringar/Jammu/Bangalore

33. Centre for Design of Advance Computing (C-DAC), Mohali, Punjab
(The above list is only indicative).

6.21.1 Career in Life Sciences – the concept

Life science or biological science is a science which deals with living organisms, their life process and their interrelationships, such as biology, medicine or ecology. It is a

synthesis of several traditional disciplines including biology, zoology, botany and newer more specialized areas of study such as biophysics, biochemistry, microbiology, etc. Essentially, life science is the scientific study of the living world as a whole.

An interest in biology may lead you to insights into how the natural world works and to careers where you can develop new treatments for people who are suffering from diseases or find better ways to grow plants to be used as food around the world, as also design strategies to protect endangered plant and animal species and even become educators to teach a new generation of biologists.

6.21.2 Requisite Educational Background/Entry Route

It is advisable that to become Life scientists or biologists the students should have a strong base in science, starting with physics, chemistry, biology and mathematics at the plus two level. During B. Sc. it is possible to specialize in one of the biological sciences or in life science. Post-Graduation leads to opportunities for placement in academia, industry or research.

Most Universities offer the basic biological science degree courses, but physiology, anatomy, marine biology science, ecology, food science or wildlife biology courses are available at postgraduate level in only a few universities. Biotechnology, bioinformatics and forensic science are the new directions in the biological life sciences. Biotechnology and bioinformatics are also available as a technological discipline.

Joint CSIR-UGC Test for Junior Research Fellowship and eligibility for Lectureship held twice a year in the months of June and December in the Life Science can lead to opportunities in research with a fellowship in premier institutions and lectureship in universities across the country.

A Ph. D degree from a nationally reputed institution enhances placement and advancement prospects.

6.21.3 Skills/Specialisation

> Anatomists study the form and structure of animal bodies.
> Biochemists study the chemical composition and behaviour of living things and attempt to understand the complex reactions involved in reproduction, growth, metabolism and heredity.
> Biophysicists study the physical principles within living cells and organisms.
> Botanists study plants and the environment.
> Ecologists study the relationship between organisms and their environment

> Food scientists study the chemical, physical, and biological nature of good to learn how to safety produce, preserve, package, distribute and store it.

> Geneticists study heredity in various forms of life.

> Marine biologists study the development, function, and environment of plant and animal life in the ocean.
> Microbiologists investigate microscopic organisms such as bacteria, viruses, algae, yeasts, and moulds
> Molecular biologists apply their research on animal and bacterial systems, with the goal of improving and bettering the understanding of human health.

➢ Physiologists are biologists, who specialize in studying all the life stages of plants or animals.

➢ Wildlife biologists study the habitats and the conditions necessary for the survival of birds and other wildlife.

➢ Zoologists study the origin, behaviour, diseases, and the life processes of animals.

6.21.4 Job Opportunities

Life sciences can lead to careers in academic research, product development, process development, consulting and teaching. Biological scientists who work in applied research or product development use knowledge provided by basic research to develop new drugs, treatments and medical diagnostic tests; increase crop yields and protect and clean up the environment by developing new bio-fuels.

Biological scientists may work for the Government, in Academic Institutions or in Industry. They may join various sectors including Health, Agriculture, Food, Pharmaceutical, Biotechnology, Waste Management and Environment Protection.

Teaching offers exciting opportunities whether it is in schools, colleges, universities or in private tuitions.

6.21.5 Universities/Colleges/Institutes Offering Courses

- Tata Institute of Fundamental Research, Mumbai (www.tifr.res.in/)

- National Centre for Biological Sciences, Bangalore (www.ncbs.res.in)

- Institute of Life Sciences, Bhubaneswar (www.ilsc.org)

- National Centre for Plant Genome Research, JNU Campus, New Delhi (www.ncpgr.nic.in)

- National Institute for Research in Reproductive Health, Jehangir Merwanji Street, Parel, Mumbai – 400012

- Institute of Life Sciences, Hyderabad (www.ilsresearch.org)

- Dr B. R. Ambedkar Centre for Biomedical Research, University of Delhi (www.acbrdu.edu)

- Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad (www.cdfd.org.in)

- Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram (www.rcgb.res.in)

- Institute of Microbial Technology, Chandigarh (http//imtech.res.in)

- Centre for Cellular and Molecualr Biology, Hyderabad (www.ccmb.res.in)

- Jawaharlal Nehru Centre for Advanced Scientific Research (A Deemed University), Bangalore (www.incasr.ac.in)

(The above list is only indicative).

6.22.1 Career in Microbiology – the concept

Microbiology is the study of organisms that are usually too small to be seen by the naked eye (unaided). Microbiology is a large discipline, which has a great impact on other

areas of biology and general human welfare. Society benefits from Micro-organisms (M.Os) in many ways. They are necessary for the production of bread, cheese, beer, antibiotics, vaccines, vitamins, enzymes and many other important products. Indeed, modern biotechnology rests upon a microbiological foundation. M.Os are indispensable components of our ecosystem. They make possible the cycles of carbon, oxygen, nitrogen and sulfur that takes place in terrestrial and aquatic systems. They are also source of nutrients at the base of all ecological food chains and webs.

6.22.2 Requisite Educational Background/Entry Route

The minimum educational qualification required is B.Sc Microbiology. After B. Sc. Microbiology graduates can pursue higher studies like M. Sc., Applied Microbiology, Medical Microbiology, M. Sc., Food Microbiology, M. Sc. Industrial Microbiology, M. Sc. Genetics, M. Sc., Biotechnology, M. Sc., Industrial Biotechnology, M. Sc., Bio-Informatics, M. Sc. Microbial Technology, M. Sc., Clinical Research, M. Sc., Molecular Biology, M. Sc., Bio-chemistry, M. Sc. Forensic Science. M. Sc., Hospital Management. In addition P.G. Diploma in Hospital Administration run by Indian Institute of Hospital Management and Research, Jaipur.

6.22.3 Skills/Specialisation

Medical microbiologists identify the agent causing an infectious disease and plan to eliminate it. Frequently they are involved in tracking down new unidentified pathogens such as the bacterium that cause plague, legionnaire's disease and the virus responsible for AIDS, SARS (Severe Acute Respiratory Syndrome) and Avian flu. These microbiologists also study the ways in which M.Os cause disease. The other related specializations are Public health microbiology, Agricultural microbiology, Microbial ecology , Food and Dairy microbiology, Industrial microbiology

6.22.4 Job Opportunities

The following kinds of opportunities can be availed:

- ➢ As Medical Representatives
- ➢ As Research and Development Scientists
- ➢ As Academician
- ➢ As Microbiologist in Diagnostic Laboratories
- ➢ In Quality Control Departments/Divisions
- ➢ Take up Self-Employment
- ➢ Take up Research work in Laboratories after qualifying NET
- ➢ After qualifying GRE and TOFEL, avail global opportunities for higher studies.

6.22.5 Universities/Colleges/Institutes Offering Courses

A large number of Colleges, Institutions and Universities are providing education in Microbiology.

6.23.1 Career in Non-Conventional Energy Sources – the concept

With a strong industrial base and successful commercialization of technologies in wind, solar thermal, solar photo-voltaics, biogas and improved biomass stoves, small hydel, today India is in a position today to offer 'state of the art' technology to developing countries and is emerging as a leader in the global movement towards sustainable energy development.

6.23.2 Requisite Educational Background/Entry Route

There are a number of specialized courses & training programmes conducted by various Institutions, as briefly mentioned hereunder:

Course in renewable energy for engineers and technicians and for administrators of government and voluntary agencies.

Course for teachers, students, social workers, administrators etc.

Eco-friendly aquaculture training for biology graduates (job oriented), backyard pond and aquarium culture training for general citizens to create awareness.

Environment related workshops and seminars for religious leaders, seminarians and trainees.

Energy management training programs for large industries and institutions, for small industries and institutions.

Training workshops on rain water utilization and waste water management for general citizens, institutions and industries.

Training programmes for solar P.V. and thermal system installation for encouraging young technicians.

6.23.3 Skills/Specialisation

New Technologies: Emerging Renewable Options:

Chemical storage of energy, Fuel cells, Hydrogen energy, Geothermal energy. Alternative fuels for surface transportation, Bio-fuels, ocean & Tidal energy.

Power Generation Technologies:

Wind Mills, Small Hydro-Power, Bio-Mass Energy and Co-Generation, Energy from Wastes, Solar Energy Technologies, Solar Photo-Voltaics, Solar Thermal.

Rural Energy Technologies:

Biogas, Energy efficient wood burning cook stoves (improved chullahas). Integrated rural energy program.

6.23.4 Job Opportunities

After acquiring qualification and training in non-conventional energy sources, the candidates can offer consultancy in:

- Solar thermal testing, standardization and system design
- SPV testing, standardization and system design
- Material testing
- Solar thermal power generation
- Interactive research and development
- Technology assessment report, at national and international levels
- Integration of solar and conventional systems
- Financial and cost benefit analysis
- Assessment of improvement in environment
- Diagnostic studies for performance improvement for existing systems
- Designing of energy efficient buildings using solar passive concepts
- Energy Auditor/assessor

6.23.5 Universities/Colleges/Institutes Offering Courses

1. CSER-TD (Centre for Solar Energy Research-Technology Dissemination) T.P.K. Road, 625001 Madurai.
2. Karpagam Polytechnic College, Main Road, Eachanari 641021, Coimbatore.
3. Renewable Energy Centre – Mithradham – Chunangamveli, Aluva, Kerala.
4. Indian Renewable Energy Development Agency (IREDA).
5. Three organizations under Ministry of New & Renewable Energy, (MNRE) for technology development, testing and certification of RE systems are:
   o Solar Energy Centre (SEC), Gurgaon, Haryana.
   o Centre for Wind Energy Technology (C-WET), Chennai, Tamil Nadu.
   o Sardar Swarab Singh National Institute of Renewable Energy (NIRE), Jallandhar, Punjab.
6. Solar Energy Centre (SEC) of Ministry of New & Renewable Energy, (MNRE) New Delhi is actively involved in different activities concerning with design, development, testing, standardization, consultancy, training and information dissemination in the field of solar energy.
7. The School of Energy Studies at Jadavpur University. It is a multidisciplinary unit coordinating activities in different University departments for creation of energy awareness, advocacy and promotion of non-conventional energy sources, and conducts research and development activities, The School offers a 3-semester M.Tech. Course in Energy Science & Technology. Certificate course on Energy Management & Audit as well as shorter courses on utilization technologies in the fields of Solar Photovoltaics, Solar Thermal, Wind Energy, Biogas, Biomass, Photochemical Mini-micro Hydel and Energy Management.

8.   Energy Systems Engineering (ESE) at IIT, Bombay.

9.   Maharashtra Energy Development Agency (MEDA) – Pune.

6.24.1 Career in Nano-technology – the concept

Nanotechnology is the technology that is based on the scale of nanometers. One nanometer is equal to one-billionth 10-9 of a metre. It is 5,000 to 50,000 times smaller than the diameter of a human hair. Compared to a metre, one nanometer is roughly of the same proportion as a golf ball is to the Earth. Nanotechnology is a new interdisciplinary subject combining physics, chemistry, biology and engineering. The goal of Nanotechnology is the control of individual atoms and molecules in the creation of computer chips and other devices which are many a time smaller than those created by the usage of current technology.

6.24.2 Requisite Educational Background/Entry Route

Presently, no course in Nanotechnology is offered at the graduation level in any reputed institute in India. However, the IIT's are considering the option of starting a B. Tech Programme in Nanotechnology.

The eligibility criteria for studying Nanotechnology at the post gradation level is Bachelor's Degree with major or honors in Physics, Chemistry, Life Science and with PCM (Physics, Chemistry and Mathematics) as subsidiary subjects. In order to pursue a PhD programme in Nanotechnology, one should have completed an M.Tech in Mechanical, Chemical, Electronic, Biotechnology, Computer Science etc. or an M.Sc in Physics, Chemistry, Material Science, Biotechnology, Computer Science etc.

6.24.3 Skills/Specialisation

One should have a scientific bent of mind and a natural propensity for research work in order to study Nanotechnology, an open and enquiring mind with sound analytical and computer programming skills is a must in this field.

The scope and application of Nanotechnology is tremendous and mind-boggling. According to the scientists, 21st century would be the Nanotechnology century. It is estimated that Nanotechnology would revolutionize every area, be it medicine, aerospace, engineering, various industrial and technological areas, health or any other field. Nanobiotechnology can make tiny medical devices and sensors with fantastic military and civilian use. Converting sunlight into power, targeting a drug to a single malignant cell, cleaning ponds and creating sensors in the form of biochip, to be interested in the human body are some of the important landmark break through of Nanotechnology. The technology has the potential to produce garments which can block chemical and biological weapons from touching the skin of a person.

6.24.4 Job Opportunities

With a professional degree in Nanotechnology, one will get job opportunities in biotech companies among several others avenues. In a biotech company, one's work profile may include the fabrication of miniature systems and devices to be used in Nanomedicine or working on a nanoparticle-based molecular system for detecting biological warfare agents. One will also find employment opportunities in large pharmaceutical companies where one can work on the delivery process of drugs or on the development of a new therapeutic drug.

There are a lot of opportunities available in the field of research in Nanotechnology; various research programmes in Nanotechnology are funded by the Government and Universities across the country.

Currently, there are around 500 companies in the market who offer nanotech products while another 150 odd institutions are involved in research work in Nanotechnology, The Government of India offers considerable support for the generation of awareness and promotion of Nanotehnology, Two schemes releated to Nanotechnology - the Nanoscience and Technology Initiative launched by the Department of Science and Technology and the Science and Technology Initiatives in Nanotechnology – are being promoted by the Government of India.

Several other work opportunities are also available in Nanotechnology, apart from that of a scientist or an engineer, business development and administration, legal areas, and sales and marketing are few other areas, where on can work in the field of Nanotechnology.

With a professional degree in Nanotechnology under one's belt, one can work as a scientist, academician, biotechnologist, systems designer, research officer or product designer.

Nanotechnology impacts all major sectors like solar energy, aerospace, environment, telecommunications, computing, etc. Nanotechnology has been widely used in number of movies, television series and video games too. It is the technology of the future. Remuneration: Generally, the starting salary for one to Rs.12,00,000per annum. Nanotechnology is a booming industry which is expected to throw up a large number of job opportunities with handsome pay packages in the future. Remuneration can vary from Rs. 60,000 to Rs. 12,00,000 per annum depending upon qualification.

6.24.5 Universities/Colleges/Institutes Offering Courses

- Panjab University, Chandigarh M. Tech, Nano Science & Nano Technology.
- University of Madras- M.Sc., M. Tech in dual degree - Nanoscience and Nanotechnology
- The Indian Institute of Technology at Chennai.
- The Indian Institute of Technology at Kanpur.
- The Indian Institute of Technology at Mumbai.
- The Indian Institute of Technology at Kharagpur.
- The Indian Institute of Technology at Delhi.

- The Indian Institute of Technology at Guwahati.
- Indian Institute of Science- Masters
- Jadavpur University at Kolkata- Masters, PhD
- Amity University, Noida – Bachelors & Masters Integrated

6.25.1 Career in Packing Technology – the concept

Packaging is the art, science and technology of protecting or enclosing products for distribution, storage, sale and use. Packing also refers to the process of design, evaluation and production of packages. It is used for several purposes:

6.25.2 Requisite Educational Background/Entry Route

- ➢ Two years Post Graduate Diploma in Packaging.
- ➢ Four years Engineering (B. Tech) in Packaging Technology.
- ➢ One year Packaging Management course.
- ➢ Three years Diploma in Packaging Technology.
- ➢ Three months intensive course in Packaging.

For admission in two years full time Post Graduate Diploma Graduate in Science (12+3), with Physics, Chemistry, Mathematics, Microbiology (anyone as main subject)or Agriculture/Food Science or Engineering or Technology with minimum second class are eligible to apply. Students awaiting result may also apply. Admission is through entrance test conducted by the institutes.

For admission into Four Years Engineering course in Packaging Technology, students with 10+2 Science stream with minimum 50 percent aggregate are eligible for the entrance test. Admission is through AIEEE(All India Engineering Entrance Examination)conducted by CBSE(Central Board of Secondary Education) every year.

For three months full time intensive training course, Graduates in Science/Engineering/ Technology, Commerce or Diploma in Engineering/Technology are eligible. Admission is through registration.

For three years Diploma in Packaging, the candidates must have passed Secondary School Certificate examination of Maharashtra State Board of Secondary Examination, Pune or any other equivalent examination with at least 50 percent marks and at least 45 percent marks aggregate for backward class candidates. Selection for admission is through the basis of inter-se-merit of the candidate.

Besides one year graduate technology course in packaging, both part-time and distance mode is also offered by various institutes in India and abroad.

6.25.3 Skills/Specialisation

Packaging makes a bridge between production and marketing. Virtually every product, whether grown or manufactured, must be packaged so that it reaches the consumer in an acceptable condition. Packaging is now generally regarded as an essential component of our modern lifestyle and the way business is organized. Packaging today is identified as a need for industrial growth and economic development of a country.

6.25.4 Job Opportunities

The demand for trained and qualified packaging technologist is quite high. Packaging technologists ensure that products are safely and appropriately packaged. Packaging industry offers a multi disciplinary career. It offers a great career with lot of growth potential. There is no doubt that the sheer range of careers in packaging industry is formidable. The majority of packaging technologists start their careers in quality control or product development or production engineer or purchase department or in packaging departments by user industries. They also have an opportunity to join in quality control of production department of packaging materials converting industries. Typically careers start in packaging technologist and many follow a career path through senior technologist roles to become packaging development manager or head packaging. Salaries for packaging technologists vary with the employer and levels of responsibility. Mostly placement is through campus interview. The emoluments of students are in range of about Rs20,000 to Rs 25,000 per month.

6.25.5 Universities/Colleges/Institutes Offering Courses

1. Indian Institute of Packaging, Block CP, Sector V, Salt Lake, Bidhan Nagar, Kolkata, West Bengal   Email: iipacal@cal.vsnl.net.in
2. Indian Institute of Packaging, Plot169, Industrial Estate, Perungudi, Chennai, Tamil Nadu, Email: iipche@giasmd01.vsnl.net.in   Website: www.iip-in.com/
3. Indian Institute of Packaging, E-2, MIDC Area, Chakala, Andheri(E),P.O. Box 9432, Mumbai, Maharashtra   Email: iip@bom3.vsnl.net.in   Website: www.iip-in.com
4. Indian Institute of Packaging, 21, Functional Industrial Estate, Patpargang, Opp. Patpargang Bus Depot, New Delhi
5. Indian Institute of Packaging, Lux-3, Industrial Estate, Hyderabad – 500 018, A.P. Email: karnaips@yahoo.co.in
   Serial number 1 to 5 offers two year Post Graduate Diploma and three months certificate course in packaging.
6. Department of Printing Technology, Guru Jambheshwar University of Science & Technology, Hisar-125001, Haryana. Email:anjan_baral2222@yahoo.co.in
   This department offers four years Engineering in Packaging Technology.
7. Department of Printing Technology Institute of Mass Communication & Media Technology, Kurukshetra University, Kurukshetra, Haryana
   This institute offers four years engineering in Printing & Packaging.
8. Department of Packaging Technology, Government Polytechnic, Magalway Bazar, Sadar, Nagpur, Maharashtra - 440 001
   This department offers three years Diploma in Packaging Technology
9. SIES School of Packaging Technology Center, Shri Chandrasekarendra Saraswathy. Vidya Puram, Plot IC Sector 5,Nerul Navi Mumbai – 400 706 Maharashtra   Email: siescom@vsnl.net

This institute offers various courses like, Graduate Course, Post Graduate Diploma and number of short duration hands on laboratory trainings in Packaging.
This list is indicative

6.26.1 Career in Pest Management – the concept

Pest controllers provide a variety of services, including building inspections, chemical applications, setting and maintaining traps and creating physical barriers to prevent infestation. To succeed in this job, one needs to have a thorough knowledge of a pest's habits. And, of course, one has to get over one's fear of insects and rodents.

6.26.2 Requisite Educational Background/Entry Route

Supervisors and technical officers should be Science graduates or posses a degree in Agriculture. There is no institution in India that offers a formal degree in Pest Management. However, the Centre for Technological Research Institute in Mysore offers a theoretical course in Pest management. The Purdue University in the US offers a correspondence course in the same. The British Pest Control Association also offers a formal degree.

6.26.3 Skills/Specialisation

A lot of this job involves applying toxic chemicals and hence pest controllers must be well-trained to protect their own health and the health of their clients. Since chemicals can be dangerous and pests are increasingly resistant to pesticides, pest controllers must be well-versed with a wide range of pest control techniques. A part of this wide spectrum of methods is the ability to train clients to prevent infestations.

A thorough knowledge of the biology and behaviour of pests and pesticides and their effects on both pests and humans is required. Good communication skills are also required as the job involves face-to face interaction with clients.

Apart from these qualities, the person need to be fit and in good health as the job is physically demanding. People with breathing problems should be careful as this job involves handling chemicals. Good presentation skills, problem-making abilities, a positive attitude and a strong work ethic is something that is required to make it big in this industry.

6.26.4 Job Opportunities

As Operator: One who takes orders from the Call Office and carries out pest control at the client's site. HSC pass candidates are considered for this job. Those with two-three years experience are also considered.

As Supervisor: The most senior operators become supervisors. They lead a team of operators and supervise the entire treatment process, look after the scheduling, mobilizing of materials, ensure the timely completion of projects and prepare the necessary documents.

As Technical Officer: One who heads the operations department. The Technical Officer, also called Senior Technician, analyses the pest infestation along with a team and decides the procedure to be adopted. His job is to co-ordinates with clients and is also responsible for the billing.

Prospects: The vast majority of pest controllers work in the pest control industry, servicing private homes and businesses. However, some work for building and property management companies. Many eventually open their own business. You may also look for franchising options in this industry.

6.26.5 Universities/Colleges/Institutes Offering Courses

As stated above, there is no institution in India that offers a formal degree in Pest Management. However, the Centre for Technological Research Institute in Mysore offers a theoretical course in Pest Management. The Purdue University in the US offers a correspondence course in the same. The British Pest Control Association also offers a formal degree.

6.27.1 Career in Pharmacy – the concept

Keeping in view the large scope and significance of pharmacy the Union Ministry of Health and Family Welfare, Government of India constituted a statutory body "Pharmacy Council of India", under the Pharmacy Act 1948. This Council is responsible for prescription, regulation and maintenance of minimum educational standards for the training of pharmacist and their registration throughout the country. The Council prescribes syllabus rules and regulations for diploma, graduate, postgraduate courses.

6.27.2 Requisite Educational Background/Entry Route

To have a successful career in Pharmacy an aspirant after 12th can opt for D. Pharma or B. Pharma either with physics, chemistry and mathematics or with physics, chemistry and biology both stream of students can join above courses. In India pharmacy education is a two tier system. D. Pharma, a basic and diploma course in a pharmacy is of two year while, B. Pharma is a four year degree course in pharmacy. After completing D. Pharma one may directly take admission in B. Pharma on the basis of lateral entry. Admission to these courses comes along with medical or other entrance examinations or separately in May/June of every year. Some institutions/universities and their affiliated colleges also have selection on the basis of marks obtained in qualifying board examinations.

6.27.3 Skills/Specialisation

After B. Pharma one may enter into higher education as M. Pharma for specialization. Presently there are about eight specializations available in various institutions/ universities across the country. After M. Pharma one may register himself/herself for Ph. D. or post-doctoral degree in some premier institutes, universities or abroad.

6.27.4 Job Opportunities

The discipline of pharmacy has a good future, offering wide range of employment opportunities with an excellent salary. Only with an undergraduate degree one may easily enter into pharmaceutical associated jobs as described below. However, one can take up teaching/research as a career with M. Pharma and Ph. D degree only.

Career opportun.	Potential Employer	Job Description
Pharmacist	Public & Private Hospital	Monitor drug therapy, Prepare IV admixture, Oversee drug admin.
Coordinator	MNCs	Access patients complete record including lab test & diagnostic information.
Health Inspector	Universities/Institutions	Important role in nutritional support, pain management Home care.
Drug Inspector	Leading NGOs	Preparing prescription to patients
Technician	Chemical/Drug Analysis Lab.	Administrative functions like purchasing and meeting arrangement
Research Officer	Pathological Lab.	R & D
Scientist	Charitable Trusts Bio-tech Industries	

6.27.5 Universities/Colleges/Institutes Offering Courses

ASSAM
1.   Department of Pharmaceutical Sciences, Dibrugarh   B. Pharma

BIHAR
2.   Muzaffarpur Institute of Technology, Muzaffarpur   B. Pharma
3.   Bihar College of Pharmacy, Patna   B. Pharma

JHARKHAND
4.   Birla Institute of Technology, Ranchi   B. Pharma
                                                                M. Pharma

WEST BENGAL
5.   Jadavpur University, Department of Pharmacy   B. Pharma

ORISSA
6.   College of Pharmaceutical Science, Berhampur   B. Pharma
7.   Roland Institute of Pharmaceutical Science   B. Pharma
8.   Sri Jayave College of Pharmacy   B. Pharma
9.   Kanak Manjari Institute of Pharmaceutical Science, Rourkela   B. Pharma
                                                                M. Pharma
10.   College of Pharmacy Science, Mohud, Berhampur   B. Pharma
                                                                D. Pharma

MADHYA PRADESH

11.	College of Pharmacy, SGSITS Campus, Indore	B. Pharma
		M. Pharma
12.	Dr. Harisingh Gaur Vishwavidyalaya, Department of Pharmaceutical Science, Sagar	B. Pharma
		M. Pharma
13.	Vikram University, B. R. Nahata College of Pharmacy, Mandsaur	B. Pharma
		M. Pharma

DELHI

14.	College of Pharmacy, Mehrauli Badarpur Road New Delhi	B. Pharma
		M. Pharma
15.	Jamia Hamdard University, Department of Pharmacy, New Delhi	B. Pharma
		M. Pharma
16.	Delhi University. Delhi	B. Pharma

UTTAR PRADESH

17.	Department of Pharmaceutics, Institute of Technology BHU	B. Pharma
		M. Pharma
18.	Department of Pharmacy, Allahabad University Allahabad	B. Pharma
		M. Pharma
19.	Department of Pharmacy, AMU, Aligarh	B. Pharma
		M. Pharma
20.	Department of Pharmaceutical Science, Agra University, Agra	B. Pharma
		M. Pharma

UTTARAKHAND

21.	Bhagwan Singh Institute of Pharmacy, Dehradun	B. Pharma

HARYANA

22.	Hindu College of Pharmacy, Sonepat	B. Pharma
23.	Jambeshwar University, Department of Pharmacy, Hisar	B. Pharma

CHANDIGARH

24.	Institute of Pharmaceutical Science, Punjab University Chandigarh	B. Pharma
		M. Pharma

PUNJAB

25.	National Institute of Pharmaceutical Education, Mohali Punjab	B. Pharma
		M. Pharma

JAMMU & KASHMIR

26.	Department of Pharmaceutical Science, Kashmir University Campus, Hazartbal, Sringar	B. Pharma

MAHARASHTRA

27.	Institute of Pharmacy, Pusad	B. Pharma
28.	Prince K. M. Kundnani College of Pharmacy Mumbai	B. Pharma
		M. Pharma
29.	Bombay College of Pharmacy, Kalina, Mumbai	B. Pharma

30.	Maharashtra College of Pharmacy,	B. Pharma
	Latur	M. Pharma
31.	Department of Pharmaceutical Science,Nagpur	B. Pharma
32.	College of Pharmacy, Nasik	B. Pharma
		M. Pharma
33.	Poona College of Pharmacy, Pune	B. Pharma
34.	College of Pharmacy, Ahmednagar	B. Pharma
		M. Pharma
35.	Government College of Pharmacy, Satara	B. Pharma
36.	University Institute of Pharmaceutical Science, Mumbai	B. Pharma

RAJASTHAN

37.	M.G. College of Pharmaceutical Science, Jaipur		B. Pharma
38.	Birla Institute of Technology & Science, Pilani	(Hons)	B. Pharma
39.	Bhupal Nobels College, Department of Pharmacy		B. Pharma
	Udaipur		D. Pharma
40.	Lachoo Memorial of Science, Jodhpur		B. Pharma
			D. Pharma

GUJARAT

41.	Department of Pharmacy, M. S. University of Baroda	B. Pharma
42.	Lallubhai Motilal College of Pharmacy,	B. Pharma
	Ahmedabad	M. Pharma
43	A.R. College & G. H. Patel Institute of Pharmacy,	B. Pharma
	Vallabh Vidyanagar, Kheda	D. Pharma
44.	B. K. Mody Government Pharmacy College,	B. Pharma
	Polytechnic Campus, Rajkot	D. Pharma

GOA

45.	Goa College of Pharmacy, Panaji	B. Pharma

ANDHRA PRADESH

46.	Department of Pharmaceutical Science, J. V. D. College	B. Pharma
	of Science and Technology, Visakhapatnam	
47.	University College of Pharmaceutical Science, Warangal	B. Pharma
		M. Pharma

KARNATAKA

48.	Al-Ameen College of Pharmacy, Bangalore	B. Pharma
		D. Pharma
49.	Timmegowda Kengal College of Pharmacy, Bangalore	B. Pharma
		D. Pharma
50.	Government College of Pharmacy, Bangalore	B. Pharma
		M. Pharma
51.	MMU College of Pharmacy, Ramanagaram	B. Pharma
		D. Pharma
52.	PES College of Pharmacy, Bangalore	B. Pharma
		D. Pharma
53.	St. Johns Pharmacy College, Vijayanagar, Bangalore	B. Pharma
		D. Pharma

54.	Vutkoor Laxmaiah College of Pharmacy,	B. Pharma
	Raichur	D. Pharma
55.	College of Pharmacy, Gulbarga	B. Pharma
56.	Karnataka B. Pharmacy College, Bidar	B. Pharma
57.	College of Pharmacy, Nawbad, Bidar	B. Pharma
58.	Lugman College of Pharmacy, Gulbarga	B. Pharma
59.	College of Pharmacy, Campus JNMC	B. Pharma
	Belgaum	D. Pharma
60.	K.L.E. Society's College of Pharmacy, Hubli	B. Pharma
		D. Pharma
61.	College of Pharmaceutical Science, Kasturba Medical	B. Pharma
	College, Manipal	
62.	SJM College of Pharmaacy, JMIT Campus, Chitra Durga	B. Pharma
63.	SET College of Pharmacy, Dharwad	B. Pharma
64.	JSS College of Pharmacy, Mysore	B. Pharma
		D. Pharma

TAMIL NADU

65.	University Institute of Pharmaceutical Technology,	B. Pharma
	Annamalai University, Annamalainagar	
66.	CL Baid Mehta College of Pharmacy, Chennai	B. Pharma
		D. Pharma
67.	JKK Natarajah College of Pharmacy, Salem	B. Pharma
68.	JSS College of Pharmacy, Ootacamund	B. Pharma
		M. Pharma
69.	KM College of Pharmacy, Madurai	B. Pharma
70.	Periyar College of Pharmaceutical Science (for girls)	B. Pharma
	Tiruchirapalli	M. Pharma
71.	Sri Ram Krishna Institute of Paramedical Sciences, Coimbatore	B. Pharma
72.	Cheran College of Pharmacy, Coimbatore	B. Pharma
73.	Chennai Medical College, Chennai	B. Pharma

PONDICHERRY

| 74. | Pant Institute of Technology, Pondicherry | B. Pharma |

(The above list is only indicative).

6.28.1 Career in Physiotherapy – the concept

Physiotherapy means physiotherapeutic system of medicine which includes examination, treatment advice and instructions to any person in connection with movement, dysfunction, bodily malfunction, physical disorder, disability, healing and pain from trauma and disease.

The physiotherapist's skill are required by the health care team in most disciplines of medicine including surgery, neurology, orthopaedics, gynaecology, obstetrics, dermatology, ENT, cardiothoracic, vascular surgery, burns, plastic surgery, paediatrics, rehabilitation and sports medicine, etc.

6.28.2 Requisite Educational Background/Entry Route

1. Bachelor of Physiotherapy/B.Sc. (Hons) physical therapy
    Duration: 4 and ½ year (including Internship)
    Eligibility for admission : Inter Science with Biology with 50% marks
    Process of admission: Through entrance test.
    Entrance Test : held in April or May.
    Age: not less than 17 years

2. Master in Physiotherapy (M.P.T.)
    Duration: 2 years
    Eligibility: B.P.T. (4 and ½ years)
    Speciality: Neurology, Orthopaedic/Musculoskeletal, Sports, Cardiothoracic and Rehabilitation.
    Commencement of the course: The course commences from 1st April, every year.

6.28.3 Skills/Specialisation

The purpose of physiotherapy is to decrease body dysfunctions, reduce pain caused either by trauma, inflammation, degeneration and surgery. The various conditions in which physiotherapy is useful are as follows:

1. Management of a fracture and return to normal function is possible with simple methods of physiotherapy. It allows for regain of full joint movements and muscles power after healing of a fracture.
2. In joints and soft tissue injury rapid repair of damages tissue occurs with quick reduction of pain and swelling.
3. Restoration of full joint movements with reduction of pain and deformity is possible in various kinds of joint diseases like osteoarthritis, rheumatoid arthritis juvenile arthritis etc.
4. In degenerative disease of spine, physiotherapy arrests the progress of disease as in cervical spondylosis, ankylosing spondylosis. Suitable arthroses are also provided for giving support to spine. It also has a major role to play congenital disease of spine like spina-bifida.
5. Chest physiotherapy has a vital role to play in medical and surgical conditions like bronchial asthma, chronic obstructive lungs disease, pneumothorax but also surgical procedures involving spine, pelvis, extremities and abdomen.
6. In hemiplegia or paraplegia physiotherapy greatly helps the patient to gradually increase his mobility.
7. In children physiotherapy is assuming real importance in children with cerebral palsy, spina-bifida, clubfoot, muscular dystrophy etc.
8. It easies labour and return to normal after delivery. It is also useful in gynaecological problems like incontinence, prolepses of uterus, pelvis inflammatory disease.
9. Sports medicine – A physiotherapist is mandatory for any sport event. He maintains the fitness of sports person and provide first aid in case of various sports injuries.

6.28.4 Job Opportunities

Physical therapists practice in:

- Hospitals
- Nursing homes
- Residential homes/Rehabilitation centers
- Private offices/Private practices/Private clinics
- Out-patient clinics
- Community health care centers/Primary health care centers
- Fitness centers/Health clubs
- Occupational health centers
- Special schools
- Senior citizen centers
- Sports centers
- Teaching
- Foreign countries
- Companies
- N.G.O.
- Public settings (e.g. shopping malls)

6.28.5 Universities/Colleges/Institutes Offering Courses

A large number of Colleges, Institutions and Universities are providing education in Physiotherapy.

6.29.1 Career as a Plant Breeder – the concept

Plant breeding is a science based on principles of genetics and cytogenetics. It aims at meeting the ever-growing needs of food grains and other plant based raw materials of the world by improving the genetic make-up of the crop. Improved varieties are developed through plant breeding.

6.29.2 Requisite Educational Background/Entry Route

A graduate degree in Agriculture is essential to pursue postgraduate course. A post graduation in genetics and Plant Breeding or a Ph. D in Genetics and Plant Breeding is preferred. The field is also open for postgraduates in Botany. Botany students have to study basic courses of Agriculture in addition to the courses in Plant Breeding. These courses are offered exclusively in the Agricultural colleges.

6.29.3 Skills/Specialisation

A Plant Breeder should have the skills and objectives to improve yield, quality, disease resistance, drought and frost resistance and other desirable characteristics of the crop. Plant breeding has been crucial in increasing agricultural production. It is now practiced worldwide by government institutions and commercial enterprises.

6.29.4 Job Opportunities

Plant breeders can make a career in education and research in 31 Agriculture Universities in the country, 40 ICAR Institutes, Seed production Agencies of the Government such as National Seed Corporation, State Seed Corporations, SFCI, etc. International crop research institutes under CGIAR system also offer jobs to plant breeders.

Indian seed industry, which is, valued at US $ 1000 million also offers large number of jobs. There are more than 200 seed companies operating in India. Now opportunities are opening up in International seed industry also.

6.29.5 Universities/Colleges/Institutes Offering Courses

Some of the State Agricultural Universities offering Postgraduate courses in Plant Breeding are as under:

- Acharya N. G. Ranga Agricultural University (ANGRAU), Hyderabad, A.P.
- Anand Agricultural University (AAU), Anand, Gujarat;
- Assam Agricultural University (AAU), Jorhat, Assam;
- Bidhan Chandra Krishi Vishva Vidyalaya (BCKVV), Haringhatta, Nadia, West Bengal;
- Birsa Agricultural University (BAU), Kanke, Ranchi, Jharkhand;
- Central Agricultural University (CAU), Jroisemba, Imphal, Manipur;
- Ch. Sarwan Kumar Krishi Vishwa Vidyalaya (CSKHPKV), Palampur, Himachal Pradesh;
- Chandra Shekhar Azad University of Agriculture & Technology (CSAUT), Kanpur, Uttar Pradesh;
- Ch. Charan Singh Haryana Agricultural University (HAU), Hisar, Haryana;
- Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth (KKV), Dapoli, Maharashtra;
- Dr. Panjabrao Deshmukh Krishi Vishwa Vidyalaya (PKV), Krish Nagar, Akola, Maharashtra;
- Dr. Yashwant Singh Parmar University of Horticulture & Forestry (YSPUH&F), Solan, Himachal Pradesh;
- Govind Ballabh Pant University of Agriculture and Technology (GBPAU&T), Pantnagar, Uttarakhand;
- Indira Gandhi Krishi Vishwa Vidyalaya (IGKVV), Krishal Nagar, Raipur, Chhattisgarh;
- Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri, Maharashtra;
- Marathwada Agricultural University (MAU), Parbhani, Maharashtra;
- Narendra Dev University of Agriculture and Technology (NDUAT), Faizabad, Uttar Pradesh;
- Navasari Agricultural University (NAU), Navsari, Gujarat;
- Orissa University of Agriculture & Technology (OUAT), Bhubaneswar, Orissa;
- Punjab Agricultural University (PAU), Ludhiana, Punjab;
- Rajasthan Agricultural University (RAU), Bikaner, Rajasthan;
- Rajendra Agricultural University (RAU), Pusa, Samastipur, Bihar;
- Sardar Vallabh Bhai Patel University of Agriculture & Technology (SVBPUAT), Modipuram, Meerut, Uttar Pradesh;

- Sardar Krushi Nagar Dantiwada Agricultural University (SDAU), Sardar Krishi Nagar, Banaskantha, Gujarat;
- Uttar Banga Krishi Vishwavidyalaya (UBKV), P. O. Pundibari, Distt. Cooch Behar, West Bengal;
- University of Agricultural Sciences (UAS), Krishi Nagar, Dharwad, Karnataka:
- University of Agricultural Sciences (UAS), Bangalore, Karnataka:
- Tamil Nadu Agricultural University (TNAU), Chennai, Tamil Nadu;
- Sher-e-Kashmir University of Agricultural Sciences & Technology (SKUAS&T, Jammu), Camp Office, Railway Road, Jammu, Jammu & Kashmir;
- Sher-e-Kashmir University of Agricultural Sciences & Technology (SKUAS&T, Kashmir), Shalimar Campus, Srinagar, Jammu & Kashmir.
 (The above list is only indicative).

Besides these State Agricultural Universities, Agriculture is taught in ICAR Institutes based Deemed-to-be-Universities such as Indian Agricultural Research Institute, New Delhi and other institutions namely BHU Varanasi, AMU Aligarh, Vishwa Bharti and AAI (DU) Allahabad.

A large number of **scholarships** are offered by State Governments, ICAR as well as other Institutions at under graduate as well as postgraduate level.

6.30.1 Career in Plant Protection – the concept

Plant Protection is a branch of Agricultural Science. There are a number of sub-branches of Plant Protection Science such as Plant Pathology (Etiology, management of diseases caused by fungi, bacteria, viruses, viroids, virusoids phytoplasmas etc.) Plant Entomology or Entomology (Insects), Plant Nematology or Nematology (Nematodes), Weed sciences (weeds), etc.

6.30.2 Requisite Educational Background/Entry Route

Through entrance exams the candidate can take admission in various agriculture as well as non-agriculture universities. There are two separate entrance examination through which entry is possible. One is through All India ICAR Entrance and another through State-wise agriculture universities. There are 34 state agriculture universities, 3 deemed agriculture universities and 3 central universities, which offer the UG in agricultures and PG degrees in plant protection or in related subjects . Universities provide four years UG Honors degree in Agriculture and two years PG degree Plant Protection/Plant Pathology/Entomology/Nematology and Weed sciences subjects with dissertation. Only those candidates having passed their bachelor's degree or appearing in the Final Examination in the biological sciences or in agriculture, under 10+2+3 or 10+2+4 are eligible to apply for admission in the master courses of Plant Protection and its sub-branches. Candidates must have obtained at least 60% marks of its equivalent overall grade point average (OGPA) for general category and for SC/ST/PH 55% marks or equivalent OGPA/ The admission can be obtained through All India Combined Entrance and State level Entrance Examinations conducted separately. The All India Entrance is

being held regularly by the ICAR that also provide the JRF Scholarships to the students holding good ranks. The tentative numbers of seats in M.Sc. Plant Pathology are 74 (20 JRF), in Entomology, 80 (23 JRF), Nematology, 10 (3 JRF) and in Plant Protection, 4 (1 JRF). The number of seats both JRF and Non-JRF may vary depending upon the approval of number of seats in different universities by the time of counseling and admission.

6.30.3 Skills/Specialisation

Training in plant protection and in the related subjects is provided by a number of institutions regularly such as National Plant Protection Training Institute, Rajendra Nagar, Hyderabad, Environment Protection Training and Research Institute, Gochibowli, Hyderabad, Division of Forest Entomology, FRI, Dehradun, Institute of Indian Bio-informatics, Training in Plant Protection, Government of India, Ministry of Agriculture.

6.30.4 Job Opportunities

Opportunities exist in Government sector, private sector and personal business. After a candidate has received his Masters degree or Ph.D degree in Plant protection or any of its branches he can opt for any of the aforesaid sectors.

6.30.5 Universities/Colleges/Institutes Offering Courses

S.No	Name and address of the Universities
1.	Acharya N.G. Ranga Agricultural University, Rajendra Nagar, Hyderabad
2.	Assam Agricultural University, Jorhat - 785013
3.	Dr. Balasaheb Sawant, Konkan Krishi Vidyapeeth, DAPOLI (Distt. Ratnagiri)
4.	Birsa Agricultural University, Kanke, Ranchi - 834006
5.	Bidhan Chandra Krishi Vishwavidyalaya, P.O. Krishi Vishwavidyalaya, Mohanpur - 741252
6.	CCS Haryana Agricultural University, Hisar - 125004
7.	C.S. Azad Univesity of Agriculture and Technology, Kanpur - 208002
8.	Ch. Sarvan Kumar Krishi Vishwavidyalaya, Palampur - 176062
9.	Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar - 385506
10.	Govind Ballabh Pant University of Agriculture & Technology, Pantnagar - 263145
11.	Indira Gandhi Krishi Vishwa Vidyalaya, Krishaknagar, Raipur - 492012
12.	Jawahalal Nehru Krishi Vishwavidyalaya, Jabalpur - 482004
13.	Kerala Agricultural University, Vellanikkara, Thrissur - 690654
14.	Marathwada Agricultural University, Parbhani - 431402
15.	Mahatma Phule Krishi Vidyapeeth, Rahuri - 413722
16.	Maharana Pratap University of Agriculture & Technology, RCA Campus, Udaipur - 313001
17.	Narendra Dev University of Agriculture and Technology, Kumarganj, Faizabad - 224001
18.	Orissa University of Agriculture and Technology, Bhubaneswar - 751003
19.	Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Krishinagar, Akola - 444104
20.	Punjab Agricultural University, Ludhiana - 141004

21.	Rajendra Agricultural University, Pusa, Samastipur - 848125
22.	Rajasthan Agricultural University, Bikaner - 334006
23.	Sher-e-Kashmir University of Agricultural Sciences & Technology, Railway Road, Jammu Tawi (J&K) - 180004
24.	Sher-e-Kashmir University of Agricultural Sciences & Technology, Shalimar Campus, Srinagar (J&K) - 191121
25.	Tamil Nadu Agricultural University, Coimbatore - 641003
26.	University of Agricultural Sciences, Krishinagar, Dharwad - 580005
27.	University of Agricultural Sciences, GKVK, Bangalore - 560065
28.	Dr. Y. S .Parmar University of Horticulture and Forestry, Nauni (Distt. Solan) - 173230
29.	Uttar Banga Krishi Viswa Vidyalaya, Pundibari – 736165 (West Bengal)
30.	Sardar Vallabha Bhai Patel University of Agriculture and Technology, Meerut
31.	Navsari Agricultural University, Navsari - 396450
32.	Anand Agricultural University, Anand – 388110 (Gujarat)
33.	Junagadh Agricultural University, Junagadh – 362001 (Gujarat)
	DEEMED UNIVERSITIES
34.	Indian Agricultural Research Institute, Pusa, New Delhi - 110012
35.	Allahabad Agricultural Institute, Allahabad - 211007
	CENTRAL UNIVERSITIES/NON-AGRICULTURE UNIVERSITIES
36.	Central Agricultural University, Iroisemba, Imphal (Manipur) - 795001
37.	Aligarh Muslim University, Aligarh
38.	Banaras Hindu University, Varanasi
39.	Meerut University, Meerut

(The above list is only indicative).

6.31.1 Career in Plastic Engineering – the concept

There has been significant development of synthetic plastic goods recently due to advances in organic chemistry. The future of moldable plastic is unlimited. The word plastic refers to groups of synthetic components of high molecular weight, which carry the moldable characteristic by heating and pressure and thereby gives finished products by retaining its shape, dimension, and quality under normal usable condition.

6.31.2 Requisite Educational Background/Entry Route

There are large number of courses available for Xth Standard science students and above namely certificate course, diploma, degree and post-graduate courses. The requisite qualification for post graduate diploma in CAD/CAM for Plastic Engineering is B.E./B.Tech./B.Sc. Engineering (4 yrs.) in Mechanical, Chemical, Production, Polymer, Tool Engineering, Electrical & Electronics, Instrumentation, Petrochemical, Electrical, Mechatronics, AMIE in any of above disciplines or equivalent

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6.31.3 Skills/Specialisation

Working in the plastic industry needs high grade skills, to convert the knowledge into reality and confidant to accommodate the fast changing design methods. The modern plastic industry predominantly addresses the Moldable Materials, Processing, Applications, Tooling and Plant and Equipment related to plastics. The professionals in the plastics industries convert plastic granules (raw material) into finished products by different processing methods like Extrusion, Injection, Blow, Transfer, Compression, Thermo forming and thermo setting. A typical Plastic industry includes different department like Plastic Product Design and Mould Design, Tool Room that fabricate moulds using hi tech Machines to get perfect finish and intricate shape. The processing department converts raw materials into ready to use finished part.

6.31.4 Job Opportunities

India has a number of large, medium and small enterprises dealing with various plastic goods. The demand of various plastic goods is also very large as may be seen from the following Table. There is no dearth of job opportunities in this field:

S. No.	Parts	Methods	Material	Use
1	PET Jars/ Hollow	Blow Molding	Pet	Jars, Packing, Water Bottels
2	Pipe, Cable Insulation	Extrusion	PVC, PP	Water Pipe, Electrical cable
3	Electronic, Automobile Parts, Industrial and House hold goods	Injection	ABS, PC, PP, PE, Nylon	TV, Monitor, Chair, CD, AC, Fridge, Auto parts, Locomotive, Toys, Artificial Limbs
5	Switch gear	Compression	Thermo-sets	Switch, MCB
6	Large Hollow	Roto-mould	LLDPE, LDPE	Water Tank
7	Once use Parts	Thermo forms	LDPE	Tea Cups, trays

6.31.5 Universities/Colleges/Institutes Offering Courses

Though there are ample varied and exciting opportunities across the country, but very few Institutes offer course in Plastics Engineering and its related fields. Some of these are:

S. No.	Institution	Course	Duration
1	Central Institute of Plastic Engineering and Technology (CIPET), Chennai and Select Centre across the country, Autonomous Society under Department of Chemical and Petro-Chemicals	M. Tech (PE) Select Centre PGD-PE PD-Plastic Mould Design Dip Mould Making Tech PG-Plastic Processing Tech PG-Plastic Testing Tech	2Yrs 1 Yr 3 Yrs 1 Yr 1 Yr
2	Central Institute of Tool Design (CTTD), SIDO TR Hydrabad	ME-Tool Design PD Tool Design	2Yrs 1Yr

3	Central Tool Room and Training Centre (CTTC), SIDO TR, Bhubaneswar	PD-Tool Design and Manuf. Plastic Processing-Need Base	1Yr 1 to 6 Months
4	Central Polytechnic, Chennai govt. Technical Training Centre, Gindy, Chennai IDTR, IGTR and Select SIDO TRs across Country	PD Tool Design (PT) PD Tool Design PD Tool Design	2Yrs 18 Months 1Yr
5	Govt. Tool Room & Trg. Centre (GTTC) Bangalore and Select Centre across Karnataka. TRTC, Delhi-Both Indo-Danish Project Respective State Owned Institute NTTF-Select Centres across the country	PD Tool Design PG in Tool Engineering	1Yr 2Yrs
6	Govt. Institute of Tool Engineering, Dindigul TN Dept. Ind. & Commerce	Diploma in Tool Engineering	3Yrs
	Arulmigu Chandikeswari Polytechnic, Covai, TN VSV Nadar Polytechnic, Virudh Nagar, TN Chhotu Ram Polytechnic, Rothak, Haryana GND Co-Ed. Polytechnic, New Delhi	Diploma in Plastic Engineering	3Yrs
7	Nirma Institute of Technology, Ahmedabad, Gujarat, Shree Baghubai Mofatlal Polytechnic, Mumbai, MS State owned Government Polytechnic Ahmedabad (Also PT) Vadodra, Valsad-Gujarat, Ambala City-Haryana, Nasik-MS		
8	University College of Science & Tech, Calcutta Harcourt Butler Technology Institute, Kanpur, UP LD College of Engineering Ahmedabad, Gujarat SSE College of Engg & Tech. Akola, MS North Maharashtra University, Jalgaon, MS MIT, Anna University, Chennai	Integrated M. Tech PE B. Tech, M. Tech (Plastic) BE Plastic Tech BE Polymer Plastic Tech BE Plastic Technology B. Tech Rubber	

9	Indian Plastic Institute (IPI)-Mumbai: A Leading National Professional Institute	Institute Diploma (PT)	1Yr
		1 Polymer Sc & Tech 2 Processing of Plastics 3 Product Design & Design of Mould Dies-All Short Courses	Each 225 Theory 75 Hrs Practical 5 Industrial Visits
10	Govt. ITI/ATI/CTI in all States Select Centre	Plastic Processing Operator	2Yrs

6.32.1 Career in Prosthetic & Orthotics – the concept

The Prosthetic and Orthotics Science is an allied Health and Technical Process Industry that addresses the segment of disability due to deformity, genetic mutation, spinal cord injury etc. Today improved materials and recent technologies like CAD/CAM. CNC Carving, Reverse Engineering, Laser scanning are enabling many individuals with disabilities to return to activities they previously enjoyed.

Prosthesis is an artificial replacement or extension of a missing part of the body. Orthotics is the medical field concerned with the application and manufacture of orthoses devices which support or correct the function of a limb, improve function or relieve symptoms of disease.

6.32.2 Requisite Educational Background/Entry Route

➢ Dip. In P & O, B.P.& O Engineering
➢ B.P. & O Engineering
➢ B.Sc. (Hon) – P & O
➢ Dip. In P & O Engineering
➢ D.P. & O Engineering
➢ Tailor made workshop related course for P & O specific Program

The courses include classroom and practical sessions in laboratories, where students learn the fundamental of Manufacturing, Materials, Measuring, CAD/CAM. Medical subjects and fitting of appliances. The range of options available today require the Prosthetist/Orthotist to be well trained and educated to analyze the individual needs of each patient and to develop appropriate recommendations. The courses are aimed at enabling qualified Prosthestists/Orthotists to work with physicians, therapists and other professional involved in rehabilitation in a clinical environment. The major Training and Research Center falls under Ministry of Social Justice and Empowerment, State owned and aided rehabilitation institute. After training a student may choose to Practice in Orthotics and/or Prosthetic track.

6.32.3 Skills/Specialisation

Orthotics and Prosthetic Technologists and Technicians are specialists who design, fabricate and fit the Orthopaedic braces (Orthoses) and artificial limbs (Prostheses) necessary for rehabilitation. Providing Orthotics and Prosthetic care involves the

application of clinical and technical processes to meet patient rehabilitation objectives. The professionals are experts in polymer processes, strength of materials, material science and applied bio-mechanical principles to develop and totally customize an Orthoses (brace) or Prosthesis (artificial limb).

Recent Technology in P & O: CAD/CAM is increasingly being used to help design and fabricate models from which Orthoses and Prosthetic sockets are produced.

6.32.4 Job Opportunities

Orthotics and Prosthetic is a profession with a variety of exciting employment opportunities available including O & P practitioners, Technicians and Technologist, Consultants, Assistants and Fitters based on their educational and experience background. There are numerous NGO's offering lucrative employment and also there are ample opportunities to work for Companies who manufacture Orthoses or Prosthesis fittings and accessories. Now-a-days many multinational companies are coming to India to open their modern plants which could give good placements. According to experts, a moderate ranked fresher may get salary around Rs.10,000/- per month. Few National Institutes offering Diploma, Degree, P.G. and Workshop related for P & O specific programme etc are given in the chart below.

6.32.5 Universities/Colleges/Institutes Offering Courses

S.No	Institute	Course
1.	SV NIRTR, Ministry of Social Justice Olatpur, P.O. Bairoi, Cuttack - 754010	Dip. In P & O, B.P.& O Engineering
2.	National Institute for Orthopaedically Handicapped, BT Road, BoonHoogly, Kolkata – 700090	B.P. & O Engineering
3.	The Institute for the Physically Handicapped, Vishnu Digamber Marg, New Delhi -110002	B.Sc. (Hon) – P & O
4.	The Government Institute of Rehabilitation Medicine, K. K. Nagar, Chennai	Dip. In P & O Engineering
5.	The Department of Rehabilitation Safdarjung Hospital, Ansari Nagar, New Delhi	Dip. In P & O Engineering
6.	The All India Institute of Physical Medicine & Rehabiitation, Hazi Ali Park, Mumbai - 400034	D.P. & O Engineering
7.	Central Polytechnic, Taramani, Chennai - 600013	Dip. In P. & O Engineering
8.	CTTC (An Indo-Danish) Bhubaneswar Department of SIDO, Ministry of SSI	Tailor made workshop related course for P & O specific Programme

(The above list is only indicative).

6.33.1 Career in Seed Industry – the concept

In the last four decades, India has made significant advances in agriculture where the role of the seed sector is substantial. In comparison to the total Global seed market (Us $ 21 billion per annum) the Indian seed market share is around $ 900 million (Rs.4000 crores).

Dr. M. S. Swaminathan, an eminent scientist, has highlighted India's potential in this respect and estimated that India can capture one-fourth of the world's business in seed, transforming rural scenario. So, students in agriculture have an unlimited prospect in this growing industry.

6.33.2 Requisite Educational Background/Entry Route

- 10+2 students interested in agriculture subjects, have to appear in the ICAR (Indian Council of Agriculture Research) entrance test for getting admission at graduation in agro universities all over the country. Besides, universities also conduct their own entrance tests.
- Similarly, graduates in agriculture who are interested for masters have to appear for ICAR-led Junior Research Fellowship (JRF) examination and to get higher rank to opt for good institutions.
- Masters students can take admission in Ph.D in same university or can appear in IARI conducted all India examination.
- Students who have completed doctorate or masters in specialized subjects can take up research which is the key strength of any seed industry. Marketing is also another scope for masters. Agriculture graduates on the other hand, can opt for marketing or production

6.33.3 Skills/Specialisation

The seed industry includes:

1. **Genetics & Plant Breeding:** Breeding is a creation of variation in strength for any seed qualified breeder should have a creative and selective eye towards selecting plants for breeding programmes.

2. **Agronomy:** Agronomy is called the "mother of agriculture". Before release of the new hybrid seeds or varieties, it is mandatory for the seed producers to test the seed for multi-location trials. Agronomists also have the opportunity to look after the seed production units.

3. **Entomology:** Damage to crop by insect-pests is common. The entomologist design crop-wise admissible insect levels using various crop protection techniques and crop-insect specific control measures.

4. **Biotechnology:** Biotechnology has paved the way for the introduction of transgenic crops. Biotechnologists can determine seed quality parameters faster through simpler Molecular techniques and Genetic marker studies.

5. **Seed Technology:** Seed technologists monitor supply of best quality seeds, production. Quality testing for different parameters like germination, physical purity, moisture contents are assessed and maintained to certain standard prescribed on the Seed act before final packaging for marketing.

6. **Plant Pathology:** Disease is one of the major constraints in getting high yield. Pathologists have a role to take the challenge to find out the feasible solutions.

7. **Soil Science:** Students from soil science also have enough opportunity in the seed industry in studying the plant-soil relation and their interactions.

6.33.4 Job Opportunities

Qualified students in Agriculture having specializations as described above, can make a career in education and research in 31 Agriculture Universities in the country, 40 ICAR Institutes, Seed production Agencies of the Government such as National Seed Corporation, State Seed Corporations, SFCI, etc. and International crop research institutes under CGIAR system.

6.33.5 Universities/Colleges/Institutes Offering Courses

1. Indian Agricultural Research Institute (IARI), New Delhi.
   It is a premier agricultural institute in India and has international reputation. IARI is a deemed university and has only post-graduate studies (Masters & Doctorate) with limited seats. For getting admission B. Sc. Agricultural graduates need to get rank in top order in JRF examination. For doctoral programme, IARI-Ph.D entrance (open for all India competition) will be conducted.
   Website: www.iari.res.in
2. G.B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand.
   It has a good reputation. All agricultural subjects are taught here.
   Website: www.gbpuattech..ac.in
3. Punjab Agricultural University, Ludhiana, Punjab.
   The university has outstanding achievements in agricultural research, education and extension.
   Website: www.pau.edu
4. CCS Agricutlural University, Hisar, Haryana
   HAU has an international repute for its advances in high yielding crops. Website: www.haryanaonline.com/hau.htm
5. Acharya N. G. Ranga Agricultural University, Rajendranagar, Andhra Pradesh
   It is a reputed university having 13 colleges in Agriculture, Veterinary, Home Science, Agricultural Engineering, Fisheries Science and Polytechnics.
   Website: www.medistudies.com/ngranga/ngranga,htm
6. University of Agricultural Sciences, Dharwad, Karnataka.
   It has multiple research centres and good infrastructure in the field of agriculture.
   Website: www.usad.ed/introduction.htm
7. Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur, West Bengal.
   The university is one of the pioneer institutes of Agricultural Education, Research and Extension. Website: www.bckv.edu.in

8. Orissa University of Agriculture & Technology, Bhubaneswar, Orissa.
   It is also one of the oldest agricultural institutes in India.
   Website: www.ouat.ac.in
9. Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh
   KNKV has good reputation in the agricultural research.
   Website: www.jnkv.nic.in
10. Tamil Nadu Agricultural University, Coimbaotre, Tamil Nadu
    It is one of the oldest reputed Agricultural University dealing with multidisciplinary departments, especially plant breeding and genetics. Website: www.tnau.ac.in

6.34.1 Career in Seismology & Earthquake Engineering – the concept

Seismology is the scientific study of earthquakes and the movement of waves through the earth. The field also includes studies of variants such as seaquakes, volcanoes and plate tectonics in general and consequential phenomena such as tsunamis.

The science deals with study of earthquakes and broadly comes under geology or geophysical science. A seismologist's job is to locate the source, the nature and size of seismic events for the use of various agencies. The Seismology and Earthquake Engineering is a multidisciplinary field comprising Earthquake scientists as well as technicians and professional, specializing in computers, physics, electronics, telecommunications, civil and structural engineering.

6.34.2 Requisite Educational Background/Entry Route

The Seismology and Earthquake Engineering course come from combined Geography and Physics, Geophysics as a field is in high demand in several areas like oil exploration and ground water. Since it is very much a scientific field, anyone who desires to become seismologist has to have the basic background in science (PCM) right from Class XI onwards. Admission is given as per merit test of candidates (written test followed by interview). Later, all those having a degree in geology, geophysics, physics or applied science can opt for a specialization in seismology. There are several universities and institutions across the country offering an M. Tech course in geophysics, which covers seismology. Considering the vast application of seismology in structural engineering, students having a basic degree in engineering are also specializing in the study of earthquakes and their effects.

6.34.3 Skills/Specialisation

Research seismologists come into the field with a wide variety of undergraduate majors. Only a few universities offer undergraduate degrees in geophysics, of which seismology is a part. Because seismology is an applied field, most graduate departments prefer students to have solid undergraduate training in more basic disciplines, particularly mathematics or physics. Course work in basic geology is also very helpful. The computer is the primary tool of the trade for most research seismologists, so a high degree of computer expertise is essential.

6.34.4 Job Opportunities

Preparation for a research career in the field whether in a University, Private Industry, or with the Government, requires the completion of a Ph. D degree. However, rewarding careers in observational and operational seismology, especially in the petroleum industry, are open to a Bachelor degree holder. Many have found that a Master of Science degree in geophysics, providing a year or two of advanced specialized study before beginning an industrial career, is a valuable asset.

There are Central Governments institutions like National Geophysical Research Institute, (NGRI), Hyderabad, Oil & Natural Gas Corporation (ONGC), Weather Forecasting Department, Geological Survey of India (GSI), who advertise for the post of Earthquake Scientist, Geologist, Scientist, Geologist, Scientific Assistant etc.

6.34.5 Universities/Colleges/Institutes Offering Courses
1.   Department of Earthquake Engineering, Indian Institute of Technology, (IIT), Roorkee, Uttarakhand, offers M. Tech degree in Seismology.
2.   Indian Institute of Technology, (IIT), Kharagpur, West Bengal, offers M. Tech degree in Computation Seismology (www.iitkgp.ernet.in)
3.   National Information Centre of Earthquake Engineering, Indian Institute of Technology, (IIT), Kanpur, Uttar Pradesh) (www.iitk.ac.in)
4.   Department of Geophysics, Banaras Hindu University, (BHU), Varanasi, Uttar Pradesh (www.bhu.ac.in)
5.   Wadia Institute of Himalayan Geology, Dehradun, Uttarakhand (htpp\himgeology.com)
6.   Mumbai University, Mumbai, Maharashtra (www.mu.ac.in)
7.   Kurukhestra University, Haryana (www.kuk.ernet.in)
8.   Anna University, Chennai, Tamil Nadu (www.annauniv.edu)
9.   Osmania University, Hyderabad, Andhra Pradesh (www.osmania.ac.in)

6.35.1 Career in Sericulture – the concept

The word 'Sericulture' is derived from the Greek word 'Sericos' meaning 'Silk' and the English 'Culture' meaning 'rearing'. Sericulture refers to the conscious mass-scale rearing of silk producing organisms to obtain silk. Mulberry sericulture involves the cultivation of mulberry to produce leaf rearing silkworm to convert leaf to the cocoon, reeling of cocoon to obtain silk yarn and weaving to convert the yarn to fabric.

6.35.2 Requisite Educational Background/Entry Route

To become a Sericulture Graduate one has to pass four years degree from Sericulture College of State Agricultural Universities or Silk Institutes of various Universities. There are two types of degrees, B.Sc. (Sericulture) and B.Sc. Silk Technology (Sericulture).

For admission in the 4 years Sericulture degree course one can apply after 10+2 having PCB group. Admission is given as per merit test of candidates and availability of seats. Special quota for outside state candidates are allowed to the candidates who have passed entrance exam of ICAR. B.Sc. (Sericulture) and B.Sc. Silk Technology (Sericulture) involves courses such as silk worm rearing and grainage, S/W breeding & genetics, silk

reeling and spinning, silk grading and testing, seed technology, arboriculture and moriculture. Disease and pest of silk and food plants, production planning and extrusion, costing and management, silk weaving technology, silk dying and printing technology. Fourth year syllabus contains practical experience like sericulture farm/silk realing unit/weaving and dyeing-printing mill also.

After completion of B.Sc. (Sericulture)/ B.Sc Sericulture technology candidates can become M.Sc (Sericulture)/Silk technology. For admission in Central Institute one has to appear for entrance test.

6.35.3 Skills/Specialisation

The qualified Sericulturists use their skills
1.   to make available the much needed technically competent extension personnel for transfer of technology.
2.   to make available personnel to assist the research and development (R & D) & vocational instructor to teach sericulture.
3.   to make available administrator to plan, develop and execute sericulture development plan.
4.   to create sericulturist farm managers, silk rearers, silk weavers, exporters, traders.

6.35.4 Job Opportunities

| 1. | **State Government** | Every state government has a sericulture directorate under Industry department which advertise:
1. Project Manager (Sericulture), Asstt. Director (Sericulture), Research Officer (Sericulture), Marketing Officer (Sericulture) etc for 4 years B.Sc silk technology/ B.Sc Sericulture/ PG diploma in sericulture with 2 years experience.
2. Asstt. Project Officer/ Asstt. Superintendent (Seri)/ Sericulture Extension Officer/ Sericulture Inspector etc for four years B.Sc silk technology/B.Sc Sericulture/ PG diploma in sericulture.
3. Supervisor: Three years B.Sc (Vocational) sericulture degree with one year experience.
4. Farm Technician/Grainage Technician: 2 years Inter vocational sericulture course with one year apprenticeship training from NCVT.
5. Rearer: 10th pass with one year certificate in sericulture

Human Resource Department (HRD):

a) Lecturer (Seri) at +2 higher secondary school: M.Sc. (seri)/ 4 years B. Sc degree in Silk Technology (Sericulture)
b) Instructor (Seri): 4 years B.Sc degree in Silk Technology (Sericulture) |

		c) Lab Assistant: 3 years B. Sc vocational sericulture degree or B.Sc with PG diploma in sericulture. d) State Khadi Board: As a Development Officer, District Khadi Officer
2.	**Central Government**	One can get job in Central Government Agency like Central Silk Board/ Silk Export Promotion Council/ FAO/ NABARD, Krishi Vigyan Kendra, ATMA, KVIC etc.
3.	**Academic Institutes**	Candidates having Post Graduate degree (M.Sc Seric/M.Sc. Silk Technology) can apply for the post of Lecturer, Asstt. Professor in the faculty of Sericulture in various degree/ diploma college/institute.
4.	**Nationalised Banks**	Sericulture graduates can get jobs as a field officer, manager in agriculture loan section in nationalized banks as well as private banks.
5.	**Private Sector**	Candidates can work as a manager in sericulture farm, grainage, silk rearing (filature), silk weaving mill, dyeing printing industry, spinning mill etc.
6.	**NGO Sectors**	Candidates can work as a sericulture manager in various central government sponsored schemes like SGSY, welfare department, Scheme run by NGO's like Pradan, Vikash Bharati etc.
7.	**Self Employment**	As a entrepreneur, after obtaining the professional degree in B.Sc Silk Technology/Sericulture, candidates can start their own enterprises. Financial support can be obtained through NABARD or through nationalized banks.

6.35.5 Universities/Colleges/Institutes Offering Courses

Sericulture Colleges of State Agricultural Universities or Silk Institutes of various Universities. (This is only indicative).

6.36.1 Career in Sidha System of Medicine – the concept

India is a home to a variety of traditional healing practices. Some are indigenous while a few are from other parts of the world. In course of time, they developed, flourished and became established traditional Systems of Medicine. Siddha, Ayurveda and Unani are the major systems in India recognized by the Government of India as Indian (traditional) Systems of Medicine (ISM).

6.36.2 Requisite Educational Background/Entry Route

To get admission to BSMS course, minimum eligibility is 10+2 with subjects Physics, Chemistry & Biology. The candidates who wish to study BSMS course should appear for a common entrance test conducted by Government prior to admission. Since Siddha literature is available in Tamil, a knowledge of Tamil language is essential to study these courses.

In order to become a Siddha Medical Practitioner, a formal medical education is mandatory. In undergraduate course, Bachelor of Siddha Medicine & Surgery (BSMS) is a 5 1/2 year long course including a 6 month internship period. After this BSMS course, postgraduate course (MD Siddha) is also available in some of the colleges.

Establishment of a National Institute of Siddha (NIS) in Chennai has been a long-standing dream of the people of Tamil Nadu. It is a joint venture of both the Central Government and the Tamil Nadu State Government. Once this institute becomes fully functional, it will further develop and propagate Siddha system. Further, the postgraduate education and research activities in Siddha Medicine will be strengthened.

6.36.3 Skills/Specialisation

According to Siddha Medicine, there are seven elements viz. saram (plasma), cheneer (blood), ooun (muscle), kozhuppu (fat), elumbu (bone), moolai (nerve) and sukila or inthiriyam (semen) that are responsible for physical, physiological and psychological actions/functions of the human body. These seven elements are activated by three components or humors viz. vatha (air), pitha (fire or heat or energy) and kapha (water).

Siddha medicine also instructs the patients 'to do certain things' and 'not to do certain things', which are termed as 'pathya' and 'apathya' respectively during medication. The treatment in Siddha medicine is aimed at keeping the three humors at Equilibrium State in the body thereby keeping the seven elements in normal condition to have a healthy body and mind.

Further, Siddha system also practices Varma (vital points). There are some vital points in our body, which are either in the junctions of bones, tendons or ligaments or bloody vessels.

6.36.4 Job Opportunities

There are various avenues of job opportunities for those who have opted for a career in Siddha medicine,. One can practice privately by opening a Siddha clinic from his/her residence or from a suitable place. One can serve in various Government and Private Hospitals, Clinics, Nursing Homes and Health Departments. Also one can choose a career in teaching and research field.

6.36.5 Universities/Colleges/Institutes Offering Courses

1. Government Siddha Medical College, Chennai (both BSMS & MD Siddha).
2. Government Siddha Medical College, Palayamkottai, Tirunelveli Dt. Tamil Nadu (both BSMS & MD Siddha)
3. Akila Thiruvithamcore Siddha Vaidya Sangam Siddha Medical College & Hospital, Anandasraman, Munchirai, Kanyakumari Dist. Tamil Nadu (BSMS).
4. Sri Sai Ram Siddha Medical College, Sriperumpudur, Kancheepuram, Dist. Tamil Nadu (BSMS).
5. Velumaily Siddha Medical College, Sriperumpudur, Kancheepuram Dist. Tamil Nadu (BSMS).
6. Shanthigiri Siddha Medical College, Koliya Kodu, Trivandrum, Kerala (BSMS). (The above list is only indicative).

6.37.1 Career in Tea Management – the concept

Tea is one of the most refreshing and popular beverages of the world. India being the world's largest producer, exporter and consumer of tea offers good career in the Tea Sector. There are a variety of jobs one can specialize in the tea industry. Altogether it is known as tea management. Tea tasting is one of the highly specialized area of work. Other areas are researchers, plantation managers, tea brokers, consultants. etc.

6.37.2 Requisite Educational Background/Entry Route

The minimum qualification required to get admission in a training institute is class 10 or 10+2. A degree or a post graduate in Agricultural Science (Tea Husbandry and Technology) or a B.Sc in Botany, Food Sciences, Horticulture or allied fields is preferred. However, anybody who has a basic educational background can get into tea industry and pick up the skills required on the job.

6.37.3 Skills/Specialisation

The subject matter of the Tea Husbandry and Technology at Postgraduate (PG) level consists of sub-disciplines of crop production (planting, pruning and plucking), irrigation management, weed management, insect pest and disease management, economics and marketing and processing technology. At PG level during ones specialization in one of these sub-disciplines, the tea technologist normally completes his sub-specialization by offering some minor and supporting courses in the disciplines of soil science, plant physiology,-genetics and plant breeding, biochemistry, biotechnology agricultural-meteorology, statistics and environmental sciences.

6.37.4 Job Opportunities

New entrants are taken as assistants at the plantation level. After gaining experience and competence as assistant can get promoted to the level of Assistant Manager, and then Manager of a tea garden. Most assistants can expect to become managers in 12 – 15 years of service.

Many jobs in Tea Industry require diploma or degree in agriculture and specialization in Tea Husbandry and Plantation crops is an added advantage. The post graduate degree offers job opportunities at supervisory or managerial levels and to conduct research in different R&D sectors. There are multiple options for a Tea Husbandry and Technologist in the below mentioned sectors.

1.   Government Organizations:

        a)   For M. Sc Agr. (Tea Husbandry & Technology)
              The State Agricultural Universities (SAUs) are recruiting M. Sc in Tea Husbandry and Technology as Assistant Scientists/Assistant Professors/ Assistant Extension specialists and Technical Assistants. Council of Scientific and Industrial Research(CSIR) can also appoint Tea Husbandry and Technologist at their regional research institutes and centers.

b) Educationist: Lecturer, Reader, Assistant Professor, Associate Professor, Professor, Dean in Deemed to be University(IARI) and in Agriculture Universities and Colleges.

c) Training Organizer & Training Associate in Krishi Vigyan Kendras (KVKs) in the jurisdiction of tea areas.

d) Agriculture/field officers in different Nationalized Banks including National Bank for Agriculture and Rural Development(NABARD).

e) Agricultural Development Officers and Agricultural Extension Officers in the State Agricultural Department and also officers in the Department of Industries.

2. Private Sector

a) The major tea area is in North East and South India and also there are big corporates like Tata, Brooke Bond, Lipton, Assam Brook, Parry Agro Industries, Williamson Magor's apart from tea estates who induct postgraduates in tea as Assistant Managers and also Scientists in the research and development sector. Besides, tea technologist can opt for a career as a tea taster.

b) Self Employment in Agriculture
A tea technologist is trained like an agriculturist so he can act as a consultant, seed producer grower (horticulture and vegetable) and contractor and can start vocational education.

c) Plantation/Factory Managers
Tea plantations are controlled by managers who have Junior Assistant and Assistant Managers, depending on the size and requirement of the plantation, to assist them in the smooth functioning of the tea estate. Their work involves supervision of all plantation work involved from planting to plucking, processing to packing and transport of tea to auction houses. New entrants are taken on as Assistants at the plantation level.

d) Tea Taster
Tea Tasting is a highly specialized area. Tea tasters differentiate between the various flavours of tea and help to brand the varieties according to quality. Most tea companies employ tea tasters for ensuring quality standards; and preparing blends. Tea tasting is typically learnt on the job. Tea tasters have to develop the expertise to distinguish between the taste and aroma of different teas. Tea tasters need to develop managerial as well as marketing skills.

e) Researcher
Research is an integral part of the industry. Much research is conducted by botanists, biotechnologist and other scientists, who study methods of producing disease-resistant, high yielding varieties of tea, as also strains that produce leaves that are natural blends of various teas. They receive

advice from tea tasters on commercial factors like taste, economic viability and maturability of tea. Besides, there are many areas like soil and plant relationships and mineralization studies. The Tea Research Association at Jorhat (Assam)is a premier organization where pioneering work is being done in the field of research. CSIR and Agricultural Universities are also doing pioneer work in this field. The research associations as well as Tea plantation owners employ researchers.

f) Tea Brokers
Tea brokers act as intermediaries between the planter-producer and the buyer, and must be up-to-date with market trends and international prices.

g) Consultants
The tea board of India and various tea associations employ consultants. Experienced tea planters can take up consultancy services by offering advice on the varieties of tea to be planted, new varieties and their sources, recruitment and training of personnel ,compensation, benefits and incentives to labour and so on.

6.37.5 Universities/Colleges/Institutes offering Courses

A degree in Plantation crops (Tea science) at Ph.D level is given only by Assam Agricultural University and Uttar Banga Krishi Vishavidyalaya. These courses are offered exclusively in the agricultural colleges. A graduate degree in Agriculture is generally essential to pursue postgraduate course.

There are a number of Institutes providing training in Tea management. The minimum qualification required to get admission in a training institute is class 10 or 10+2. These institutes teach tea production to processing, finance, marketing and sales where tea tasting forms part of the curriculum.

There are 5 State Agricultural Universities offering Postgraduate courses in Tea Husbandry and Technology/Plantation crops. These are:

➢ Assam Agricultural University, Jorhat, Assam (Department of Tea Husbandry and Technology)
➢ Ch. Sarwan Kumar Krishi Vishwa Vidyalaya, Palampur, Himachal Pradesh (Department of Tea Husbandry and Technology)
➢ Bidhan Chandra Krishi Vishwavidyalaya, Haringhatta Nadia, West Bengal (Department of Plantation Crops)
➢ Uttar Banga Krishi Vishwavidyalaya, P.O. Pundibari, Distt. Cooch Behar, West Bengal. (Department of Plantation Crops and Processing Technology)
➢ Tamil Nadu Agricultural University, Chennai, Tamil Nadu (Department of Plantation Crops)

Institutes offering courses in tea are:

- Assam Agricultural University, Department of Tea Husbandry and Technology, Jorhat, Assam (B.Sc & M. Sc Agriculture Course) Website: http://aau.ac.in.index.htm
- Indian Institute of Plantation Management, Jnana Bharathi Campus, P.O. Malathalli, Bangalore – 560 056 Website: www.iipmb.com
- Dipras Institute of Professional Studies, 23/28 Gariahat Road, Kolkata – 700 029
- NITM, Darjeeling Tea Research and Management Association P.O. Kadamtala-734 433, Dist. Darjeeling, West Bengal
- Assam Darjeeling Tea Research Centre, Kurseong, Darjeeling – 734 203 West Bengal
- UPASI Tea Research Institute, Nirar Dam B.P.O., Valparai- 642 127 Tamil Nadu
- Birla Institute of Futuristic Studies, 17 A Darga Road, Park Circus, Kolkata –
- 700 017
- The Tea Tasters Academy, Coonoor, Niligris (Kerala)

6.38.1 Career in Veterinary Science – the concept

Veterinary Science deals with the study of animal health care, breeding, feeding and management practices. The job of a veterinarian is challenging keeping in view of the wide range of animals. Contrary to earlier belief, veterinary profession is no longer the male bastion.

6.38.2 Requisite Educational Background/Entry Route

The minimum requisite qualification is 10+2 with Physics, Chemistry and Biology (PCB) for taking admission in the B.V.Sc & A.H. (Bachelor of Veterinary Science and Animal Husbandry). For national level test, minimum percentage required is 50% for general category and 40% for SC/ST. The minimum age required is 17 years. Candidates are selected for this five years B.V.Sc. & A.H. course on the basis of entrance test held by State Agriculture Universities at State level and by VCI (Veterinary Council of India) at National level. 15% seats in every college are filled through National level test and rest by the State level test.

For getting admission to M.V.Sc., there is a State and a National level test as for B.V.Sc & A.H. Apart from 38 colleges in India, IVRI (Indian Veterinary Research Institute, Bareilly, U.P.) offers the Master and Ph.D. programmes in almost every subject. NDRI and College of Animal Science, CCSHAU, Hisar are awarding Masters and Ph.D. in the Animal Sciences only. There are opportunities overseas for higher studies.

6.38.3 Skills/Specialisation

The course content of B.V.Sc & AH prepares the students very well to handle the veterinary profession and under the guidance and experts in the field they are in a position to handle animal health, breeding, feeding etc.

6.38.4 Job Opportunities

Teaching jobs as Professors, Assistant Professors, Lecturers etc., can be availed in 38 colleges in India, Scientists job in IVRI (Indian Veterinary Research Institute, Bareilly, U.P., NDRI and College of Animal Science, CCSHAU, Hisar etc. An MBA along with B.V.Sc & A.H. provides the candidates better opportunities in different industries at managerial grade. There are number of opportunities in NGOs/Societies working for the welfare of the animals and livestock owners like BAIF (Bharti Agro Industrial Federation), Help-in-Suffering, LPP (League for Pastoral People), PETA (People for Ethnical Treatment of Animal) etc.

6.38.5 Universities/Colleges/Institutes Offering Courses

Presently there are 38 veterinary colleges in the country which are imparting the B.V.Sc & A.H. degree. There are 40 State Agricultural Universities in the country of which seven are specialized universities dealing exclusively with Veterinary Science and Animal Science including fishery education. The 15 constituent colleges are attached to these Veterinary Universities. Out of the remaining 33 States Agriculture Universities, 18 Universities have 19 constituent colleges. Apart from these there is one constituent college of Central Agricultural University, Imphal and one affiliated to University of Pondicherry in the country. In addition Rajasthan Agriculture University, Bikaner has accorded affiliation to two veterinary colleges under private sector.

7.1 Recruitment of Freshers

Freshers are now considered as precious talent that can be trained and groomed to suit individual needs of organizations. While experience can not be replaced yet freshers are definitely valuable. For quite some time now a shift in the recruitment plans is visible. Earlier it was heavily focused on experienced persons and now it is focused on campuses strongly. The rise in the recruitment of freshers is driven by many factors. It enables organization to train and create specialized talent pool right from the beginning, as these recruits are fresh out of the college. It is also economical to tap into the huge resource available, to meet the manpower crunch in the industry. Freshers also help in infusing fresh blood into the company and with their right training and development they are able to create specialized talent pool right from the beginning.

7.1.1 Mode of Recruitment

The mode of recruitment of freshers is through campus placements where graduates are recruited directly from the college campus. Campus placement is not a new concept as earlier it used to happen only on premium campuses like IITs and IIMs but now it is prevalent in many colleges and institutes. Most colleges and Engineering Institutes etc., have now Campus Placement cells and Career Guidance centres which help students in getting information about opportunities in different companies and how to proceed further. For example, in Delhi, colleges like St. Stephen's, SRCC, Khalsa, Hindu, Kirori Mal, Miranda House, Ramjas, Lady Siri Ram and Hans Raj have Placement Cells that invite Corporate firms for recruitment. Others that do not have an organized Placement Cell also keep getting offers from various companies. These Cells even provide training on how to perform well in interviews or group discussions etc.

7.1.2 Training of Freshers

After the freshers are induced into a company, a considerable amount of money and time is invested to train them and build on their professional, technical and management skills. Training helps them to gain collective knowledge of the company. Training sharpens the competencies of these freshers and gives them the right inputs on technology as well as soft skills. On-the-job training provides these fresh employees an opportunity to gain exposure to a variety of leading edge solutions and technologies and real life client experiences.

7.1.3 Choice of Options

Freshers have a wide variety of options to choose from. A large number of careers have been discussed in Chapter - 9. S&T students can make a choice according to their own background and interest. A large number of Government and Private Sector companies visit Colleges and S&T Organisations/Institutions every year to recruit freshers. Defence

Research & Development Organisation (DRDO) is one of the Government organizations which regularly recruits through campus placements. Similarly, the Department of Atomic Energy (DAE), Indian Space Research Organisation (ISRO) under the Department of Space (DOS), Government of India, recruit freshers through slightly different schemes parallel to the campus placement. To name a few in the Private Sector, the companies such as Infosys, Satyam, Wipro, HCL, Excel Tech, Samsung, Siemens, Automobile, Pharmaceutical and many companies from other sectors have been making campus placements. The procedure adopted for Campus Placement by some of the organizations is described for the information of S&T students so that they can prepare themselves accordingly:

7.2   Campus Placement by Defence Research & Development Organisation (DRDO)

DRDO conducts Campus Selection in all institutions having intake through IIT system, IISc Bangalore, National Institutes of Technology/Regional Engineering Colleges and Central Universities viz. Delhi University (DCE, NSIT), Aligarh Muslim University, Jamia Millia Islamia University, Allahabad Univesity, Tezpur University, North Eastern Hill University(Shillong, Meghalaya) . Depending on the requirements every year, selection is made in different subjects normally during July-November. Currently there are two modes of induction as given below:

Directly as Scientist 'B'

Eligibility:

Seventh semester / Final year students of BE/BTech/BSc (Engineering) with minimum 65% marks up to sixth semester /third year and 60% marks for the reserved categories viz. SC/ST/OBC on merit basis.

As Scientist 'B' through Aeronautical Research & Development Board (AR&DB) Fellowship

Eligibility:

- Students of B.E./M.E./M. Tech in Aero Engineering receiving AR&DB fellowship. (Fellowship: Rs.6000/-per month)
- AR&DB B.E. / B. Tech. (Aeronautical Engg) Scholarship Scheme at PEC, Chandigarh and MIT, Chennai , IIT Kharagpur, (Grant: Rs. 3000/- monthly stipend and Rs. 2500/- per year for purchase of Books)
- AR&DB M.E. / M. Tech. (Aeronautical Engg) Scholarship Scheme at IIT Kharagpur, IIT Madras and MIT Chennai, (Grant: Rs. 6000/- stipend and Rs. 3500/- per year for purchase of Books)

For more information, visit DRDOs websites: www.rac.drdo.gov.in and www.drdo.org

7.3 Online Registration for Employment by Indian Space Research Organisation(ISRO)

Job opportunities in S&T are announced by ISRO throughout the year such as Scientists, Engineers, Graduate Apprentice, Technician Apprentice, Technical Assistants, Technicians etc. Details of various jobs with requisite qualification, age etc., can always be seen on their website www.isro.gov.in. The requisite qualification for **centralised recruitment of scientists/engineers "sc" is M.E./M.Tech/M.Sc(Engg)/M.Des. and/or Ph.D.** For example, PhD holders (also those who have submitted the thesis and awaiting award of the degree) with specialisation in Science or Engineering that are relevant to ISRO such as Aeronautics, Agriculture, Atmospheric Sciences, Chemical, Civil, Computational Fluid Dynamics, Computer, Control Systems, Electrical, Electro-Optics, Electronics, Environmental, Geology, Material Science and Metallurgy, Mechanical, Oceanography, Power Systems, Remote Sensing, Space Science, Structures, Telecommunication, Water Resources, etc., are invited to register themselves for possible employment in ISRO. As and when vacancy arises, those enrolled in the Live Register are considered for selection based on the discipline in which vacancy occurs. Applications can be registered as well as their status can be seen online.

7.4 Recruitment procedure followed by the Department of Atomic Energy (DAE)

Being a scientific organization working in the advanced field of science and technology, DAE has been following a comprehensive policy to develop competent scientists, engineers and technical personnel to support its programmes. The recruitment of scientific and technical staff is generally carried out through well-formulated specific need based training schemes:

7.4.1 Recruitment of Scientific and Technical Personnel

The recruitment of scientific and technical personnel is generally carried out through a well-formulated specific need based training schemes. The majority of the scientific staff in DAE is recruited after successful completion of one-year training programme called Orientation Course for Engineering Graduates and Science Post Graduates [OCES] of BARC Training School and its affiliates.

Additionally, a scheme called **"DAE Graduate Fellowship Scheme (DGFS)"** is being operated with select IITs, wherein the engineers and scientists undergo two-years M.Tech. programme in these IITs and are absorbed in DAE after successful completion of the programme.

For all the above-referred selection of scientific personnel through BARC training school and its affiliates, the candidates are first screened in on the basis of GATE score for engineers and GATE score/written test for scientists. The screened in candidates are then interviewed by duly constituted Selection Committees. Selection is based on the assessment made by the Selection Committee. In the case of DGFS, additionally, the candidate should have taken admission in one of the IITs where the said scheme is in operation.

Ph.D. holders in basic sciences and engineering are inducted as "KS Krishnan Associates" who, after working for one to two years in the organization, are screened in for absorption in DAE based on their performance during the period of associateship and are selected based on the performance in the interview.

To cater to the need of technical personnel, Graduates in science and Diploma holders in engineering are recruited through a one-year Stipendiary Training Scheme (Category-I). They are absorbed as Scientific Assistant-B after successful completion of the training in the various facilities of DAE. Similarly, candidates having qualification of HSC (science) / SSC followed by ITI certificate are also recruited under Two-years Stipendiary Training Scheme (Category-II) and they are absorbed as Tradesmen after successful completion of the training in the various facilities of DAE. The procedure involving initial screening followed by interview is adopted for the selection of these categories of staff. Selection is based on the assessment by the appropriate Standing Selection Committee.

Recruitment is normally carried out through open advertisements in Employment News, local and/or national newspapers as applicable. Local Employment Exchanges are also approached for recruitment of personnel at the level of Scientific Assistant/Tradesman and equivalent posts. For more information, DAEs website www.hrdbarc.gov.in may be visited.

CHAPTER – 8

ENTRANCE & COMPETITIVE EXAMINATIONS

8.1   Information on Entrance Examinations

Information on entrance and competitive examinations has briefly been given in Chapter – 9 relating to Career Options, wherever it is necessary to appear in such examinations. However, information on some of the important entrance examinations is given below:

8.1.1   Biotechnology Entrance Examinations

Biotechnology is a technique that uses living organisms or substances from those organisms, to make or modify a product, to improve plants or animals, or to develop microorganisms for specific purposes.

8.1.2   Admission to Master's Degree Programmes in Biotechnology

Being an inter-disciplinary programme, candidates with bachelor's degree under 10+2+3 pattern of education in Physical, Biological, Agricultural, Veterinary and Fishery Sciences. Pharmacy, Engineering & Technology, 4 years B.S. (Physician Assistant) course, Medicine (MBBS) or BDs and allied fields are all eligible to apply for M. Sc Biotechnology programmes across most universities. Each university has its own typical eligibility criteria, but the admission process is usually a written entrance test with questions in English.

Entry into specific institutions

8.1.3   *Jawaharlal Nehru University, New Delhi* conducts the Combined Biotechnology Entrance Examination in May every year on behalf of the participating universities, for admission to M. Sc (Biotechnology)/M. Sc. Agri/ M.V. Sc (Biotechnology)/M. Tech (Biotechnology) programmes being offered by various participating universities. For more details, their website www.jnu.ac.in may be visited.

8.1.4   *The IITs* have started conducting a Joint Admission Test M. Sc (JAM) for admission to its post-graduate programmes, including M. Sc Biotechnology programmes offered at IIT Roorkee (www.iilr.ernet.in) and IIT Bombay (www.iitb.ac.in). These are open to candidates   with   a   Bachelor's   degree   in   any   branch   of Science/Agriculture/Pharmacy/Veterinary/Engineering/Medicine (MBBS). For more details, their websites may be visited.

8.1.5   *The Thapar Institute of Technology & Engineering at Patiala* (www.tiet.ac.in) admits a certain number of students through Combined Biotechnology Entrance Examination conducted by JNU while the remaining are admitted on the basis of the M. Sc Biotechnology entrance examination conducted by TIET. For more details, their websites may be visited.

8.2   Medical Entrance

8.2.1   Medical Entrance Tests

Medical entrance tests or premedical tests (commonly known as PMTs) are conducted to identify students with the potential for the rigour of medical studies. The national level medical entrance tests are open to students without reference to their place of domicile. Medical entrance tests conducted by state level authorities/organizations are meant for shortlisting students of state domicile for admission to the medical colleges within the state.

8.2.2   Typical Requirements

A basic requirement for applying for medical entrance tests is that the student should be at least 17 years old on or before 31st December of the year of admission. Upper age limit, where specified, is 25 years. The aspirant should have completed 10+2 or equivalent examination with the subjects physics, chemistry and biology.

Sometimes, the medical entrance test is in the form of a common health science entrance test which means that students aspiring for any of the health/medical science related courses like MBBS/BDS/BAMS/BUMS/BHMS/Physiotherapy/ Occupational Therapy/ Nursing/Veterinay Science should appear for a common entrance test. This does not in any way, change the content of the entrance test.

Overview of some popular tests

8.2.3   All India Pre-Medical/Pre-Dental Entrance Examination (AIPMT) is conducted by *Central Board of Secondary Education (CBSE)* every year in two stages. It is used to select candidates for admission to 15% of the total seats for MBBS/BDS courses in all medical/dental colleges run by the Union of India, State Governments, Municipal or other local authorities in India except in the states of Andhra Pradesh and Jammu & Kashmir. Indian national who have passed in the subjects Physics, Chemistry, Biology and English individually and obtained a minimum of 50% taken together in PCB (40% for SC/ST/OBC candidates) at the qualifying exam. 10+2, can apply. For more details, their website: www.cbse.nic.in may be visited.

8.2.4   *All India Institute of Medical Sciences, New Delhi* holds the competitive all India entrance examination for admission to its MBBS programme. It is open to students who have passed 12th class exam with Physics, Chemistry, Biology and English securing a minimum of 60% marks (50% for SC/ST candidates). For more details, their website: www.aiims.edu or www.aiims.ac.in. may be visited.

8.2.5   Admission to MBBS course at *Armed Forces Medical College, Pune* is through a competitive written test open to unmarried candidates who have passed XIIth standard or equivalent exam. as a regular student in the first attempt in English, Physics, Chemistry and Biology securing not less than 60% of aggregate marks in three science subjects taken together, not less than 50% marks in each of the science subjects and not less than 50% marks in English. B. Sc. graduates with Physics, Chemistry and Biology

(Botany & Zoology) who have passed class XIIth as indicated above can also apply. Candidates must have passed an exam in Maths at least of the matriculation standard and not attained age of 22 years (24 for those who have passed the B. Sc. exam).

8.2.6   For admission to MBBS at *Jawaharlal Nehru Institute of Postgraduate Medical Education and Research (JIPMER), Pondicherry,* resident Indian nationals who studied in school in India in the preceding two years, passed or currently appearing for HSC exam. under 10+2+3 pattern with Physics, Chemistry, Biology (Botany and Zoology) and English as subjects of study; passed individually in each subject and obtained not less than 50% in PCB (40& for SC/ST) can apply. For more details, their website: www.jipmer.edu. may be visited.

8.2.7   For admission to *Christian Medical College, Vellore* which is affiliated to the Dr. MGR Medical University, applicants should have secured 60% marks in each Physics, Chemistry and Biology (or Botany & Zoology taken together) with an aggregate of 140/200 in the subjects, both at qualifying and competitive examinations and must have passed in English. For more details, their website: www.cmch-vellore.edu/pages/id=admission may be visited.

8.2.8   Admission to MBBS at *Mahatma Gandhi Institute of Medical Sciences, PO Sevagram, Wardha –442102* is open to candidates who have passed 12th Std exam. in English, Physics, Chemistry and Biology individually in one and the same sitting obtaining minimum 50% marks (40% for SC/ST/OBC) taken together in PCB.

8.2.9   *Banaras Hindu University, Varanasi* offers MBBS *at Institute of Medical Science* to students who have passed 10+2 and equivalent examination with a minimum of 50% marks (40% in case of SC/ST candidates) in English, Physics, Chemistry and Biology taken together. For more details, their website: www,bhu.ac.in may be visited.

8.2.10   Asso-CET is conducted by *Association of Management of Unaided Private Medical and Dental Colleges, Maharashtra (AMUPMDC).* It is meant for selecting candidates for admission to MBBS and other medical/health related courses in the State of Maharashtra. Candidates who have passed HSC (10+2) equivalent with PCB can apply if they have obtained not less than 50% marks in PCB taken together (for MBBS/BDS courses). For more details, their website: www.amupmdc.org may be visited.

8.2.11   *Faculty of Medical Sciences, University of Delhi,* conducts Post-Graduate Medical Entrance Test (PGMET) for admission to various Post-Graduate (Degree/Diploma) courses. For more details, their website: www.du.ac.in may be visited.

8.2.12   *For more information, following websites may be visited:*

> ➢ Bharati Vidyapeeth, Pune (www.bharatividyapeeth.edu)
> ➢ Padmashree Dr. D. Y. Patil Vidyapeeth, Navi Mumbai (www.dypatil.com)
> ➢ Dr D Y Patil Medical College, Dr D Y Patil Vidyapeeth, Pune (www.dypatilvidyapeeth.org)
> ➢ Sri Ramachandra Medical College & Research Institute, Chennai (www.srmc.edu)

> ➤ Pravara Institute of Medical Science, Loni (www.pravara.com)
> ➤ Manipal Academy of Higher Education, Manipal (www.manipal.edu)
> ➤ Krishna Institute of Medical Sciences, Karad (www.kimsdeemeduniversity.in)
> ➤ Amrita Institute of Medical Sciences, Kochi (Amrita Vishwa Vidyapeetham) www.aimshospital.org/medcoll/admissions06 html
> ➤ St. John's National Academy of Health Sciences, Bangalore –560034

8.3   Joint Entrance Examination by IITs & other Institutes

For admission to undergraduate courses at seven Indian Institutes of Technology at Mumbai, Delhi, Guwahati, Kanpur, Kharagpur, Chennai and Roorkee and IT-BHU, Varanasi and Indian School of Mines University, Dhanbad, every year a Joint Entrance Examination (JEE) is held. Eligibility requirements for this examination and syllabus for Physics, Chemistry, Mathematics and Aptitude Test can be seen on the respective websites of IITs. The advertisement for JEE is also published in leading National Dailies and Employment News/Rozgar Samachar.

8.4   Information on Competitive Examinations by ICAR

Indian Council of Agricultural Research (ICAR) is one of the largest employer of scientific manpower in the country. More than 6,500 research scientists work directly in the Council's research establishments and about 5,000 scientists in the State Agricultural Universities (SAUs) in projects funded directly by the Council.

8.4.1   Recruitment through Competitive Examination by ICAR

Recruitment to the positions in ICAR as mentioned above is made each year by the Agricultural Scientists Recruitment Board (ASRB) in 61 disciplines through a nation wide competitive examination followed by a personal interview. These 61 disciplines apart from agricultural science, animal science and fisheries science include Basic and Fundamental Sciences, Social Sciences, Home Science and Engineering. The maximum qualification is a Master's degree in the subject but many doctoral degree holders also appear in this examination.

8.4.2   Scientific Placements

Scientific placements are classified into: Scientists, Scientists Selection Grade, Senior Scientists and Principal Scientists. Nearly 1,000 of them occupy management placements as Heads of Divisions, Project Coordinators, Project Directors-General etc. For more details website: www.icar.org.in may be visited.

(The above information is only indicative. For more details on Entrance/Competitive Examinations, organization-wise/subject-wise websites may be visited).

TALENT-FELLOWSHIPS-SCHOLARSHIPS-STUDENTSHIP SCHEMES

9.1   Talent Search

There are a number of schemes which are operational in the country to identify talented school and college students so as to retain meritorious students for research and development careers and university teaching careers in the sciences. Some major schemes are as follows:

9.1.1   National Talent Search Scheme (NTSS)

This scheme is operated by the National Council of Educational and Training (NCERT) and aims to identify all round talent in science and social science on the basis of written tests and interview. About 1000 students are selected at Class X + stage.

9.1.2   Kishore Vaigyanik Protsahan Yojana (KVPY)

This scheme is operated by the Indian Institute of Science, Bangalore and it aims to search talent in science on the basis of normalized marks in Boards, written tests and a final interview. About 80 students are selected at X+ stage and a similar number at the XII+ stage. The scheme exists for engineering and medicine streams also. The nodal agency for this scheme is the Department of Science & Technology, Government of India. Since this is an important scheme, its details are given under the Title "Fellowships" hereunder for the benefit of S&T students:

9.1.3   Jagdishchandra Bose National Science Talent Search (JBNSTS), Kolkata

This scheme is for students from the eastern region of the country and it aims to identify talent in science on the basis of a written test and an interview. About 16 junior Scholarships for school students and about 7 Scholarships for undergraduates are given under this scheme.

9.1.4   CSIR Programme for Youth and Leadership in Science

Top 50 students of CBSE, ICSE and the other State Boards qualify out of approximately 2000 students at the Class X+ stage, for this scheme that involves nurture through visits to laboratories and project work.

9.1.5   Homi Bhabha Centre for Science Education (HBCSE)

HBCSE in collaboration with Indian Association of Physics Teachers, Indian Association of Chemistry Teachers, National Board of Higher Mathematics and National Council of Science Museums organizes   Science, Mathematics and Astronomy Olympiads. The Olympiads involve a multi-stage selection and training

programme leading to participation of Indian Teams in International Olympiads in different subjects. Putting all subjects together, a total of about 1,00,000 students appear for the first stage of Olympiads. The Olympiads are exceptionally challenging subject-based competitions, both in theory and experiment for the science students completing the senior secondary stage. Each year, India sends a total of about 25 students in mathematics, physics, chemistry, biology and astronomy to the International Olympiads in these subjects.

9.1.6   Children's Science Congress

This scheme is organized by the Department of Science and Technology, Government of India and it aims to select students with scholastic talent and competence. The scheme encourages innovative projects and investigations in science by such selected students.

9.1.7   Talent Search at the Undergraduate Level

There are not many talent search schemes at the undergraduate level. One of them is KVPY scheme as mentioned earlier. **National Graduate Physics Examination (NGPE)** conducted by Indian Association of Physics Teachers is based on a test involving both theory and experiment. The entrance examinations for entry to M.Sc programmes at different IITs and similar entrance/selection examinations at higher levels e.g. GATE, JEST, UGC-CSIR-NET are also sources of spotting talented science students at higher level.

Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore, conducts a programme of training and exposure to research for selected undergraduate students in chemistry. Opportunities for visits and orientation programmes for undergraduate students exist at several other institutes such as **Saha Institute of Nuclear Physics; S.N. Bose National Centre for Basic Sciences; Tata Institute of Fundamental Research, IITs etc.** A comprehensive all India programme of talent nurture for undergraduate science students namely National Initiative on Undergraduate Science (NIUS) has been launched from April, 2004 by Homi Bhabha Centre for Science Education (HBCSE) in collaboration with Tata Institute of Fundamental Research (TIFR) and B.A.R.C. Department of Atomic Energy.

9.2   Fellowships

Several Fellowship Schemes of the Government Departments/Agencies are available which can be availed of by the S&T Students. Information on some of the important ones is provided hereunder. For other Fellowship schemes, the information can be collected from various websites.

9.2.1   NET Fellowship Scheme of CSIR

A certain number of Junior Research Fellowships (JRFs) are awarded each year by CSIR to those holding M.Sc or equivalent degree, with minimum 55% marks

(applicable to General and OBC candidates) and minimum of 50% marks (applicable to SC, ST and Physically Handicapped), after qualifying the National Eligibility Test (NET) conducted by CSIR twice in a year. The tests are conducted generally on the penultimate Sunday in the months of June and December.

Age Limit

The upper limit for JRF is 28 years which is relaxed upto 5 years in the case of candidates belonging to Scheduled Castes/Scheduled Tribes, Women, Physically Handicapped and OBC applicants.

Fellowship Tenure

The total tenure as JRF plus SRF (NET) is five years. This includes the tenure of Fellowship awarded by UGC/DST/ICMR/ICAR etc., or any other Funding Agency/Institution. The order for continuation at the same rate of stipend as SRF (NET), continuation at the same rate of stipend as JRF or otherwise is issued by the EMR Division of HRD Group, CSIR. It is mandatory on the part of the fellow to acknowledge support of CSIR in his/her research publication.

More details about CSIR-NET can be seen from website www.csirhrdg.res.in of HRD Group, CSIR.

9.2.2   **Junior Research Fellowship Scheme of ICMR**

ICMR JRF Examination is the first step in the process of admission to the Ph.D/ Research Programme through council's support. Test for ICMR JRF fellowship are conducted at the five centres viz. Chandigarh, Chennai, Delhi, Kolkata and Mumbai once a year. The award of JRF is made on merit basis by holding an entrance examination after issuing a countrywide admission notice. The admission notice is published in leading English Newspapers of India usually during March/April and also on the website. The entrance examination is usually held in the first/second week of July. **M.Sc. or equivalent degree** with minimum 55% marks for General/OBC Candidates and 50% for the SC/ST & physically handicapped candidates are eligible.

This national level examination is held by ICMR for determining the eligibility of Indian National candidates for the award of Junior Research Fellowships (JRF). The award of Junior Research Fellowship to the successful eligible candidates depends on their finding placement in a medical college / hospital / university / national laboratory / institution of higher learning and research as applicable.

Age Limit

The age limit for admission to the eligibility test is 28 years (upper age limit relaxable upto 5 years in case of candidates belonging to SC/ST, physically handicapped (PH) and female candidates, 3 years in the case of OBC category.

Number of Fellowships

I. A total of **150 Fellowships** would be awarded. **120 Fellowships** are awarded for work in the field of **Biomedical Sciences** with emphasis on **Life Sciences** (like microbiology, physiology, molecular biology, genetics, human biology, bioinformatics, biotechnology, biochemistry, biophysics, immunology, zoology, environmental science, botany, veterinary sciences, bio-informatics etc.).

II. **Another 100 candidates** are selected for consideration for positions of JRF under various research schemes of ICMR (subject to fulfilling the conditions for appointment under the schemes) for the duration of that scheme. These JRFs are also permitted to complete Ph.D. while working in the scheme, if enrolled. **The validity of result is two years for placement in ICMR funded projects.**

III. SC/ST/OBC/Physically Handicapped (PH) applicants is given such special consideration as per policy guidelines.

Fellowship Tenure

The duration of junior research fellowship is initially limited till three years. **The total tenure as JRF plus SRF shall not exceed 5 (five) years.**

For more details the website of ICMR: www.icmr.nic.in may be visited.

9.2.3   National Fellowships For Students Interested In Research Careers, Kishore Vaigyanik Protsahan Yojana (KVPY)

The Department of Science and Technology, Government of India, offers attractive fellowships (Rs. 2000 to Rs. 5000 p.m.) and contingency grants to students studying in Basic Sciences, Engineering or Medicine. Selection to the Programme takes into account academic excellence and demonstrated interest in research. Selection is open to Indian nationals studying in India.

Eligibility:

Basic Sciences:

- **Stream SA:** Students joining in XI Standards (Science subjects) during the academic year 2007-2008 and having secured a minimum of 75% (65% for SC/ST) marks aggregate in Mathematics and Science subjects in X Standard Board Examination.

- **Stream SB:** (1) Open to all students pursing First Year B. Sc. degree / M.Sc. Integrated (UG Programme in Basic Sciences) during the academic year 2007 – 2008 and having secured minimum of 60% (50% for SC/ST) marks aggregate in Mathematics & Science subjects in XII Standard Board Examination.

(2) Students of Class 10 +2 of the academic year 2007-08 who are aspiring to join **IISER** for integrated M.S. Programme for the session August 2008 may also take the Aptitude Test for the SB Stream provided they secure a minimum of 75% marks (65% for SC/ST) aggregate in Mathematics and Science subjects in X Standard Board Examination.

- **Stream SP:** Students pursing XI, XII Standard, First of any UG Programme in Basic Sciences during the academic year 2007-2008 and having secured a minimum of 60% (50% for SC/ST) marks aggregate in X Standard and XII Standard Board Examination.

Engineering:

- **Stream EA:** Students joining First year B.E. / B. Tech / B. Arch during the academic year 2007-2008 and having a minimum of 60% (50% for SC/ST) marks aggregate in Mathematics and Science subjects in XII Standard Board Examination. A copy of the research project is required to accompany the application.

- **Stream EB:** Students joining Second year B.E. / B. Tech / B. Arch during the academic year 2007-2008 and having a minimum of 60% marks (50% for SC / ST) in the First year exam of B.E. / B. Tech / B. Arch. A copy of the research project is required to accompany the application.

Medicine:

- **Stream MA:** Students enrolled in II year MBBS Programme during the academic year 2007-2008. Students must have passed XII Standard Board Examination with 75% (65% for SC /ST) marks aggregate in Science subjects. A copy of the Bio-Medical research project is required to accompany the application.

For more details: www.iisc.ernet.in/kvpy may be visited.

9.2.4   Graduate Fellowship Scheme of Department of Atomic Energy

Department of Atomic Energy (DAE), Graduate Fellowship Scheme. DAE Graduate Fellowship Schemes are being developed to further strengthen research-education linkage in areas of interest to DAE programs. DAE Institute MTech scheme is one such scheme and provides excellent career opportunity for pursuing prestigious programmes of the Department to students qualifying for admission to the MTech course in Indian Institute of Technology at Kanpur or Mumbai (likely to be extended to other IIT's particularly at Delhi & Chennai). Student pursuing specified specialisation (such as Mechanical Engineering, Nuclear Engineering & Technology, Chemical Engineering, Civil Engineering, Materials Science, Electrical Engineering, Computer Science & Engineering.

9.2.5   Other Fellowships

There are several other Fellowships Schemes. Some of the important ones are mentioned hereunder. The following information is only indicative. For more details on Fellowships, organization-wise/fellowship-wise websites may be visited.

- Boyscast fellowship scheme
- Dr K S Krishnan DAE Research Fellowships
- Dr. K.S. Krishnan Research Associateship (KSKRA)
- Rajiv Gandhi Science Telent Research Fellowships
- Research fellowships in engineering
- Scholarships for postgraduate study in engineering/technology at indian universities (GATE))

9.3   Scholarships in S&T

There are several S&T Scholarship schemes available in India. Information on some of the important ones is provided hereunder. For other Scholarship schemes, the information can be collected from various websites.

9.3.1   DST's Scholarship Scheme for Women Scientists and Technologists

The "Women Scientists Scheme (WOS)" has been evolved by the Department of Science and Technology (DST) for providing opportunities to women scientists and technologists between the age group of 30-50 years who desire to return to mainstream science and work as bench-level scientists. Through this endeavour of the Department, a concerted effort is made to give women a strong foothold into the scientific profession, help them re-enter into the mainstream and provide a launch pad for further forays into the field of science and technology, both from the point of view of pure science and its application to societal development.

Under this scheme, women scientists are being encouraged to pursue research in frontier areas of science and engineering, on problems of societal relevance and to take up S&T based internship followed by self-employment.

Category of Scholarships

Three categories of scholarships, with research grants, are available for Indian citizen. Scholarships are envisaged in both institutional and non-institutional modes. Under the institutional mode, national and state-level organizations, recognized universities, educations and R&D laboratories are considered for grant by the Department.

S&T - based Non-Government, Voluntary and Non-Profit organisation, working on societal issues and having the legal status of a registered society are considered under the non-institutional mode.

The various categories of Scholarships available are indicated below:

o   Scholarship for Research in Basic/Applied Science (WOS-A)
o   Scholarship for Research in S&T - based Societal Programs (WOS-B)
o   Internship for the Self-Employment (WOS-C)

The scheme is meant to encourage women candidates, preferably those having a break in career and not having regular employment. For more details, please visit DST's website: **www.dst.gov.nic.in**.

9.3.2   Scholarship Scheme for Women having Science Qualifications

The Department of Science and Technology has launched a scholarship scheme for women having science qualifications for training in the area of intellectual property rights especially in patent searches, understanding of patent specification and preparation of technology scan report. Long term objectives: 1. Empower the talented and skilled women who have studied science, engineering and medicines to contribute effectively in the advancement of science and technology in the country. 2. Develop a pool of women in India ready to undertake scientific and technical aspects of intellectual property rights.

9.3.3   Scholarships in Birla Institute of Technology and Science

Birla Institute of Technology And Science Pilani - 333 031 (Rajasthan) offers Ph.D. Fellowship for Research Related to Information and Communication Technologies for Emerging Economies. Subjects: Information and Communication Technology: Handwriting Recognition, Technology for Education and Multimedia Broadcast. Eligibility: Master degree in Engineering and Technology and those interested in pursuing research in above areas. Duration: 3 years. Value: Maintenance allowances: Rs.20000 pm. Other allowances: Rs.20000 pm for living expenses for the duration candidate spends at HP Labs, Bangalore. Notification: As per notification in leading dailies.

9.3.4   Scholarships in National Institute of Pharmaceutical Education & Research

National Institute of Pharmaceutical Education & Research (NIPER) Sector 67, Phase X, S.A.S. Nagar, Mohali-160062 offers Doctoral Programmes. Department Eligibility for Application: Medicinal Chemistry M.S.(Pharm)/M.Pharm. M.Sc. (Organic Chemistry) Natural Products

9.3.5   Scholarships in National Council of Science Museums

National Council of Science Museums Block-GN, Sector-V Bidhan Nagar Kolkata-700091 offers Post Graduate Fellowship for M.S. course in Science Communication.. The selected fellows will undergo full- time Master of Science (Post Graduate) course in Science Communication being conducted by the Council in collaboration with the Birla Institute of Technology & Science (BITS), Pilani on an off-campus mode. Eligibility: First class Bachelor's degree in Engineering or Technology in Mechanical/

Electrical/Electronics/ Information Technology/Telecommunication/ Instrumentation/ Computer/ Metallurgy/ Chemical Engineering/ Production Engineering or first M.Sc. degree in Physics/Chemistry/Bio-science/Environmental Science. Duration: 2 year. Value: Rs. 5000 p.m. for two years with contingency grant of Rs. 5000 p.m.

9.3.6 Scholarships in Council of Science & Technology

Council of Science & Technology ,Vigyan Bhawan, Suraj Kund Park 9-Nabi Bulah Road, Lucknow 226018 (Uttar Pradesh) offers the following awards: 1) Science Student Award: These awards would be given to the students who have obtained highest marks in Science subjects in High School and Intermediate examinations (10 +2) conducted by U.P. Board Allahabad or equivalent Board. 2) Bal Vigyan Samman: Five awards of Rs. 7000/- each and a citation would be given to science students up to the age of 18 years for their outstanding and important innovative scientific ideas and works including Science

9.3.7 Scholarships in Department of Atomic Energy

Department of Atomic Energy (Department of Atomic Energy Board of Research in Nuclear Sciences) 6th Floor, Central Complex BARC, Mumbai 400085 (Maharashtra) Offers Scheme to Grant financial assistance to Young Scientists Subjects: Engineering and Technology with special reference to atomic energy. Eligibility: Scientists/Engineers working in Universities, academic institutions of higher learning and research organisations having regular positions. Age: below 35 years. Value: The Award carries a maximum research grant of Rs. 5 lakhs in a block of three years and can be utilised for expenditure on equipment, cons, umbels, travel and other contingencies in connection with his/her research activities. Note: Those working in the laboratories and institutions fully.

9.3.8 Scholarships in Indian Institute of Information Technology

Indian Institute of Information Technology, IIIT-Allahabad (1IIT-A), Deoghat Jhalwa, Allahabad 211011 (UP) offers Uttar Pradesh Chhatra Kalyan Nidhi Graduate/PG Scholarships for Poor Meritorious Students. Eligibility: Obtained minimum 55% in Postgraduation. Age: As per institute rules. The candidate's parent's/guardian's income is not more than Rs.75,000/- p.a. Duration: 1-year. Postgraduate in Agriculture: Rs. 3,000/-.   Postgraduate in Technical/Medical Rs.. 4,800/-. Ph.D Rs. 10,000 – 12,000/-. For Chemistry, Physics, Biology, Botany, Agriculture, Medical, Engineering, Forest & Environment: Value Rs. 10,000/-.For Bio-chemistry, Bio-technology, Bio-instrumentation, Biometrics, Material Science, Environment and Energy Technology, Electronics and Communication. Value: Rs. 12,000/-.

9.3.9 Scholarships in Indian Institute of Science

Indian Institute of Science, Bangalore 560012 (Karnataka) Offers Research Programme in the following programme: (i) Research (M.Sc. (Engg.) and Ph.D.) (ii) Course (ME/M Tech/MDes) (iii) Integrated Ph.D. (iv) External Registration Program

at the institute. Research Programs: (1) Science Faculty - Ph.D Programs: Astronomy & Astrophysics, Biochemistry, Ecological Sciences, High Energy Physics, Inorganic Physical Chemistry, Management Studies, Material Research, Mathematics, Microbiology & Cell Biology, Molecular Biophysics, Molecular Reproduction, Development and Genetics, Organic Chemistry, Physics, Solid State & Structural Chemistry. (2) Engineering Faculty - Ph.D & M.Sc. (Engg): Aerospace Engineering, Atmospheric & Oceanic Sciences, Chemical Engineering, Civil Engineering, Computer Science & Automation, Electrical Communication.

9.3.10   Scholarship Scheme of ICAR in discipline of Tea Husbandry & Technology

Scholarship is available to pursue graduation and post graduation in the discipline of Tea Husbandry and Technology. ICAR offers National Talent Scholarship @ Rs 1200/-per month, to the first 230 meritorious candidates in the exam conducted by ICAR in each of the ten subjects provided a candidate takes admission in any institution not falling in his/her own home state. ICAR offers JRF (two seats) in the field of agronomy (Tea Husbandry and Technology) at the Post Graduate level. At the postgraduate level, respective state governments as well as ICAR offers a number of scholarships. ICAR conducts an All India Entrance Examination for the award of ICAR's Junior Research Fellowships (JRF) and admission to 100% seats of Master's Degree Programme at IARI, IVRI, CIFE, BDRI and 25% seats at all the SAU's, CAU, and Central Universities in the field of Agriculture, Veterinary & Allied Sciences. Near about 500 scholarships are offered by the ICAR.

9.4   Traineeship/Studentship in Bioinformatics at the Apex Bioinformatics Centre for the Year 2007: Department of Biotechnology

The Department of Biotechnology, Government of India has established a Nationwide-Bioinformtics Network in the country known as Biotechnology Information System (BTISnet), to accelerate Biotechnology R&D and industry activities. The Apex Biotechnology Information Centre (BTIC) of this network is situated in the Department of Biotechnology to coordinate the activities of the BTIS net centres. As part of the human resource development activities in Bioinformatics, the Centre offers Traineeship/Studentship in Bioinformatics.

Website: http://www.dbtindia.hov.in/research/researchfmain.html .

9.4.1   Short Term Research Studentship Programme (STS) of ICMR

The Indian Council of Medical Research initiated the Short Term Research Studentship Programme in 1979 in order to promote interest and aptitude for research among medical undergraduates. The main objective of this programme is to provide an opportunity to undergraduate medical students to familiarize themselves with research methodology and techniques by being associated for a short duration with their seniors on ongoing research programme or by undertaking independent projects. This may serve as an incentive for them to take up research as a career in the future. The Institution must provide the student with all facilities for carrying out research. For more details the website of ICMR: www.icmr.nic.in may be visited.

SCIENCE & TECHNOLOGY ENTREPRENEURSHIP DEVELOPMENT

10.1 The Entrepreneurship Scheme of NSTEDB

The Department of Science and Technology (DST), Govt. of India, New Delhi, has identified entrepreneurship as one of the principal mechanism for solving the problem of unemployment and underemployment amongst science and technology graduates in the country. The National Science and Technology Entrepreneurship Development Board (NSTEDB), set up in 1982 under the DST, felt that some machinery should be created in the educational institutions which could help in strengthening industry-institute interaction and also promote entrepreneurial culture in technical institutions and institutions of higher learning.

A number of programmes under the Scheme have been initiated, such as:

- Entreneurship Development Cell (EDC)
- Science & Technology Entrepreneurship Development (STED) Project
- Science & Technology Entrepreneurs Park (STEP)
- Technology Business Incubator (TBI)
- Entrepreneurship Awareness Camp (EAC)
- Entreneurship Development Programme (EDP)
- Faculty Development Programme (FDP)
- Open Learning Programme in Entrepreneurship (OLPE)
- Skill Development Training Through Science & Technoloty (STST)
- Technology Based Entreneurship Development Programme (TEDP)
- Science Tech Entrepreneur – Magazine
- TIME IS – Web Portal

One of the examples of participating in the above scheme is that of the Jawaharlal Nehru Technological University, Kukatpally, Hyderabad - 500 072.(Website: www.jntu.ac.in/edc) which has established the Entrepreneurship Development Cell with partial financial support from DST. In order to make optimal use of facilities, expertise and know-how available in the technical institutions for the benefit of the society, it is necessary that appropriate links are established between them and the industry. Thus, it is necessary to develop mechanisms so that academic institutions could focus their attention on entrepreneurship and self employment in addition to their present mandate of churning out trained manpower.

For more details please visit Website: www.nstedb.com, www.techno-preneur.net of National Science & Technology Entrepreneurship Development Board's (NSTEDB) established in 1982 under the aegis of the Department of Science & Technology, Government of India.

10.2 Entrepreneurial Training for Agricultural Graduates

The Krishi Vigyan Kendras (KVKs) and agricultural universities have been directed to provide the necessary information and assistance to the agricultural graduates aspiring to set up these centers to meet the start up requirements of these agriprenteurers. The institutions have been advised to provide their facilities to the young entrepreneurs on payment basis. Commercial banks have been instructed by the Reserve Bank of India (RBI) to consider loan assistance to these sectors on priority basis. The rates of interest as well as security norms are as per the RBI guidelines. The current rate of interest applicable to loans to these projects is around nine per cent.

The NABARD has contacted companies such as Deepak Fertilizers, MAHYCO, Maharashtra State Seeds Corporation, Venkateshwars Hatcheries, Harneshwar Agro Products, Gokul Dairy, etc. to consider extending franchises, dealerships, service centers with established brands.

Some of the state-supported training institutes like the National Institute of Agriculture Extension Management at Hyderabad, KVK at Babhaleshwar and MITCON have been providing training facilities to the agricultural graduates in building up their entrepreneur capabilities.

10.3 Success Rate of Enterprises put up by Graduates

The success rate of the enterprises put up by graduates trained and assisted by professional institutes is indeed very encouraging. The rate of return on the capital employed ranges from 15-120 per cent. Besides, these units have helped in adding value to some of the rural produce turned out at remote, infrastructure-deficit areas. For example, the bulk coolers set up in interior cluster of villages not covered by the regular dairy milk roots have not only turned out profits to the promotes but have also enhanced the earnings of small dairy producers by bringing market access to their milk. Some of the enterprises which have taken up production of fisher lings have generated very attractive profits apart from yielding part time income to hundreds of farmers. An average unit has generated direct employment to about 10 workers and indirect employment to hundreds of persons. The range and the list of the successful AC&ABCs are indeed very encouraging.

For details of model projects qualified for loans through commercial banks one could check at www.cab.rbi.org.in. The desirous candidates could access more information on these project proposals at www.agriclinics.net., www.kvk.pravara.com and www.nabard.org

11.1 ITIs - An Overview

The following brief information is being provided for the benefit of those science students who drop out at 11th or 12th class level or do not wish to take up further education after qualifying 12th level and desire to acquire technical skills for employment:

11.2 Status of ITIs

India has about 5,100 Industrial Training Institutes (ITIs) and 1745 Polytechnics. The total seating capacity in these **ITIs** is about **6.28** lakh.

11.3 Objectives

* To fill up the gap between manpower available & the technically skilled manpower requirement.
* To impart Quality Training to the Trainees.

11.4 Vocational Education

Vocational Education refers to vocational courses being offered in schools for Grades 11 and 12 students under a Centrally Sponsored Scheme 'Vocationalization of Secondary Education.' Ministry of Human Resource Development (MHRD) has overall responsibility.

11.5 Vocational Training

Vocational Training is offered through separate training institutes set up for the purpose. Ministry of Labour & Employment has over all responsibility

11.6 Role of State Governments

The State Governments are responsible for implementation of Vocational Training Programmes at the State Level. They deliver vocational training through:

* Industrial Training Institutes (ITIs) under the administrative and financial control of the respective State Government.

* Industrial Training Centers (ITCs) privately funded and managed. Some get support from State Government.

11.7 Recent initiatives taken by Government to strengthen ITIs

* Establishments of new ITIs in the North Eastern States & Jammu & Kashmir.

* Introduction of multi-skilled courses in selected ITIs.

- Ten new courses with strong Industry linkage approved for introduction in the ITIs.

- Introduction of externally aided projects for reforms & improvements in vocational training.

- Up gradation of ITI's into Centre of Excellence (CoE)

11.8 Objectives of Centres of Excellence

- Main objective is to produce multi skilled workforce of world standard by introducing new multi-skill modular courses as per needs of Industry.

- Improving physical infrastructure facilities like building, equipment etc.

- Adopting new training technology with close involvement of Industry.

- Empowering these Centres by providing sufficient autonomy.

- Building up partnership with nearby industry by setting up Institute Management Committee (IMC).

INSTITUTIONS OF HIGHER LEARNING

12.1 S&T Institutions of Higher Learning

There are a large number of S&T Institutions of Higher Learning all over India where the students can take admission. These are listed below State-wise.

12.2 Post-Graduate Programmes in Science, Engineering, Technology, Architecture & Pharmacy

This chapter gives a list of Postgraduate Programmes (M.Tech., M.Sc. (Engg.), M.E., M.Pharma., M.Arch., M.S. and M.Des. etc.) available at various recognized Institutions/ Universities.

For more details about the course and the eligibility criteria, the applicants are requested to contact the respective Institutions/Universities and also ascertain which paper in GATE 2007 will make them eligible for their intended course of study. The candidates seeking admission into various PG Programmes in different institutions should have the required eligibility for that Programme.

ANDHRA PRADESH

Annamacharya Institute of Technology & Sciences, Rajampet
Digital Electronics and Communication Systems, CAD/CAM

Aurora's Engineering College, Bhongir
VLSI Design, Power Electronics

Bapatla Engineering College, Bapatla
Communication & Signal Processing, CAD/CAM

Central Institute of Tool Design, Hyderabad
Tool Design, CAD/CAM

Centre For Energy Studies, Institute of Post Graduate Studies & Research, Jawaharlal Nehru Technological University, Masab Tank
Energy Systems

Chaitanya Bharathi Institute of Technology, Hyderabad
Computer Science, Communication System, Structural Engineering, CAD/CAM

College of Engineering, Andhra University, Waltair
Information Technology, Geo-technical Engineering, Hydromechanics & Water Management, Remote Sensing (Geo-Tech), Structural Engineering, Computer Science & Engineering, Industrial Drives & Controls, Power Systems Engineering, Digital Systems, Microwave & Radar, Systems & Controls, Production Engineering, Industrial Metallurgy, Marine Engineering & Mechanical Handling, Environmental Engineering & Management, Machine Design, Structural Engineering, Electronics Instrumentation, CAD/CAM, Industrial Engineering, Heat Transfer In Energy System, Chemical Engineering, Industrial Process Instrumentation, Chemical Engineering, Bio-Technology, Radar and Microwaves, Computer Science & Technology, Information Technology

College of Engineering, Gandhi Institute of Technology & Management, Visakhapatnam
Structural Engineering (Disaster Management), Industrial Safety Engineering, Computer Science & Technology, CAD/CAM, Bio-Medical Engineering, Information Technology, Industrial Engineering

G Pulla Reddy College of Engineering, Hyderabad
Power Electronics, Comm. & Signal Process, CAD/CAM, Thermal Science & Energy System

G. Narayanamma Institute of Technology & Science, Hyderabad
Power Electronics & Electric Drives

Gayatri Vidya Parishad College of Engineering, Visakhapatnam
Chemical Engineering, Power System Control & Automation, Computer Science & Engineering, CAD/CAM

Godavari Institute of Engineering & Technology, Rajahmundry
Power Systems (High Voltage), Software Engineering

Gokaraju Rangaraju Institute of Engineering & Technology, Bachupalli
Design for Manufacturing

Gudlavalleru Engineering College, Gudlavalleru
Digital Electronics & Communication Systems

Institute of Post Graduate Studies & Research (IPGSR), JNTU, Hyderabad
Environmental Geoinformatics, Environmental Management, Water Resources Management, Geoinformatics and Surveying Technology

J.B. Institute of Engineering & Technology, Yenkapally
Electrical Power Systems, Industrial Engineering & Management

JNTU College of Engineering, Anantapur
Computer Aided Structural Engineering, Structural Engineering, Chemical Engineering, Control Systems, Electrical Power Systems, Power & Industrial Drives, Water Resources Engineering Digital Electronics & Communications Systems, Structural Engineering,

Electrical Power Systems, Refrigeration & Airconditioning Engineering, Structural Engineering, Electrical Power Systems, Refrigeration & Airconditioning Engineering, Computer Science & Engineering Software Engineering, Energy Systems. Refrigeration & Air Conditioning, Digital Systems & Computer Electronics

JNTU College of Engineering, Hyderabad
Biotechnology, Energy Systems. Remote Sensing, Transportation Engineering, Water Resources, Digital Systems & Computer Electronics, Thermal Engineering, Environmental Management

JNTU College of Engineering, Kakinada
Soil Mechanics & Foundation Engineering, Structural Engineering, Advanced Power Systems, Soil Mechanics & Foundation Engineering, Electronic Instrumentation, High Voltage Engineering, Machine Design, Soil Mechanics & Foundation Engineering, Electronic Instrumentation, High Voltage Engineering, Machine Design, Computer Science

JNTU College of Engineering, Kukatapally
System and Signal Processing, Power Electronics, Electrical Power Engineering, Geo Environmental Engineering, Digital Systems & Computer Electronics, Information Technology, Computer Science, Advanced Manufacturing Systems, Thermal Engineering

JNTU School of Planning & Architecture, Hyderabad
Urban & Regional Planning

K.S.R.M. College of Engineering, Kadapa
CAD/CAM

Kakatiya Institute of Technology & Science, Warangal
Digital Communication, Structural & Construction Engineering, Software Engineering, Design Engineering

Karshak Engineering College, Hyderabad
Embedded Systems, Software Engineering

Koneru Lakshmaiah College of Engineering, Guntur
Power Electronics & Power Systems Automation, Communication & Radar System, Computer Sc & Engineering, Computer Integrated Manufacturing

M.V.S.R. Engineering College, Ranga Reddy
Production Engineering (ME)

Madanapalle Institute of Technology & Science, Chittoor
Digital Electronics & Comm. Systems

Maharaj Vijayaram Ganjapathi Raj College of Engineering, Vizianagaram
Machine Design

Muffakham Jah College of Engineering & Technology, Hyderabad
CAD/CAM

N.B.K.R. Institute of Science & Technology, Nellore
Computer Aided Power Systems, Industrial Engineering

Narasaraopet Engineering College, Narasaraopet
Digital Electronics & Communication Systems, Power & Industrial Drives

National Institute of Technology, Warangal
Engineering Structure, Geo-Technical Engineering, Transportation Engineering, Water Resources Engineering, Remote Sensing & GIS, Environmental Engineering, Power Electronics & Drives, Power Systems Engineering, Thermal Engineering, Manufacturing Systems Engineering, Computer Integrated Manufacturing, Advanced Manufacturing Processes, Electronics Instrumentation, VLSI System Design, Industrial Metallurgy, Chemical Engineering Computer Science & Engineering, Computer Science, Electrical Machines & Industrial Drives, Power Systems, Electronic Instrumentation, Design & Prod Engineering (Machine Tool), Design & Production of IC Engines & Gas Turbines

P.R.R.M Engineering College, Rangha Reddy
Power Electronics

Padmasri Dr. B.V. Raju Institute of Technology, Secunderabad
Chemical Engineering

R.V.R. & J.C. College of Engineering, Guntur
Structural Engineering, Control Systems Engineering, Computer Science & Engineering, CAD/CAM

Rajeev Gandhi Memorial College of Engineering & Technology, Nandyal
Power Electronics, Machine Design, Computer Science, Digital Systems & Computer Electronics

SRKR Engineering College, Bhimavaram
CAD/CAM, Structural Engineering & Natural Disaster Management

SV University College of Engineering, Tirupati
Energy Management, Chemical Engineering, Environmental Engineering, Geo-Technical Engineering, Hydraulics & Water Resources Engineering, Structural Engineering, Electronics Instrumentation & Comm Sys, Instrumentation & Control System, Power Systems, Operation & Control, Industrial Engineering, Production Engineering, Computer Science, Space Technology& Applications

Sathya Sai Institute of Higher Learning, Anantpur
Computer Science, Fibre Optics & Digital Image Processing

School of Information Technology (J.N.T.U.), Hyderabad
Computer Science, Software Engineering

Sree Nidhi Institute of Science & Technology, Hyderabad
Digital Systems & Computer Electronics, Electrical Power Engineering, CAD/CAM

Sree Vidyanikethan Engineering College, Chittoor
Electrical Power Systems, Computer Science & Engineering (Software)

University College of Engineering, Osmania University, Hyderabad
Hydraulic Machines & Water Management/Structural Engineering (ME), Industrial Drives & Control (ME), Power Systems Engineering (ME), Power Systems Engineering/Industrial Drives & Control (ME), Digital System Engineering (ME), Digital System Engineering/Systems & Signal Processing (ME), Microwave & Radar Engineering (ME), Systems & Signal Processing (ME), Production Engineering (ME), Turbo Machinery (ME), Bio-Medical Engineering (ME), Health Care Engineering (ME), Automation & Robotics (ME), Computer Sc & Engineering (MTech), Chemical Reaction Engineering (MTech), Plant Design (MTech), Process Dynamic & Control (MTech), Transfer Process (MTech) Ceramic Engineering (MTech), Chemical Technology (MTech), Material Sciene & Technology (MTech), Technology of Surface Coatings (MTech), Technology of Vegetable Oils, Fats & Detergents (MTech)

University of Hyderabad, Hyderabad
Artificial Intelligence, Computer Science, Medical biotechnology, Information Technology/Banking & Information Security

V.R. Siddharatha Engineering College, Vijayawada
Structural Engineering, Production Engineering, Microwave Engineering

Vaagdevi College of Engineering, Warangal
Electrical Engineering

Vasavi College of Engineering, Hyderabad
Embedded System & VLSI Design, Advanced Design & Manufacturing

Vignan's Engineering College, Guntur
Chemical Engineering, Machine Design

VNR Vignana Jyothi Institute of Engineering & Tech, Hyderabad
Advanced Manufacturing Systems, VLSI System Design, Power Electronics

JNTU School of Planning & Architecture, Hyderabad
Planning (Housing)

Bapatla College of Pharmacy, Bapatla
Pharmaceutical

College of Engineering, Andhra University, Waltair
Pharmaceutical Chemistry, Pharmacology, Pharmaceutical Biotechnology, Pharmaceutical Technology, Pharmacognosy & Phytochemistry, Pharmaceutical Analysis and Quality Assurance

G Pulla Reddy College of Pharmacy, Hyderabad
Physical Chemistry, Pharmacognosy

KVSR Siddhartha College of Pharmaceutical Science, Vijayawada
Pharmaceutics

Sarojini Naidu Vanita Maha Vidyalaya, Hyderabad
Pharmaceutical Chemistry

Shadan College of Pharmacy, Hyderabad
Pharmacology

Shri Vishnu College of Pharmacy, Bhimavaram
Pharmaceutical Technology

Sri Venkateshwara College of Pharmacy, Hyderabad
Pharmaceutics

St Peters Institute of Pharmaceutical Sciences, Vidyanagar
Pharmaceutics

Talla Padmavathi College of Pharmacy, Warangal
Pharmaceutical Chemistry

College of Engineering, Osmania University, Hyderabad
Technology of Pharmaceutics & Fine Chemicals

University College of Pharmaceutical Science, Kakatiya University, Warangal
Pharmaceutics, Pharmacognosy, Industrial Pharmacy

Vaagdevi College of Pharmacy, Ramnagar
Pharmacognosy

ARUNACHAL PRADESH

North East Regional Institute of Science & Technology, Itanagar
Environmental Science & Engineering, Information Technology, Forest Technology

ASSAM

Assam Engineering College, Guwahati
Soil Mechanics, Watershed Management & Flood Control, Electrical Engineering

Dibrugarh University, Dibrugarh
Petroleum Exploration & Production, Petroleum Refining & Petrochem., Petroleum Geology

Jorhat Engineering College, Jorhat
Production & Industrial Engineering

National Institute of Technology, Silchar
Water Resources Engineering, Solid Mechanics, Machine Design, Production Engineering, Fluid Flow & Water Resource Engineering, Power & Energy System Engineering, Earth Quake Engineering

Tezpur (Central) University, Tezpur
Design & Technology, Information Technology, Energy Technology

Dibrugarh University. Dibrugarh
Pharmaceuticals, Pharmacognosy

BIHAR

Bihar College of Engineering, Patna
Structural Engineering, Transportation Engineering, Water Resource Engineering, Control System Engineering, Power System Engineering, Refrigeration, Air Conditioning & Heat Turbine, Thermo Turbo Machines

Muzaffarpur Institute of Technology, Muzaffarpur

Thermal Engineering, Machine Design

CHANDIGARH

Punjab Engineering College, Chandigarh
Environmental Engineering, Highways, Irrigation & Hydrology, Structures, Power Systems, Electronics Engineering, Production Engineering (PT), Rotodynamic Machines, Industrial Materials & Metallurgy, Computer Integrated Manufacturing (PT), Computer Integrated Manufacturing, Information Technology

Panjab University, Chandigarh
Chemical Engineering, Transfer Process & Process Engineering & Plant Design, Structural Engineering, Polymers, Micro Electronics, Energy Engineering & Management, Instrumentation, Pharmaceutical Chemistry, Pharmaceutics, Pharmacognosy, Pharmacology

Technical Teachers Training Institute, Chandigarh
Construction Technology & Management, Computer Science & Engineering, Master of Engineering Education, Manufacturing Technology, Electronics & Communication Engineering Instrumentation & Control

CHHATTISGARH

Bhilai Institute of Technology, Durg
Production Engineering, Environmental Science & Engineering, Instrumentation & Control

Government Engineering College, Raipur
Applied Geology, Chemical Process Design, Water Resources Development & Irrigation Engineering, Energy Systems and Pollution, Computer Technology

Raipur Institute of Technology, Raipur
Environmental Engineering

SLT Institute of Pharmaceutical Science, Bilaspur
Pharmaceutics

DELHI

Delhi College of Engineering, Delhi
VLSI Design and Embedded Systems, Power Systems, Environmental Engineering, Hydraulics & Flood Control, Structural Engineering, Control & Instrumentation, Electronics & Comm. Engineering, Thermal Engineering, Production Engineering, Polymer Technology, Computer Technology & Application, Information Systems, Digital Systems Design, Signal Processing, Process Control, Microwave & Optical Communication, Software Engineering

Indraprastha University, Delhi
Chemical Technology, Biotechnology, Information Technology

Jamia Millia Islamia, Delhi
Geo-Technical Engineering, Geo-Technical Engineering (Pt), Applied Arts, Art Education, Painting, Sculpture, Electrical Engineering System Management, Environmental Science & Engineering (Pt)

Netaji Subhas Institute of Technology, Delhi
Industrial Electronics & Automation, Mechatronics System, Bioformatics, Production & Automation, Bio-Medical Engineering

School of Planning & Architecture, Delhi
Building Engineering & Management, Housing, Environmental Planning, Regional Planning, Urban Planning, Transport Planning, Architecture Conservation, Industrial Design, Urban Design, Landscape Arch, Interior Design

College of Pharmacy, New Delhi
Quality Assurance

Jamia Hamdard University, Delhi
Pharmaceutics, Pharmaceutical Chemistry, Pharmacognosy, Pharmacology

GOA

College of Engineering, Farmagudi
Foundation Engineering, Industrial Engineering

Padre Conceicao College of Engineering, Goa
Internet Technology

Goa College of Pharmacy, Panaji
Pharmaceutical Chemistry, Pharmacognosy, Pharmacology, Quality Assurance

GUJARAT

Birla Vishvakarma, Vallabh Vidyanagar
Construction Engineering & Management, Environmental Engineering, Machine Design, Structural Engineering, Computer Engineering

Centre for Environmental Planning & Technology, Ahmedabad
Infrastructure

D. Desai Institute of Technology, Nadiad
Chemical Engineering, Soil Engineering, Structural Engineering, Water Resources Engineering, Electronics & Communication Systems Engineering, Geotechnical Engineering

L.D. College of Engineering, Ahmedabad
Computer Aided Structural Analysis & Design, Water Resources Management, Automation & Control / Power Systems, CAD & CAM, Cryogenics, Transportation Engineering, Environmental Management, Communication Systems Engineering, Applied Instrumentation, Chemical Engineering

Lukhdhirji Engineering College, Morbi
Water Resources Engineering & Management

Nirma Institute of Technology, Ahmedabad
Advanced Power Systems / Drives, Environmental Process Design, Computer Aided Structural Analysis & Design, Electronics and Communication Engineering (VLSI), CAD/CAM

S.V. National Institute of Technology, Surat
Soil Mechanics & Foundation Engineering, Structural Engineering, Environmental Engineering, Town & Regional Planning, Water Resources Engineering, Mechanical Engineering, Turbine Machines, Computer Communication

M.S. University, Vadodara
Fracture Mechanics, Structural Engineering, Petrochemical Engineering, Automatic Control & Robotics, Water Resources Engineering, Polymer Tech, Environmental Engineering, Highway & Transportation Engineering, Hydraulic Structures, Electrical Power Engineering, Industrial Electronics, Microprocessor System & Applications, Jet Propulsion & Gas Turbine, Production Engineering, Thermal Science, Industrial Metallurgy, Materials Tech, Irrigation & Water Management, Welding, Geo-Tech (Entry Level M.Sc.), Textile Tech, Man-Made Fibres, Textile Chemistry

A.R. College of Pharmacy & Institute of Pharmacy, Vallabh Vidyanagar
Quality Assurance, Pharmaceutics

Anand Pharmacy College, Anand
Pharmacology

Dayalbhai R. Patel Institute of PG Studies, Gandhinagar
Pharmacology

K.B. Institute of Pharmaceutical Education & Research, Gandhinagar
Pharmacology

L.M. College of Pharmacy, Ahmedabad
Pharmaceutical Chemistry, Pharmaceutical Technology & Pharmaceutics, Pharmacology, Quality Assurance

Shree S.K. Patel College of Pharmaceutical Engineering & Tech, Mehsana
Pharmaceutics, Quality Assurance, Pharmacology

The Maharaja Syajirao University of Baroda, Vadodara
Medicinal Chemistry, Pharmaceutical Analysis, Pharmaceutics, Pharmacognosy & Phytochemistry, Pharmacology, New Drug Deliverty System

HARYANA

Apeejay College of Engineering, Gurgaon
Instrumentation & Control

C.R. State College of Engineering, Sonepat
Instrumentation & Control, System Design and Engineering

Career Institute of Technology & Management, Faridabad
Manufacturing & Automation

Kurukshetra University, Kurukshetra
Computer Science, Computer Science & Engineering, Environmental Science, Environmental Science & Engineering

Lingaya's Institute of Management & Technology, Faridabad
Power Electro., Electrical Machine & Drives, Power, Design of Mech. Equipment

Maharishi Markandeswar Engineering College, Ambala
Computer Science & Engineering, Manufacturing Systems Engineering

N.C. College of Engineering, Panipat
Electronics & Communication Engineering

National Council for Cement & Building Materials, Ballabhgarh
Construction Technology and Management

National Institute of Technology, Kurukshetra
Instrumentation, Soil Mechanics & Foundation Engineering, Structural Engineering, Water Resources Engineering, Control Systems, Power System, Electronics & Communication Engineering, Computer Engineering, Mechanical Engineering

Technological Institute of Textile & Science, Haryana
Textile Technology

YMCA Institute of Engineering, Faridabad
Manufacturing & Automation Technology, Power System & Drives, Computer Engineering

Guru Jambheshwar University, Department of Pharmaceutical Science, Hisar
Pharmaceutical Chemistry

Maharishi Dayanand University, Dept of Pharmaceutical Sciences, Rohtak
Industrial Pharmacy, Pharmaceutics (Drug Regulatory Affairs)

HIMACHAL PRADESH

National Institute of Technology, Hamirpur
Computational Methods & Experimental Techniques in Fluid Dynamics, Manufacturing & Automation Engineering, Advanced Power System & Control, Water Resource Engineering

JAMMU & KASHMIR

National Institute of Technology, Srinagar
Mechanical System Design, Communication & Information Technology

JHARKHAND

Bihar Institute of Technology, Dhanbad
Plant Design, Soil Mechanics & Foundation Engineering, Structural Engineering, Heat Power Engineering, Machine Design, Production Technology, Physical Metallurgy

Birla Institute of Technology, Ranchi
Software Engineering, Microwave Engineering, Soil Mechanics, Structural & Foundation Engineering, Control Systems, Power System, Mechanical Engineering, Aerodynamics, Rocket Propulsion, Quality Engineering & Management, Automated Manufacturing Systems, Applied Machines (New Materials & Processing Technology), Instrumentation, Computer Aided Analysis & Design, Polymer Engineering, Remote Sensing, Computer Science & Engineering, Fuels & Combustion, Environment Science and Engineering

Indian School of Mines, Dhanbad
Mining Geophysics, Engineering Geology, Mineral Exploration, Petroleum Exploration, Environmental Science & Engineering, Fuel Engineering, Mineral Engineering, Computer Application & Software Technology, Industrial Engineering & Management, Longwall Mine Mechanisation, Mine Planning & Design, Mining Engineering, Open Cast Mining, Rock Excavation Engineering, Petroleum Engineering, Maintenance Engineering & Tribology, Mining Machinery

National Institute of Technology, Jamshedpur
Surface & Colloid Science, Power System, Extractive Metallurgy, Information Technology

Birla Institute of Technology, Mesra (Ranchi)
Pharmaceutical Chemistry, Pharmaceutics, Pharmacognocy, Pharmacology

KARNATAKA

A.M.C. Engineering College, Bangalore
Digital Electronics & Communication, Computer Sc & Engineering

B.L.D.E. College of Engineering & Technology, Bijapur
Structural Engineering

B.M.S. College of Engineering, Bangalore
Construction Technology, Power Electronics, Electronic Engineering, Machine Design, Communication Engineering (Digital), Environmental Engineering, Computer Science & Engineering, Transportation Engineering & Management

B.V. Bhoomraddi College of Engineering & Technology, Hubli
Structural Engineering, Digital Electronics, Energy System Engineering, Production Management, Computer Science & Engineering

Bangalore Institute of Technology, Bangalore
Structure Engineering, Machine Design

Bapuji Institute of Engineering & Technology, Davangere
Textile Technology, Machine Design, Computer Science & Engineering

Basaveshwar Engineering College, Bagalkot
Geotechnical Engineering, Structural Engineering, Production Technology, Environmental Engineering, Computer Science & Engineering, Digital Communication, Machine Design

Bellary Engineering College, Allipur
Computer Network Engineering

Dayananda Sagar College of Engineering, Bangalore
Structural Engineering, Digital Electronics & Communications, Design Engineering

Dr. Ambedkar Institute of Technology, Bangalore
Computer Science & Engineering, VLSI Design and Embedded Systems

Ghousia College of Engineering, Ramanagaram
Power System Engineering, Manufacturing Science & Engineering

Gogte Institute of Technology, Belgaum
Structural Engineering, Production Management

Government Tool Room & Training Centre, Bangalore
Tool Engineering

Government Tool Room & Training Centre, Mysore
Tool Engineering

J.N.N. College of Engineering, Shimoga
Design Engineering, Computer Science & Engineering, Network & Internet Engineering

K.L.E.S. College of Engineering & Technology, Belgaum
Environmental Engineering, Design Engineering, Structural Engineering

K.L.S. Gogte Institute of Technology, Belgaun
Digital Communication & Networking, Computer Integrated Manufacturing

K.V.G. College of Engineering, Sullia, D.K.
Product Design & Manufacturing, Digital Electronics & Communication

Karnataka Law Society's Institute of Technology, Belgaum
Structural Engineering, Production Management

Khaja Banda College of Engineering, Gulbarga
Computer Science & Engineering, Structural Engineering

KLE's Society's College of Engineering & Technology, Belgaum
VLSI Design & Embedded Systems

M.S. Ramaiah Institute of Technology, Bangalore
Computer Science & Engineering, Software Engineering, Chemical Engineering, Digital Communication, Digital Electronics & Communication, Environmental Engineering, Computer Application in Industrial Drives, Computer Integrated Manufacturing

M.V.J. College of Engineering, Bangalore
Computer Science & Engineering, Aeronautical Engineering

Malnad College of Engineering, Hassan
Electrical Energy System, Computer Aided Design of Structures, Computer Applications in Ind. Drives, Digital Electronics & Communication Sys, Industrial Automation & Robotics

Manipal Institute of Technology, Manipal
Digital Electronics and Advance Communication, Computer Aided Mech. Design & Analysis, Construction Engineering & Management, Structural Engineering, Computer Science & Engineering, Illumination Tech, Bio-Medical Engineering, Engineering Management

N.M.A.M. Institute of Technology, Udupi
Digital Electronics & Communication, Computer Science & Engineering, Energy Systems Engineering

National Institute of Engineering, Mysore
Hydraulics, Computer Application to Industrial Drives, Power Systems, Production Engineering & Systems Technology, Engineering Management, Appropriate Technology, Information Technology

National Institute of Technology Karnataka, Surathkal
Hydraulics & Water Resources Engineering, Marine Structures, Environmental Engineering, Transportation System Engineering, Chemical Plant Design, Industrial Pollution Control Engineering, Geo-Technical Engineering, Structural Engineering, Computer Science & Engineering, Power & Energy Systems, Digital Electronics & Advanced Communications, Microelectronics, Systems Analysis & Computer Application, Advanced Manufacturing Engineering, Heat Power Engineering, Materials Engineering, Process Metallurgy, Strata Mechanics In Mines

P.E.S. College of Engineering, Nandya
Computer Integrated Manufacturing, Computer Aided Design of Structures, Computer Science & Engineering, Environmental Engineering

Pooja Doddappa College of Engineering, Gulbarga
Computer Science & Engineering, Biomedical Electronics & Industrial Instrumentation, Environmental Engineering, Structural Engineering, Power Electronics, Communication Systems, Production Engineering, Thermal Power Engineering

R.V. College of Engineering, Bangalore
Digital Communication, Product Design & Manufacturing, Computer Science & Engineering

Rural Engineering College, Devanahalli
Chemical Engineering (Water Pollution Abatement)

S.D.M. College of Engineering & Technology, Dharwad
Digital Electronics, Engineering Analysis and Design

S.J. College of Engineering, Mysore
Environmental Engineering, Bio-Medical Instrumentation, Engineering Management, Industrial Structures, Computer Engineering, Software Technology, Industrial Electronics, Maintenance Engineering, Ground Engineering, Networking & Internet Engineering, Energy Systems & Management

S.J.C. Institute of Technology, Chikkaballapur
Machine Design, Digital Communication & Networking

S.K.S.J. Technological Institute, Bangalore
Textile Technology

Siddaganga Institute of Technology, Tumkur
Chemical Engineering, Structural Engineering, Thermal Power Engineering

Sir M. Visvesvaraya Institute of Technology, Bangalore
Computer Integrated Manufacturing, Electronics

University B.D.T. College of Engineering, Davangere
Production Engineering System Technology

University of Visvesvaraya College of Engineering, Bangalore
Information Technology, Construction Technology, Environmental Engineering, Geo-Technical Engineering, Highway Engineering, Prestressed Concrete, Structural Engineering, Water Resources Engineering, Computer Science & Engineering, Power Electronics, Power Systems, Electronics Engineering, Machine Design, Manufacturing Science & Engineering, Thermal Science & Engineering

Visveswaraiah Technological University, Belgaum
VLSI & Embedded Systems, Computer Network & Engineering, Product Design & Manufacturing, Land and Water Management

AI-Ameen College of Pharmacy, Bangalore
Pharmaceutical Chemistry, Pharmaceutics, Pharmacognosy, Pharmacology, Pharmaceutical Marketing, Quality Assurance, Pharmacy Practice

Bapuji Pharmacy College, Davangere
Industrial Pharmacy

College of Pharmaceutical Sciences, Manipal
Pharmaceutical Quality Assurance, Pharmaceutical Administration, Pharmaceutical Chemistry, Pharmaceutical Marketing, Pharmaceutics, Pharmacognosy, Pharmacology, Pharmacy Practice

Dr. H.L.T. College of Pharmacy, Channapatna, Bangalore (Rural)
Pharmaceutical Chemistry, Pharmaceutics

Govt. College of Pharmacy, Bangalore
Pharmaceutical Chemistry, Pharmaceutics, Pharmacognosy, Pharmacology

H.K.E. Society's College of Pharmacy, Gulbarga
Pharmaceutical Technology

Hanagal Shri Kumareshwar College of Pharmacy, Bagalkot
Pharmacology

K.L.E.S. College of Pharmacy, Belgaum
Pharmaceutical Chemistry, Pharmaceutics, Pharmacognosy, Pharmacology, Pharmacy Practice

K.L.E.S. College of Pharmacy, Hubli
Pharmacognosy, Pharmaceutical Chemistry, Pharmaceutics, Pharmacology

Karnataka College of Pharmacy, Bidar
Industrial Pharmacy (Pharmaceutics), Bulk Drugs Technology

KLES College of Pharmacy, Bangalore
Pharmaceutics (Pharm. Technology), Pharmaceutical Chemistry

Krupanidhi College of Pharmacy, Bangalore
Pharmaceutical Chemistry, Pharmacology, Pharmaceutics

Luqman College of Pharmacy, Gulbarga
Pharmaceutics

M.S. Ramaiah College of Pharmacy, Bangalore
Pharmacognosy, Pharmaceutical Chemistry

N.E.T. Pharmacy College, Raichur
Pharmaceutics

National College of Pharmacy, Shimoga
Pharmaceutical Analysis, Pharmaceutics

Ngsm Institute of Pharmaceutical Sciences, Mangalore
Pharmaceutical Chemistry, Pharmacology, Pharmaceutics (Indusial Pharmacy)

P.E.S. College of Pharmacy, Bangalore
Pharmaceutical Chemistry, Pharmaceutics

S.C.S. College of Engineering, Harpanhalli
Pharmacology, Pharma Chemistry

Shree Siddaganga College of Pharmacy, Tumkur
Pharmacology

T.M.A.E. Society's S.C.S. College of Pharmacy, Harapanahalli, Davangere (Dist)
Pharmacology

The Oxford College of Pharmacy, Bangalore
Pharmacognosy

V.L. College of Pharmacy, Raichur
Pharmacology, Pharmaceutical Chemistry, Pharmaceutics

Visveswarapura Institute of Pharmaceutical Sciences, Bangalore
Pharmacy Practice, Pharmacology, Pharmaceutics

KERALA

Cochin University of Science & Technology, Kochi
Software Engineering (5 Yr Integr.), Industrial Catalysis, Computer & Information Science, Polymer Technology, Atmospheric Science, Ocean Technology, Computer Aided Structure Analysis & Design, Environmental Engineering, Software Engineering, Civil Engineering, Mechanical Engineering, Environmental Technology, Industrial Fisheries, Meteorology, Hydrochemistry, Marine Biology, Marine Geology, Marine Geophysics, Oceanography, Applied Chemistry, Bio Technology, Mathematics, Operational Research & Computer Applications, Physics, Statistics, Engineering Statistics, Photonics (5 Yr Integr.), MCA, Electronics, Electronic Science, Opto Electronics & Laser Technology

College of Engineering, Thiruvananthapuram
Control Systems, Electrical Machines, Guidance & Navigation Control, Power System, Environmental Science & Engineering, Industrial Engineering, Refrigeration & Airconditioning, Thermal Science & Engineering, Env. Engineering, Geo-Technical Engineering, Hydraulics Engineering, Structural Engineering, Transportation Engineering & Traffic Engineering, Applied Electronics & Instrumentation, Micro-Wave & T.V. Engineering, Machine Design, Propulsion Engineering

DOEACC Centre, Kozhikode
Embedded System

Government Engineering College, Thrissur
Production Engineering, Power System Engineering, Process Control Engineering, Environmental Engineering, Industrial Engineering, Industrial Maintenance & Reliability, Internal Combustion Engines & Turbo Machinery

Mar Athanasius College of Engineering, Kothamangalam, Ernakulam
Computer Aided & Structural Engineering, Production & Industrial Engineering

N.S.S. College of Engineering Palakkad
Structural Engineering, Digital Systems & Communication Engineering, Power Electronics, Instrumentation and Control Systems, Production Engineering

Rajiv Gandhi Institute of Technology, Kottayam
Industrial Drive and Control, Industrial Management Electronics, Instrumentation and Control Systems, Production Engineering

National Institute of Technology, Kozhikode
Offshore Structures, Structural Engineering, Computer Science & Engineering Traffic & Transportation Planning, Digital Systems & Communication Engineering, Energetics, Instrumentation & Control, Power Electronics, Industrial Engineering, Manufacturing Technology, Thermal Science, Energy Management, Material Science & Technology, Electronics Design & Technology

Shree Chitra Thirunal College of Engineering, Pappanamcode, Trivandrum
Machine Design

T.K.M. College of Engineering, Kollam
Industrial Instrumentation & Cont., Structural Engineering & Construction Management, Communication Systems, Industrial Refrigeration & Cryogenic Engineering, Computer Integrated Manufacturing

University of Kerala, Thiruvananthapuram
Technology Management, Digital Image Computing, Electronics and Communication

College of Pharmaceutical Science Medical College, Trivandrum
Pharmacy Practice, Pharmaceutical Chemistry

Mahatma Gandhi University, Kottayam
Pharmaceutics

MADHYA PRADESH

Barkatullah University, Bhopal
Material Science

Central Institute of Agricultural Engineering, Bhopal
Energy in Agriculture

Devi Ahilya Vishwavidyalaya, Indore
Instrumentation, Energy Management, Computer Science, Future Studies & Planning, Systems Management, Laser Science & Applications, Energy Management, Computer Science & Engineering (Embedded System.

Government Engineering College, Jabalpur
Environmental Engineering, Geo-Technical Engineering, Structural Engineering, Control System, High Voltage Engineering, Communication Systems, Microwave Engineering, Heat Power Engineering, Machine Design

Institute of Engineering & Technology, Indore
Digital Instrumentation, Industrial Engineering & Management, Software Engineering

Institute of Technology & Management, Gwalior
Chemical Engineering

Institute of Technology & Management, Guru Kripa Campus, Madhya Pradesh
Communication Technology & Management

Jabalpur Engineering College, Jabalpur
High Voltage and Power System Engineering

Lakshmi Narain College of Technology Bhopal
Industrial Design, Computer Science & Engineering

Madhav Institute of Technology & Science, Gwalior
Construction Technology & Management, Public Health Engineering, Structural Engineering, Industrial Systems & Drives, Measurement & Control, Communication Control & Networking, Materials Handling, Construction Technology & Management (PT), Structural Engineering (PT), Construction Technology & Management, Materials Handling (PT), Construction Technology & Management, Bio-Technology, Microwave Engineering, Production Engineering, Urban Management

Maulana Azad College of Technology (National Institute of Technology), Bhopal
Mathematics Science & Computing, Environmental Engineering & Planning, Foundation Engineering, Energy Engineering, Hydro Electricity, Digital Communication Engineering, Microwaves & Millimeter Waves, Engineering Materials, Industrial Design, Maintenance Engineering, Stress & Vibration, Thermal Engineering, Computer Science & Engineering, Electrical Drives, Advanced Manufacturing Tech, Design & Production Engineering (Heavy Electrical Equipment, Energy Engineering, Computer Science & Engineering, Hydro-Electricity, Engineering Materials, Stress & Vibration, Thermal Engineering (PT), Urban Development

Military College of Telecommunication Engineering
Infotech & Communication Engineering

Rajiv Gandhi Prodyogiki Vishwavidyalaya, Bhopal
Energy & Environment Management, Computer Technology and Applications, Information Technology, Bio-Technology

Samrat Ashok Technological Institute, Vidisha
Construction Technology & Management, Power Electronics Engineering, Advanced Production Systems, Environmental Engineering, Construction Technology & Management, Transportation Engineering, Electrical Engineering / Electrical Machines, Information Technology, Computer Science & Engineering, Software Systems, Computer Integrated Manufacturing

Shri G.S. Institute of Technology & Science, Indore
Environmental Engineering, Structural Engineering, Transportation Engineering, Water Resources Engineering, Computer Engineering, Digital Techniques and Instrumentation, Power Electronics, Industrial Engineering & Management, Tribology & Maintenance Engineering, Computer Integrated Manufacturing, Electronics & Communication Engineering, Opto Electronics With Specialisation in Optical-Communication, Microelectronics & VLSI Design

Ujjain Engineering College (Govt. Engineering College), Ujjain
Environmental Engineering & Pollution Control, Computer Aided Structural Design & Drafting, Environmental Management, Industrial Engineering & Management

B.R. Nahata College of Pharmacy, Mandsaur
Pharmacognosy, Pharmaceutics

Devi Ahilya Vishwavidyalaya, Indore
Pharmaceutical Chemistry

Dr. Harisingh Gour University, Sagar
Pharmaceutical Chemistry, Pharmaceutics, Pharmacognosy, Pharmacology, Pharmaceutical Bio-Technology

IPS Academy College of Pharmacy, Indore
Pharmaceutics

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal
Pharmaceutical Chemistry, Pharmaceutics

Shri G.S Institute of Technology & Science, Indore
Pharmaceutical & Medicinal Chemistry, Industrial Pharmacy

MAHARASHTRA

Babasaheb Naik College of Engineering, Pusad (Yavatmal)
Environmental Engineering

Bharati Vidyapeeth's College of Engineering, Pune
Hydraulic Engineering, Computer Engineering

Bharatiya Vidya Bhavan's, Sardar Patel College of Engineering, Munshi Nagar, Andheri (West)
Electronics

College of Military Engineering, Pune
Civil Engineering, Electrical Engineering, Mechanical Engineering

College of Engineering, Badnera
Production Engineering

D.Y. Patil College of Engineering, Pune
Town and Country Planning, Design Engineering, Production Engineering, Computer Engineering

Dept of Chemical Tech, Bombay University, Jalgaon
Chemical Engineering/Plastic Engineering/ Pharmaceutical, Bio-Process Technology, Perfumes & Flavour

DKTE Society's Textile & Engineering Institute, Kolhapur
Textile Technology

Dr. Babasaheb Ambedkar Technological University, Lonere (Mangaon)
Manufacturing Processing Engineering, Environmental Engineering, Computer Engineering, Elect. & Telecomm. Engineering, Chemical Engineering

Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad
Thermal & Fluids Engineering

Fr. Conceicao Rodrigues College of Engineering, Mumbai
Manufacturing Engineering, Electronic, CAD/CAM

G.H. Raisoni College of Engineering, Digdog Hills, Hingna Road
Electronics, Integrated Power System, Computer Science & Engineering, Heat Power Engineering

Government College of Engineering, Amravati
Environmental Engineering, Geo-Technical Engineering, Structural Engineering, Advanced Electronics, Electrical Power Engineering, Thermal Power Engineering

Government College of Engineering, Aurangabad
Water Resources Engineering, Soil Engineering, Power System, Electronics, Machine Design, Production Management, Structural Engineering, Computer Science & Engineering

Government College of Engineering, Karad
Construction Engineering & Management, Structural Engineering, Power Systems, Heat Power Engineering, Production Engineering

Government College of Engineering, Pune
Process Instrumentation, Bio-Medical Instrumentation, Process Metallurgy, Construction Management, Hydraulics Engineering, Soil Mechanics (Geo-Tech Engineering), Structural Engineering, Town & Country Planning, Control Systems, Power Systems, Computer Engineering, Digital Systems & Computer, Electronic Instrumentation, Microwaves, Design Engineering, Heat Power Engineering, Physical Metallurgy, Process Metallurgy, Manufacturing Engineering & Automation, Information Technology

Guru Gobind Singhji College of Engineering, Nanded
Water Management, Electronics, Instrumentation Engineering, CAD/CAM, Textile Technology

Institute of Armament Technology, Pune
Air Armament, Combat Vehicles, Laser & Electro Optics, Modelling & Simulation, Radar Systems, Integrated Digital Communication Systems, Weapons, Guided Missiles, Marine Engineering, Naval Weapons, Military Electronics, Impact Engineering

Jawahar Lal Nehru Engineering College, New Aurangabad
Electronics

K.E. Society's Rajarambapu Institute of Technology, Talwalwa
Mechanical Design Engineering, Electronics Engineering

KIT's College of Engineering, Kolhapur
Electronics & Tele Comm. Engineering, Production Engineering

Laxminarayan Institute of Technology, Nagpur
Chemical Engineering, Food Technology, Oil Technology, Paint Technology, Petro-Chemical Technology

M.G.M.'s College of Engineering & Technology, Nanded
Bio-Medical Engineering, Health Care Engineering, Structural Engineering

Maharashtra Institute of Technology, Pune
Structural Engineering, Petroleum Engineering, Polymer Engineering, Construction and Management

Mahatma Gandhi Mission's College of Engineering, Nanded
Computer Science & Engineering, Manufacturing Process Engineering

Manoharbhai Patel Institute of Engineering & Tech, Gondia
Environmental Engineering

MGM's College of Engineering & Technology, Navi-Mumba, Raigad
Computer Engineering

N.Y.S.S.'s Yeshwantraw Chavan College of Engineering, Nagpur
Structural Engineering, Production Engineering

Padmabhooshan Vasantraodada Patil Institute of Technology, Sangli
Design Engineering, Heat Power Engineering

Pravara Rural Engineering College, Loni, Pravaranagar, Ahmednagar
Structural Engineering, Design Engineering

Priyadarshini College of Engineering and Technology, Nagpur
Mechanical Engineering Design

Pune Institute of Computer Technology, Pune
Telecommunication Engineering, Computer Engineering

Pune Vidyarthi Griha's College of Engineering & Technology, Pune
Power Systems

Rajarambapu Institute of Technology, Rajaramnagar, Sakharale, Sangli
Structures, Production Engineering

Rajiv Gandhi College of Engineering Research & Technology, Babupeth, Chandrapur
Energy Management System

Ramrao Adik Institute of Technology, Nerul, Navi Mumbai
Electronics Engineering, Computer Engineering

Sardar Patel College of Engineering, Mumbai
Construction Technology & Management, Geo-Technical Engineering, Hydraulics Engineering, Structural Engineering, Machine Design, Thermal Engineering, Environmental Engineering

Shri Ramdeobaba Kamla Nehru Engineering College, Nagpur
VLSI, DSP, SW, Geo-Technical Engineering, Industrial Engineering

Shri Shivaji Vidya Prasarak Sanstha Bapusaheb Shivajirao Deore College of Engineering, Dhule
Building Science & Technology

Sinhgad College of Engineering, Pune
Digital Systems, General, Design Engineering

SRES College of Engineering, Shingnapur, Ahmednagar
Design Engineering

Sri Sant Gajanan Maharaj College of Engineering, Shegaon
Electrical Power System, Electronics Engineering

Tatyasaheb Kore Institute of Engineering & Technology, Warnanagar
Chemical Engineering

Terna Engineering College, Navi Mumbai
Electronics & Tele Communication

Thodomal Sahani Engineering College, Mumbai
Electronics Engineering, Computer Engineering

Veermata Jeejabai Technical Institute, Mumbai
Mechatronics

Victoria Jubilee Technical Institute, Matunga (East), Bombay
CAD/CAM & Automation, Engineering Construction & Management, Environmental Engineering, Structural Engineering, Computer Engineering, Control Engineering, Power systems Engineering, Electronics Engineering, Automobile Engineering, Machine Design, Production Engineering, Textile Technology

Vishwakarma Institute of Technology, Pune

Process Instrumentation or Biomedical Instrument., Heat Power Engineering, Design Engineering Computer Science & Engineering, Industrial Engineering

Visvesvaraya National Institute of Technology, Nagpur

Structural Dynamics & Earthquake Engineering, Heat Power Engineering, Materials Engineering, Water Resources Engineering, Geo-Technical Engineering, Environmental Engg, Hydraulics Engg, Structural Engg, Communication Engg, Integrated-Power System, Electronics, Heat Power Engines, Production Engg, Design of Machines and Mechanisms, Industrial Engg, Design of Machine Systems, Ferro- Alloy Technology & Alloy Steel Making, Urban Planning

Vivekanand Education Society's Institute of Technology, Mumbai
Electronics & Telecommunication, Information Technology, Instrumentation & Control

VYWS's College of Engineerign, Amravati
CAD/CAM

Walchand College of Engineering, Sangli

Environmental Engineering, Structural Engineering, Computer Engineering, Control System, Electronics, Power System, Heat Power Engineering, Machine Design, Production Engineering

Walchand Institute of Technology, Ashok Chock
Structural Engineering, Design Engineering

Yeshwant Rao Chavan College of Engineering, Nagpur
Electronics Engineering, Structural Engineering, Production Engineering, Integrated Power System, CAD/CAM

Aissms College of Pharmacy, Pune
Quality Assurance, Pharmaceutics, Pharmaceutical Chemistry

Appasaheb Birnale College of Pharmacy, Sangli
Pharmaceutical Chemistry, Pharmacology, Pharmaceutics

Bharathi Vidyapeeth's College of Pharmacy, Kolhapur
Pharmaceutical Chemistry

Bharathi Vidyapeeth's College of Pharmacy, Navi Mumbai
Pharmaceutics, Quality Assurance, Pharmacology, Pharmaceutical Chemistry

Bombay College of Pharmacy, Mumbai
Pharmaceutical Chemistry, Pharmaceutics Science, Pharmacology, Pharmacognosy

C.U. Shah College of Pharmacy, Mumbai
Quality Assurance

Department of Pharmaceutical Science, Nagpur University, Nagpur
Pharmaceutical Chemistry, Pharmaceutics, Pharmacognosy, Pharmacology

Dr. D.Y. Patil Institute of Pharmaceutical Sciences, Pune
Pharmaceutical Analysis, Pharmacognosy, Quality Assurance Techniques

Dr. D.Y. Patil College of Pharmacy, Pune
Pharmacology, Pharmaceutics, Pharmaceutical Chemistry
Dr. D.Y. Patil Pratishthan, Pune
Pharmacology

Govt. College of Pharmacy, Amravati
Pharmacognosy & Phytochemistry

Govt. College of Pharmacy, Vidya Nagar
Bio-Pharmaceutics, Pharmaceutical Chemistry

Institute of Pharmaceutical Education and Research, Wardha
Pharmaceutics, Quality Assurance, Pharmaceutical Chemistry

K.L.E. Society's College of Pharmacy, Talwalwa
Pharmaceutical Biotechnology, Pharmacology

K.M. Kundnani College of Pharmacy, Mumbai
Pharmaceutics, Pharmaceutical Chemistry, Pharmacology, Pharmaceutical Analysis, Pharmacognosy

Mahatma Gandhi Vidyamandir's Pharmacy College, Panchavati
Pharmacology

MCES's Allana College of Pharmacy, Pune
Pharmaceutics

N.D.M.V.P. Samaj's College of Pharmacy, Naskhi
Pharmaceutical Chemistry, Pharmaceutics, Pharmacology, Pharmacognosy

Nagpur College of Pharmacy, Nagpur
Quality Assurance, Pharmaceutical Chemistry

Poona College of Pharmacy, Pune
Pharmaceutical Chemistry, Quality Assurance, Pharmaceutical Bio-Technology, Pharmaceutics, Pharmacology, Pharmacognosy

Poona District Education Association's S.G.R. Sable College of Pharmacy, Pune
Pharmacy Chemistry

Praara Rural College of Pharmacy, Ahmednagar
Pharmacognosy

R.C. Patel College of Pharmacy, Shirpur, Dhule
Pharmaceutical Chemistry, Pharmacognosy, Pharmacology

Saraswathi Vidya Bhavan's College of Pharmacy, Dombivli (East), Thane
Pharmacognosy

Smt. Kishoritai Bhoyar College of Pharmacy, Nagpur
Pharmaceutical Chemistry

Sudhakar Rao Naik Institute of Pharmacy, Pusad
Industrial Pharmacy

Tapi Valley Education Society's College of Pharmacy, Faizpur
Pharmacognosy, Pharmaceutical Chemistry, Quality Assurance Technology

ORISSA

C.V. Raman College of Engineering, Bhubaneswar
Mechatronics, Heat Power Engineering

Central Institute of Plastic Engineering & Tech, Bhubaneswar
Plastic Engineering

College of Engineering & Technology, Orissa University of Agri. & Technology, Bhubaneswar
Structural Engineering, Computer Science & Information Tech, Industrial Engineering & Management

Gandhi Institute of Engineering and Technology, Gunupur
Networks, Industrial Engineering

Indira Gandhi Institute of Technology, Talcher
Environmental Sc & Engineering, Industrial Power Control & Drives

Institute of Technical Education & Research, Bhubaneswar
Computer Science & Engineering, Electronics & Tele Communication Engineering, Electrical Engineering, Mechanical Engineering

Kalinga Institute of Technology & Science, Bhubaneswar
ME (Computer Science), ME (Power Electronics & Drive)

National Institute of Science & Technology, Berhampur
ME (Electronics & Communication Engineering)

National Institute of Technology, Rourkela
Coal Chemical & Fertilisers, Telematics & Signal Processing, Software Engineering, Soil Mechanics & Foundation Engineering, Structural Engineering, Computer Science & Engineering, Electronics Systems & Communication, Industrial Power/Control & Drive, Machine Design & Analysis, Production Engineering, Ferrous Process Metallurgy, Industrial Metallurgy, Structural Engineering

University College of Engineering, Sambalpur University, Sambalpur
Hydraulics & Irrigation Engineering, Structural Engineering, Transportation Engineering, Power System Engineering, Communication Systems, Heat Power Engineering, Machine Design and Analysis, Production Engineering

College of Pharmaceutical Sciences, Berhampur
Pharmaceutics, Pharmaceutical Chemistry, Pharmaceutical Analysis & Quality Assurance

Institute of Pharmacy & Technology, Cuttack
Pharmaceutical Chemistry

Kanak Manjari Institute of Pharmaceutical Sciences, Rourkela
Pharmaceutical Chemistry

Roland Institute of Pharmaceutical Sciences, Berhampur
Pharmaceutics, Pharma Analysis & Quality Assurance, Pharmacology

Seemanta Institute of Pharmaceutical Sciences, Mayurbhani
Pharmaceutical Chemistry

Sri Jaydev College of Pharmaceutical Sciences, Khurda
Pharmaceutics

University Dept. of Pharmaceutical Science, Utkal University, Bhubaneswar
M. Pharm (Pharma Chemistry), Pharmacology

PONDICHERRY

Pondicherry Engineering College, Pondicherry
Environmental Engineering, Advanced Construction Technology, Electronics & Communication Engineering, Energy Technology, Advance Construction, Electrical Drives & Control, Distributed Computing Systems

Pondicherry University, Pondicherry
Computer Science & Engineering

PUNJAB

Baba Banda Singh Bahadur Engineering College, Fatehgarh Sahib
CAD/CAM

C.E.D.T., Mohali
Electronics Product Design & Technology

Centre for Development of Advanced Computing, Mohali
VLSI Design

College of Agricultural Engineering, Ludhiana
Farm Power & Machinery Engineering, Processing & Agricultural Structures, Soil & Water Engineering, Structural Engineering, Water Resources Engineering, Instrumentation Engineering, System & Controls, Machine Design, Thermal Engineering, Agro Industrial Processing, Sugar Engineering

DR. B.R. Ambedkar National Institute of Technology, Jalandhar
Industrial Engineering, Material Science & Technology, Chemical Engineering, Machine Design, Industrial Engineering, Textile Technology, Control Systems & Instrumentation

Giani Zail Singh (G.Z.S.) College of Engineering & Technology, Bathinda
Construction Technology & Management

Guru Nanak Dev Engineering College, Ludhiana
Power Engineering, Structural Engineering, Soil Mechanics & Foundation Engineering (Pt), Electrical Engineering (Pt), Electronics Engineering (Pt), Production Engineering, Industrial Engineering, Production Engineering (Pt), Industrial Engineering (Pt), Geo-Technical Engineering, Computer Science & Engineering

Guru Nanak Dev University, Amritsar
Food Technology

Sant Longowal Institute of Engineering & Technology, Sangrur
Instrumentation & Control Engineering, Food Engineering & Technology, Manufacturing Systems Engineering & Technology, Polymer

Thapar Institute of Engineering & Technology, Patiala
Geo-Technical Engineering, Structural Engineering, Environmental Engineering, Structures, Computer Science, Power & Machines, Industrial Engineering, Heat Power Engineering, CAD/CAM & Robotics, Software Engineering, Electronics & Communication Engineering, Material Science & Engineering, Environmental Science & Technology, Electronic Instrumentation & Control Engineering, M. Tech. (Polymer Science & Rubber Technology), M. Tech. (VLSI Design)

RAJASTHAN

Banasthali Vidyapith, Banasthali
Computer Science & Engineering

Birla Institute of Technology & Science, Pilani
Chemical Engineering, Civil Engineering, Electronics & Control, Management Systems, Mechanical Engineering, Computer Science, Software Systems, Systems & Information

Government College of Engineering, Akelgarh, Kota
Thermal Engineering, Production & Industrial Engineering, Geo-Technical Engineering, Power Systems

Institute of Engineering & Technology, Alwar
Computer Science and Engineering

M.B.M. Engineering College, Jodhpur
Environment Engineering, Geo-Technical Engineering, Transportation Engineering, Water Resources Engineering, Control Systems, Power Systems, Digital Communication Engineering, Electronics & Communication Engineering, Design Engineering, Production & Industrial Engineering, Thermal Engineering, Metalliferrous Mining Structural Engineering, Water Resources & Irrigation Engineering, Environmental Engineering (Pt), Geo-Technical Engineering (Pt), Control Systems (Pt), Power Systems (Pt), Digital Comm Engineering (Pt), Production & Industrial Engineering (Pt), Thermal Engineering (Pt), Metalliferrous Mining (Pt), Structural Engineering (Pt)

Malaviya National Institute of Technology, Jaipur
Electronics & Electrical Communication Engineering, Environmental Engineering, Transportation Engineering, Water Resources Engineering, Power System, Manufacturing Engineering, Non-Ferrous Metallurgy, Computer Aided Design in Structural Engineering, Computer Science, Mechanical Engineering (Energy Engineering)

Bhupal Nobles College of Pharmacy, Udaipur
Pharmaceutics, Pharmacology

Lachoo Memorial College of Science & Technology, Jodhpur
Quality Assurance, Pharmaceutical Chemistry

SIKKIM

Sikkim Manipal Institute of Technology, Majitar, East Sikkim
Power Electronics

TAMIL NADU

Adhiyamaan Engineering College, Hosur
Environmental Engineering, Computer Aided and Design

Alagappa Chettiar College of Engineering & Technology, Karaikudi
Microwave & Optical Engineering

Algappa College of Technology, Chennai
Bio-Technology, Ceramic Tech, Petroleum Refining & Petrochemicals, Footwear Sc & Engineering, Leather Tech, Textile Tech

Arulmigu Kalasalingam College of Engineering, Krishnakoil (Virudhunagar)
Embedded Systems, Computer Science & Engineering, Energy Engineering, CAD/Cam, Digital Comm. & Networking, Environmental Monitoring & Management, Instrumentation & Control Engineering, VLSI Design, Power System Auto & Integration, Network Engineering

Arulmigu Meenakshi Amman College of Engineering, Vadamavandal, Thiruvannamalai Dist.
Applied Electronics, Computer Science & Engineering

Arunai Engineering College, Tiruvannamalai
Power Electronics and Drives, Computer Science and Engineering, Applied Electronics, CAD/CAM

Bannari Amman Institute of Technology, Alathukombai, Sathyamangalam, Erode
Applied Electronics, Power Electronics and Drives, Engineering Design, Computer Integrated Manuf., Textile Technology

Bharath Institute of Science & Technology, Chennai
Thermal Engineering, Computer Science & Engineering, CAD/Cam, Power Electronics
& Drives

Bharatidasan University, Tiruchirapali
Energy Conservation & Management

C. Abdul Hakeem College of Engineering & Technology, Vellore
Energy Engineering

C.S.I. Institute of Technology, Thovalai
Manufacturing Engineering

Central Institute of Plastic Engineering & Technology, Chennai
Plastic Technology

Coimbatore Institute of Technology Coimbatore
Embedded Real, Time System, Advanced Manufacturing Tech, Chemical Engineering,
Comp Methods & Appl In Structural Engineering, Applied Electronics, Heat Power
Engineering, Environmental Engineering & Management

College of Engineering, Anna University, Chennai
Mechatronics, Software Engineering, Construction Engineering & Management,
Hydrology & Water Resources Engineering, Irrigation Water Management, Soil
Mechanics & Foundation Engineering, Structural Engineering, Urban Engineering,
Computer Sc & Engineering, High Voltage Engineering / Power System Engineering,
Power Electronics, Control & Instrumentation, Applied Electronics / Communication
Systems, Energy Engineering, Engineering Design, Industrial Engineering, Production
Engineering, Refri & Air Conditioning Engineering / IC Engines, Medical Electronics,
Optical Communication, Avionics, Aeronautical Engineering, Automobile Engineering,
Electronics, Instrumentation, Construction Engineering & Management, Hydrology &
Water Resources Engineering, High Voltage Engineering / Power System Engineering,
Polymer Sc & Engineering, Remote Sensing, Laser & Electro Optical Engineering

Crescent Engineering College, Vandalur
Computer Aided Design, Computer Science & Engineering, Power System Engineering,
Computer Integrated Manufacturing, Structural Engineering, Communication Systems

Dr. M.G.R. Engineering College, Chennai
Applied Electronics, Computer Science & Engineering, Communication Systems,
Industrial Engineering, Computer Integrated Manufacturing

Dr. Mahalingam College of Engineering & Technology, Pollachi
Computer Science & Engineering, CAD/CAM

Easwari Engineering College, Chennai
Computer Science Engineering, VLSI Design

Erode Sengunthar Engineering College, Thudupathi
Manufacturing Engineering

Faculty of Engineering & Technology, Annamalai University, Annamalai Nagar
Food Processing Technology

Govt. College of Engineering, Salem
Welding Technology, Structural Engineering, Computer Aided Design

Govt. College of Engineering, Tirunelveli, Tirunelveli Kattabomman
Computer Science & Engineering

Govt. College of Tech, Coimbatore
Environmental Engineering, Geo-Technical Engineering, Structural Engineering, Computer Sc & Engineering, Engineering Design

Hindustan College of Engineering, Padur, Kancheepuram
Applied Electronics, Computer Aided Design, Computer Science & Engineering, Refrigeration & Air-Conditioning, Communication Systems

Hindustan Engineering Training Centre, Chennai
IC Engineering, Structural Engineering

Institute of Road and Transport Technology, Erode
Structural Engineering, Thermal Engineering

J.J. College of Engineering & Technology, Tiruchirappali
Power Electronics & Drives, CAD/CAM, Computer Science & Engineering, Applied Electronics

J.S.S. College of Pharmacy, Oatacamund Nilgiris
Biotechnology

Jaya Engineering College, Thiruninravur
Textile Technology, Computer Science & Engineering

Jayam College of Engineering & Technology, Nallanur
Computer Science & Engineering

Jayaram College of Engineering & Technology, Trichy
Communication Systems, Manufacturing Engineering, Computer Sc & Engineering

Jerusalem College of Engineering, Pallikaranai, Chennai

Power Electronics, Computer Science & Engineering, Applied Electronics

K.L.N. College of Engineering, Pottapalayam
Power Systems Engineering, Manufacturing Engineering, Communication Systems

K.S. Rangasamy College of Technology, Tiruchengode
Applied Electronics, Computer Science & Engineering, Power Electronics and Drives, Computer Aided Design

Karunya Institute of Tech, Coimbatore
Structural Engineering, Thermal Engineering, Applied Electronics, Power Electronics & Drives, Computer Science & Engineering, Mechanical Engineering (CAD/CAM), Control & Instrumentation Engineering

Kongu Engineering College, Thoppuplayam
Mechatronics Engineering, Applied Electronics, Engineering Design, Computer Science & Engineering, Construction Engineering & Management, CAD/CAM, VLSI Design, Chemical Engineering

Kumaraguru College of Tech, Coimbatore
Industrial Engineering, Computer Science & Engineering, Communication Systems, Applied Electronics, Energy Engineering, Structural Engineering, Power Electronics and Drives, CAD/CAM, Apparel Technology and Management, Textile Technology

Madha Engineering College, Chennai
Power Electronics and Drives

Maharaja College of Engineering, Avinashi
Engineering Design, Applied Electronics

Mahendra Engineering College, Vadugapalayam
Computer Aided Design, Applied Electronics/Communication Systems

Mailam Engineering College, Mailam
Engineering Design

Mepco Schlenk Engineering College, Sivakasi, Virudhunagar
Power Electronics & Drives, Industrial Safety Engineering, Communication Systems, Computer Science & Engineering, Structural Engineering, Computer Aided Structural Engineering, CAD/CAM

Misrimal Navajee Munoth Jain Engineering College, Jyothi Nagar, Thorapakam
Applied Electronics

Mohammed Sathak Engineering College, Kilakkarai
Applied Electronics, Thermal Engineering

Monomaniam Sundarnar University, Thirunelveli
Computer Science & Engineering

National Engineering College, K.R. Nagar, Kovilpatti
Energy Engineering, Computer Science & Engineering, Communication System, Computer Communication, Production Engineering

National Institute of Technology, Tiruchirapali
Structural Engineering, Transportation Engineering & Management, Water Resources Engineering & Management, Computer Science, Satellite Comm/Communication System, Power Systems, Design & Production of Thermal Power Eqp, Industrial Engineering, Industrial Safety Engineering, Material Science, Welding Engineering, Manufacturing Technology, VLSI Engineering, Process Control Instrumentation, Energy Engineering, Plant Design, Non-Destructive Testing

Noorul Islam College of Engineering, Kumaracoil
Communication Systems, Computer Science & Engineering, Applied Electronics, Computer Integrated Manufacturing

Park College of Engineering and Technology, Coimbatore
Aeronautical Engineering, Design Engineering

Pavendhar Bharathidasan College of Engineering & Technology, Natraj Nagar
Computer Sc & Engineering, Communication Systems

Periyar Maniammai College of Technology for Women, Periyar Nagar, Vallam, Thanjavur
Software Engineering, Computer & Communications, Renewable Energy, Environmental Technology & Management

PSG College of Tech, Peelamedu, Coimbatore
Structural Engineering, Power Electronics & Drives, Applied Electronics, Computer Science, Control Systems, Electrical Machines, Power System, Communication System, Computer Integrated Manufacturing, Engineering Design, Fluid Machinery, Industrial Engineering, Machine Tools Engineering, Production Engineering, Industrial Metallurgy, Energy Engineering, Engineering Design, VLSI Design, Structural Engineering (PT), Applied Electronics (PT), Electrical Machine (PT), Industrial Engineering (PT), Machine Tools Engineering (PT), Production Engineering (PT), Product Design & Commerce, Infrastructure Engineering, Textile Tech, Textile Technology (PT)

PSNA College of Engineering & Technology, Muthanampatty, Dindigul
Computer Science & Engineering, Power Electronics & Drives, Computer and Communication, Applied Electronic

R.M.K. Engineering College, Kavaraipettai
Computer Science & Engineering, Production Engineering & Innovation Management, Applied Electronics, VLSI Design

R.V.S. College of Engineering and Technology, Dindigul
Applied Electronics, CAD/CAM, Computer Science & Engineering

Raja College of Engineering & Technology, Madurai
Power Electronics & Drives, Computer Science and Engineering, Embedded Systems

Rajalakshmi Engineering College, Thandalam,
Computer Science & Engineering, CAD/CAM

Rajarajeswari Engineering College, Chennai
CAD/CAM

S.R.M. Engineering College, Potheri, Kottankutathur (P.O)
Power Electronics and Drives, Computer Integrated Manufacturing, Chemical Engineering, VLSI, Structural Engineering, Computer Science & Engineering, Computer Aided Design (CAD), Software Engineering, Communication Systems, Construction Technology & Management

Sapthagiri College of Engineering, Periyan, Dharmapuri
Computer Science & Engineering

Saranathan College of Engineering, Venkateswara Nagar, Panjappur
Power Electronics & Drive, Communication Systems

Satyabhama Engineering College, Chengai Mgr
Computer Science & Engineering, Computer Aided Design

Sethu Institute of Technology, Pulloor, Kariapatti
CAD/CAM

Shanmugha College of Engineering, Thirumalaisamudram, Thanjavur
Power Electronics & Drives, Thermal Engineering, Computer Science, Project Management, Advanced Computing

Sona College of Technology, Salem
Computer Integrated Manufacturing (CIM), Computer Science & Engineering, Thermal Engineering, Engineering Design, Product Design and Development

Sri Krishna College of Engineering & Technology, Sugunapuram, Kuniamuthur, Coimbatore
Computer Science & Engineering, CAD/CAM, Communication Systems

Sri Muthukumaran Institution of Technology, Chennai
Computer Aided Design

Sri Ram Engineering College, Perumalpattu, Thiruvaallur
CIM (Computer Integrated Manufacturing)

Sri Ramakrishna Engineering College, Coimbatore
Software Engineering, Power Electronics and Drives, Manufacturing Engineering

Sri Sivasubramaniya Nadar College of Engineering, Kanchipura
Power Electronics and Drives, Computer Science & Engineering, Communication Systems, Applied Electronics

Sri Venkateswara College of Engineering, Sriperumbudu
Power Electronics and Drives, Computer Science & Engineering, Computer Aided Design, Thermal Engineering, Chemical Engineering, Communication Systems

Sriram Engineering College, Perumalpattu
Embedded System

SSM College of Engineering, Komarapalayam
Textile Chemistry

St. Joseph's College of Engineering, Chennai
Applied Electronics, Power Electronics & Drives, Computer Science & Engineering

St. Peter's Engineering College, Chennai
Power Electronics and Drives, CAD/CAM

St. Xavier's Catholic College of Engineering, Chunkankadai
Control & Instrumentation Engineering

Tagore Engineering College, Chennai
Computer Science & Engineering

Tamil Nadu College of Engineering, Karumathampatti, Coimbatore
Structural Engineering, Computer & Communication Engineering

Technical Teacher Training Institute, Chennai
Human Resources Development
The Indian Engineering College, Vadakkangulam, Tirunelveli
Structural Engineering

The Rajaas Engineering College, Vadakkangulam, Tirunelveli
Applied Electronics

Thiagarajar College of Engineering, Madurai
Structural Engineering, Power System Engineering, Communication Systems, Industrial Engineering, Production Engineering, Computer Science & Engineering, Wireless Technologies

V.L.B. Janakimmal College of Engineering & Technology, Kovaipudur, Coimbatore
Structural Engineering

Velammal Engineering College, Chennai
Power Systems Engineering, Applied Electronics

Vellore Engineering College Vellore
Production, Computer Science & Engineering, Environmental Engineering, Power Electronics, Energy Systems Engineering, Mechatronics

Vinayaka Mission's Kirupananda Variyar College, Salem, Coimbatore
Computer Science & Engineering, Applied Electronics

School of Arch & Planning, Anna Univ, Chennai
Architecture

Adhiparasakthi College of Pharmacy, Melmaruvathur, Kanchipuram
Pharmaceutical Analysis

Annamalai University, Annamalai Nagar
Industrial Pharmacy, Pharmacy Practice, Pharmaceutical Analysis, Pharmacology

Arulmigu Kalasalingam College of Engineering, Anand Nagar, Virudhunagar
Pharmaceutical Analysis, Pharmaceutics

Arlumigu Kalasalingam College of Pharmacy, Virudhunagar
Pharmaceutical Analysis, Pharmaceutics

C.L. Baid Mehta College of Pharmacy, Chennai
Pharmaceutical Analysis, Pharmaceutical Chemistry, Pharmaceutics, Pharmacology

College of Pharmacy, Sri Ramkrishna Institute of Paramedic, Coimbatore
Pharmaceutical Chemistry, Pharmaceutical Biotechnology

J.K.K.M. Medical Research Foundation's Annai JKK Sampoor College of Pharmacy, Namakkal
Pharmaceutics

J.S.S. College of Pharmacy, Ootacamund, Nilgiris
Industrial Pharmacy, Bulk Drugs, Pharmaceutical Chemistry, Pharmaceutics, Pharmacology, Pharmacy Practice, Pharmaceutical Analysis, Phytopharmacy & Phytomedicince, Pharmacy Practice

JKK Nataraja College of Pharmacy, Komarapalayam, Namakkal
Pharmaceutical Chemistry

K.M. College of Pharmacy, Madurai
Pharmacy Practice, Pharmaceutical Chemistry, Pharmaceutics

K.M.C.H College of Pharmacy, Coimbatore
Pharmacy, Pharmaceutical Analysis

Madurai Medical College, Madurai
Pharmacognosy, Pharmaceutical Chemistry, Pharmaceutics

Nandha College of Pharmacy, Pitchandampalayam, Erode
Pharmaceutics, Pharmaceutical Analysis, Pharmaceutical Biotechnology

Padmavathi College of Pharmacy, Periyanahalli Dharmapuri
Pharmaceutics

Periyar College of Pharmaceutical Science for Girls, Tiruchirappalli
Pharmaceutics, Pharmacy Practice

R.V.S. College of Pharmaceutical Science, Coimbatore
Pharmaceutics, Pharmaceutical Analysis

S.R.M. College of Pharmacy, Potheri, Kottankutathur, Kancheepuram
Pharmaceutical Biotechnology, Pharmaceutical Analysis

Sri Ramachandra College of Pharmacy, Chennai
Pharmacy Practice

Sri Ramakrishna Institute of Pharmaceutical Science, Coimbatore
Pharmaceutical Analysis, Pharmacology

Swamy Vivekananda College of Pharmacy Elayampalayam, Tiruchengodu, Namakkal
Pharmaceutics

The Erode College of Pharmacy, Veppampalayam, Vallipurathanpalayam
Pharmaceutics

Ultra College of Pharmacy, Thasildhar Nagar, Madurai
Pharmaceutical Biotechnology, Pharmaceutical Analysis

Vel's College of Pharmacy, Chennai
Pharmaceutics, Pharmacology, Pharmaceutical Analysis, Pharmaceutical Bio-Technology

Vinayaka Mission's College of Pharmacy, Kondappanaickanpatty, Salem
Ph. Chemistry

VM's College of Pharmacy, Konoapanaickanpatty
Pharmaceutical Analysis

UTTARAKHAND

Dehradun Institute of Technology, Makkawala, Bhagawantpur
Digital Communication, Thermal

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Govind Ballabh Pant Engineering College, Pauri (Garhwal)
Biotechnology

Pant College of Technology, G.B. Pant University of Agri. & Technology, Pantnagar
Farm Machinery & Power Engineering, Irrigation & Drainage Engineering, Process & Food Engineering, Soil & Water Conservation Engineering, Hydraulics Engineering, Soil Mechanics & Foundation Engineering, Structural Engineering, Electrical Energy Systems, Design & Production Engineering, Thermal Sc

Shri Guru Ram Rai Institute of Technology & Science, Dehradun
Clinical Pharmacy

UTTAR PRADESH

Ajay Kumar Garg Engineering College, Ghaziabad
Automation & Robotics

Aligarh Muslim University, Aligarh
Petroleum Processing, Building Engineering, Environmental Engineering, Hydraulic Structures, Instrumentation & Control, Power System & Drives, Electronics Circuits & Systems Design, Electronics & Comm. Engineering, Industrial Engineering, Machine Design, Thermal Engineering, Turbo Machines

Allahabad Agricultural Institute, Allahabad
Agricultural Process & Food Engineering, Dairy Technology, Farm Machinery & Power Engineering, Soil & Water Conservation Engineering

Baba Banarasi Das National Institute of Technology & Management, Lucknow
Production Engineering

Institute of Technology, Banaras Hindu University, Varanasi
Ceramic Engineering, Energy Engineering, Industrial Pollution & Control, Polymer, Environmental Engineering, Hydraulics & Water Resource Engineering, Soil Mechanics & Foundation Engineering, Structural Engg, Control System Engineering, Electrical Machine & Drives, Power Systems, Power Electronics, Systems Engg, Microwave Engg, Microelectronics, Communication Systems Engineering, Digital Techniques & Instrumentation, Heat Power Engineering, Machine Design, Production Engineering, Alloy Technology, Extractive Metallurgy, Industrial Metallurgy; Mine Environment, Rock Mechanics, Mine Planning; Bio-Chemical Engg, Bio-Medical Engineering, Industrial Management, Material Science & Technology, Systems Engineering, Pharmaceutics, Material Science & Technology

Bundelkhand Institute of Engineering & Technology, Jhansi
Environmental Management, Construction Technology & Management, Manufacturing Sciences & Technology

Central Institute of Plastic Engineering & Technology, Lucknow
Plastics Engineering

Centre for Development of Advanced Computing, Noida
VLSI Design, Information Technology, Computer Science & Engineering

Dayalbagh Educational Institute, Agra
Engineering Systems

DOEACC Centre, Gorakhpur
Electronics Design & Technology

Government Central Textile Institute, Kanpur
Textile Chemistry

Govt. Central Textile Institute, Kanpur
Textile Technology

Harcourt Butler Technology Institute, Kanpur
Chemical Technology (Bio-Chemi/Food Tech/Oil Tech), Chemical Engineering With Specialisation in Chemical Engineering, Computer Aided Design, Chemical Engineering, Soil Machines & Foundation Engineering, Power Electronics, Mechanical Engineering Design, Industrial Systems Engineering, Structural Engineering, Electronics & Communications

Institute of Engineering & Technology, Lucknow University, Lucknow
Environmental Engineering, Biotechnology

Kamla Nehru Institute of Technology, Sultanpur
Civil Engineering, Electrical Engineering, Electronics Engineering, Mechanical Engineering, Power Electronics & Drives

Madan Mohan Malaviya Engineering College, Allahabad
Hill Area Engineering, Industrial Electronics & Process Instrumentation, Computer Integrated Manufacturing, Power Electronics & Drives, Environmental Engineering, Digital Systems

Motilal Nehru Regional Engineering College, Allahabad
Analysis and Design of Process Equipment, Computer Aided Design in Civil Engineering, Computer Science & Engineering, Environmental Engineering, Geo-Technical Engineering, Structural Engineering, Soil Mechanics & Foundation Engineering, Control & Instrumentation / Power System Engineering, Digital Systems, CAD/CAM, Design of Process Machines, Production of Process Machines & Equipment, Thermal Engineering, Software Engineering, Water Resource Management, Environmental Geo-Tech., Power Electronics, Mechatronics, GIS & Remote Sensing, Material Science

Zakir Husain College of Engineering & Technology, Aligarh Muslim University, Aligarh
Computer Science and Engineering, Process Modeling & Simulation

Babu Banarasi Das National Institute of Technology & Management, Lucknow
Pharmaceutics

Banaras Hindu University, Varanasi
Pharmaceutical Chemistry, Pharmaceutics, Pharmacology

DR K N Modi Institute of Pharmaceutical Education & Research, Modi Nagar
Pharmaceutical Chemistry

Institute of Pharmacy, Bundelkhand University, Jhansi
Pharmaceutics

WEST BENGAL

Bengal Engineering & Science University, Shibpore
Advanced Mechanics & Theory of Machines, Fluid Power System & Control, Hydraulics Engineering, Mechanics of Fluids, Environmental Engineering, Geo-Technical Engineering, Highway & Traffic Engineering/Soil Mechanics & Foundation, Structural Engineering, Information Technology & Computer Engineering, Control Systems/Electrical Machines/Power Electron, Digital System & Instrumentation/Microwave Comm., Heat Power Engines/Machine Design/Production Engineering, Physical Metallurgy/Process Metallurgy, Mining Engineering, Mechanics of Fluids (PT), Geo-Technical Engineering (PT), Environmental Engineering (PT), Industrial Metallurgy, Material Engineering, Town & Regional Planning

College of Ceramic Technology, Kolkata
Ceramic Tech

College of Textile Technology, Baharampur
Mechanical Processing of Textiles

College of Leather Technology, Salt Lake, Kolkata
Leather Technology

Indian Statistical Institute, Kolkata
Computer Science, Quality, Reliability & Operation Research

Institute of Jute Technology, Kolkata
Mechanical Processing of Textiles

Jadavpur University, Kolkata
Software Engineering, Bio-Medical Engineering, Chemical Engineering, Soil Mechanics & Foundation Engineering / Structural Engineering, Control Systems Engineering, Electrical Machines, Electrical Power Systems, High Voltage Engineering, Communication Engineering, Control Engineering, Electronic Devices, Computer Engineering, Applied Mechanics, Fluid & Hydraulics Engineering, Industrial Metallurgy, CAD & CAM, Ergonomics, Machine Tools Design, Production Engineering,

Environmental Engineering, Computer Applications, Automobile Engineering, Water Resources and Hydraulics Engineering, Power Engineering, Illumination Engineering, Nano Science & Technology, Food Technology & Bio-Chem. Engineering, Instrumentation Engineering, Energy Science & Tech, Material Engineering, Courseware Engineering, Intelligent Automation & Robotics, VLSI Design & Microelectronics Technology, Housing / Urban Design, Pharmaceutical Chemistry / Pharmaceutical Engineering / Clinical Pharmacy & Pharmacy Management

Kalyani Government Engineering College, Kalyani
Electronics & Comm. Engineering, Computer Science & Engineering, Production Engineering

Netaji Subhash Engineering College, Kolkata
Computer Science & Engineering

National Institute of Technology, Durgapur
Production of Fertiliser, Corrosion Sciences & Technology, Industrial Electrical Systems, Extractive Metallurgy & Foundry, Mechanical Shaping of Metals, Operation Research in Industry & Business Mgt, Design & Production Engineering

National Institute of Technical Teachers' Training & Research, Salt Lake, Kolkata
Manufacturing Technology

University College of Science & Technology, Calcutta University, Kolkata
Pharmaceutical Technology, Electrical Engineering, Electrical Engineering (Electrical Power), Instrumentation & Control Engineering, Biotechnology, Environmental Engineering & Plant Safety, Process Engineering, Ceramic Engineering, Oil Technology, Petrochemicals & Petroleum Refinery Engineering, Computer Science & Engineering, Polymer Science & Technology, Radiophysics & Electronics, Optics & Opto-Electronics

CHAPTER -13

RECOMMENDATIONS

13.1   Investment in S & T can become truly effective only if adequate attention is paid to the development of human resource and to the system for their effective functioning. There is every need to make careers in S & T highly attractive, exciting and rewarding. To bring in excellence in S & T manpower there is need for competition and selection. To attract the bright talented and the motivated students to research, steps should be taken to ensure a career for them so that they are not at a disadvantage vis-à-vis other career opportunities likely to be available to them.

13.2   The present system of science education in schools does not encourage inventive needs and creativity and hence it does not produce outstanding researchers and original thinkers. Science course need to be restructured in order to expose our bright children to the thrill and challenges of science.

13.3   University system should have proper career opportunities and salary grades right from the point of entry in order to avoid frustration in them and attrition. This would motivate the faculty to work with interest and provide excellent education so as to produce brilliant and motivated students.

13.4   The highest salary grades should be available to scientists working on scientific tasks. It should be ensured that outstanding scientists are on par in respect of opportunities, remuneration and prospects with corresponding personnel in national laboratories. There is need to have specialized salary structures for outstanding scientists.

13.5   The age of retirement for scientists should uniformly be raised to 65 years.

13.6   Scientists should be provided with challenges and given necessary resources so that they have an opportunity to satisfy their scientific creativity and ambitions. Such incentives would raise considerably their performance levels and would ensure their advancement as well as groom them for leadership.

13.7   Performance should be constantly reviewed against announced objectives. This should be done on a peer-review basis. There is a special need for recognition of contributions to the development and improvement of technology and for success in transfer of technology.

13.8   Training and re-training of S & T personnel should be built into the management culture of all S & T Institutions and Organisations.

13.9   There is a strong need to allocate at least 2 to 3 percent of GDP for investment in S & T so as to bring in fast development in this sector and to harness the achievements required for speedy growth of our developing economy.

13.10 Wide publicity should be given to all educational and to career opportunities in industry and elsewhere for S & T degree holders.

13.11 If, what is stated regarding the Approach to S & T during the XIth Five Year Plan is really implemented, the country will certainly be able to emerge as a major player in the knowledge era. It states that "the Plan will focus on enlarging the pool of scientific manpower and strengthening the S & T infrastructure and converting this potential into reality, pushing India into the knowledge era as global player and raise the Indian economy to the level of developed nations".

13.12 There is a need for building the interfaces amongst Academia, R & D laboratories and other scientific institutions as well as Industries to create an environment for invention, thereby creating more job opportunities for S & T manpower. Also, in order to encourage quality and productivity in S & T, mobility of scientists and technologists between industry, academic institutions and research laboratories should be ensured.

13.13 At present, about 1200 Junior Research Fellows in science are supported by CSIR every year. This number is too small and has to be substantially increased because there is a need to progressively increase the rate of generation of high quality skilled human resource.

13.14 Attractive recruitment policies are required to be introduced without any further delay within the S & T system of the country. Such recruitment policies should be altogether different than the administrative positions in the Government. New recruits to positions of scientists/faculty spend much more years to acquire higher education viz. Ph. D and Post Doctoral etc., in comparison to the persons entering into civil services. In order to attract best scientists in India their salary support should be much higher than the civil services.

13.15 Public Sector Industries and Private Sector companies should be persuaded to spend certain amount of their profit money to promote science and technology through interactions with universities and research establishments.

13.16 National Laboratories that have been given the status of 'deemed universities' must admit a minimum of 40 to 50 bright science students coming out of the 10+2 system, especially those who have participated in the competitive and challenging olympiades and other science talent research programmes at the high school level. Such a step would retain the olympiades winners, who often lose their interest in science and join job-oriented courses.

13.17 In December 2006, the former President of India, Dr. A.P.J. Abdul Kalam while speaking to audience, where Vice Chancellor of Delhi University Faculty Members, Scientists and a large number of students were present, had suggested the need to create a National Science Cadre to attract best minds for taking up science as their life time mission. This suggestion should be accepted and implemented.

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