From the Desk of the Dean

I am glad to state that Delhi College of Engineering (DCE) and Netaji Subhas Institute of Technology (NSIT) are the most prestigious Quality Technical Educational Institutions in our country. DCE was established in 1941 by the Govt. of India to produce men and women of competence and caliber who wouId power the industrial growth of our country as well as the growth of science and technology capabilities to the nation's advantages. The DCE shifted to its new campus in 1996 from Kashmere Gate to the sprawling 165 acres lush green campus at Shahbad Daulatpur, Bawana Road, Delhi.

Netaji Subhas Institute of Technology (NSIT), erstwhile Delhi Institute of Technology, was established in 1983 by the Delhi Administration, Govt. of India to meet the growing demand for manpower in the fields of emerging areas of Engineering and Technology. The campus is situated on a piece of land 145 acres at Azad Hind Fauz Marg, Sector-3, Dwarka, New Delhi.

The DCE and NSIT have earned several distinctions in the past and I am confident that these institutions will continue to do so in the years to come. The efforts of the faculty members, technical-staff, administrative staff and Faculty of Technology, University of Delhi are laudable.

I wish to express my sincere greetings and Best Wishes to all the candidates who are aspiring to join DCE/NSIT through the highly competitive Entrance Examination CEE-2009 conducted by the Faculty of Technology, University of Delhi.

(PROF. S. K. SINGH)
Ph.D, FIE, FIGS, FIEE, FICS
DEAN, FACULTY OF TECHNOLOGY

IMPORTANT DATES

Sale of Bulletin of Information	09th March, 2009 Monday (10:00 A.M. to 4:00 P.M.) to 10th April, 2009 (Friday), on all working days Lunch (1:00 P.M. to 1:30 P.M.)
Last Date for receipt of request for supply of Bulletin by Post	2nd April, 2009 (Thursday)
Last Date for receipt of complete Application Form	10th April, 2009 (Friday) (5:30 P.M.)
Issue of duplicate admission ticket	26th, 27th, 28th and 29th May, 2009 between 10:00 A.M. to 4:00 P.M.
Date of Combined Entrance Examination (CEE)	30th May, 2009 (Saturday) (9:30 A.M. to 12:30 P.M.)
Date of Declaration of result of CEE-2009	About 2 weeks after conduct of examination.
Rechecking of result of CEE-2009	Within 7 days from the date of declaration of result of CEE 2009 on payment of Rs. 100/-
Availability of Application Form for admission in DCE/NSIT	Immediately after declaration of CEE result. The application form will be available from DCE/NSIT. The details will be published in leading newspaper by DCE/NSIT some time in 2nd/3rd week of June 2009
Counseling for admission to B.E. courses	The counseling for admission to B.E. courses for both the institution i.e. DCE/NSIT will be conducted by the Admission Committee, DCE/NSIT.
Closing date for admission to B.E. courses in DCE/NSIT	31st August, 2009

UNIVERSITY OF DELHI
(FACULTY OF TECHNOLOGY)
BASIS OF ADMISSIONS TO BACHELOR OF ENGINEERING (B.E.) COURSES UNDER THE FACULTY OF TECHNOLOGY FOR THE SESSION 2009-2010

1.1 COURSES OFFERED

The following courses are offered under the Faculty of Technology leading to full-time B.E. degree :

DELHI COLLEGE OF ENGINEERING

	Seats to be filled on the basis of CEE (85% Delhi Region)	Seats to be filled on the basis of AIEEE (15% Outside Delhi Region)	Total Intake
ELECTRONICS AND COMMUNICATION ENGINEERING	102	18	120
ELECTRICAL ENGINEERING	76	14	90
MECHANICAL ENGINEERING	102	18	120
CIVIL ENGINEERING	59	11	70
PRODUCTION AND INDUSTRIAL ENGINEERING	26	04	30
COMPUTER ENGINEERING	76	14	90
POLYMER SCIENCE & CHEMICAL TECHNOLOGY	34	06	40
ENVIRONMENTAL ENGINEERING	26	04	30
INFORMATION TECHNOLOGY	51	09	60
BIO-TECHNOLOGY	17	03	20
	569	**101**	**670**

NETAJI SUBHAS INSTITUTE OF TECHNOLOGY

ELECTRONICS AND COMMUNICATION ENGINEERING	102	18	120
COMPUTER ENGINEERING	102	18	120
INSTRUMENTATION AND CONTROL ENGINEERING	102	18	120
MANUFACTURING PROCESS & AUTOMATION ENGINEERING	51	09	60
INFORMATION TECHNOLOGY	51	09	60
BIO-TECHNOLOGY	17	03	20
	425	**75**	**500**

Note : Admission to 15% seats reserved for the candidates from Outside Delhi Region (Outside National Capital Territory of Delhi) will be made on the basis of All India Merit Rank in All India Engineering Entrance Examination (AIEEE-2009) to be conducted by Central Board of Secondary Education (CBSE).

1.2 ELIGIBILITY CONDITIONS FOR ADMISSION

1.2.1 EDUCATIONAL QUALIFICATIONS:

FOR DELHI REGION CANDIDATES (85% of quota)

A candidate passing any one of the following examinations from the recognized School/College/ Institute located within the National Capital Territory of Delhi only and securing **60% or more marks** in the aggregate of **Physics, Chemistry and Mathematics** shall be eligible for admission to the First Semester of Bachelor of Engineering Course provided he/she has passed in each subject separately :-

(i) Senior School Certificate Examination (12-year Course) of the Central Board of Secondary Education (C. B. S. E.), New Delhi.

(ii) Indian School Certificate Examination (12-year Course) of the Council for Indian School Certificate Examination, New Delhi.

(iii) B.Sc. (Gen.) Group 'A' Final Examination or equivalent examination of the University of Delhi.

(iv) B.Sc. (Hons.) Examination in Physics, Chemistry and Mathematics of the University of Delhi with combination of Physics, Chemistry, Mathematics and equal weightage to the subsidiary subjects or equivalent examination.

(v) Any other examination recognized as equivalent to the Senior School Certificate Examination of the C. B. S. E. by the University of Delhi.

FOR OUTSIDE DELHI REGION CANDIDATES

A candidate passing any one of the following examinations from the recognized School/ College/ Institute conducting located outside the National Capital Territory of Delhi only and securing 60% or more marks in the aggregate of Physics, Chemistry and Mathematics shall be eligible for admission to the First Semester of Bachelor of Engineering Course provided he/she has passed in each subject separately:

(i) Senior School Certificate Examination (12-year Course) of the Central Board of Secondary Education (C. B.S. E.) New Delhi.

(ii) Indian School Certificate Examination (12-year Course) of the Council for Indian School Certificate Examination, New Delhi.

(iii) B.Sc. (Gen.) Group 'A' Final Examination of the University of Delhi or equivalent examination.

(iv) B.Sc. (Hons.) Examination in Physics, Chemistry and Mathematics of the University of Delhi with combination of Physics, Chemistry, Mathematics and equal weightage to the subsidiary subjects or equivalent examination.

(v) Any other examination recognized as equivalent to the Senior School Certificate Examination of the C. B. S. E. by the University of Delhi.

Note: The admission under 15% quota will be made in DCE & NSIT strictly on All India Merit/Rank obtained in AIEEE-2009.

A CANDIDATE MUST ADDITIONALLY HAVE PASSED ENGLISH AS A SUBJECT OF STUDY EITHER AT THE 10th CLASS LEVEL OR 12th CLASS LEVEL (CORE OR ELECTIVE).

NOTE:

(i) An applicant who has to leave an Engineering Degree Course, or an equivalent course, after exhausting the permissible number of chances in any other University/ Board in India, will not be eligible for admission to Bachelor of Engineering Course.

(ii) Candidates who have appeared at the Annual Examination of the year 2009 and placed in compartment will not be eligible for admission for the year 2009.

(iii) Candidates who have appeared at the Annual Examination of the year 2009 and re-appear for the improvement to acquire the eligibility will not be considered for admission for the year 2009.

(iv) Candidates who have passed/ appeared in qualifying examination from Patrachar Vidyalaya or National Institute of Open Schooling will be eligible for admission to Bachelor of Engineering Courses.

(v) No admission will be made directly to the second or any subsequent semester of the course.

(vi) No change of branch will be permitted after the commencement of the second semester, even if some seats fall vacant in some of the branches during the course of second semester.

1.2.2 RELAXATION IN MARKS FOR RESERVED CATEGORIES:

Candidates belonging to the following categories, who apply for seats reserved for them shall be allowed a concession in the minimum eligibility requirements as detailed below:

(i) SCHEDULED CASTES (SC) AND SCHEDULED TRIBES (ST) :

Candidates belonging to Scheduled Castes and Scheduled Tribes shall be allowed 10 percent concession of marks in the minimum eligibility requirements.

(ii) CHILDREN/WAR WIDOWS OF DEFENCE PERSONNEL/PARA-MILITARY FORCES/ KILLED/ DISABLED IN ACTION (CW)

The children and/or widows of personnel of Armed/Para-Military forces killed/ disabled in action during hostilities who apply for seats reserved for them shall be allowed relaxation of 5 percent marks in the minimum eligibility requirements.

(iii) PHYSICALLY HANDICAPPED (PH)

Candidates belonging to Physically Handicapped category shall be allowed 5 percent concession of marks in the minimum eligibility requirements.

1.2.3 AGE REQUIREMENTS

Applicant must be minimum 17 years of age on or before the first October of the year in which he/ she seeks admission. Relaxation in minimum age upto one year only with the approval of the Vice-Chancellor is permissible (Such candidates should apply for relaxation only at the time of admission).

Candidates who are short in minimum age by more than one year are not eligible for admission.

1.3 REGION-WISE ALLOCATION OF SEATS:

The total seats earmarked for the B.E. Courses shall be allocated region-wise as follows:

(i) DELHI REGION

For students passing from the Recognized Schools/Colleges/ Institutions located within the National Capital Territory of Delhi.	85 Percent.

(ii) OUTSIDE DELHI REGION

For students passing from the Recognized Schools/Colleges/ Institutions located outside the National Capital Territory of Delhi.	15 Percent.

NOTE:

(i) THE CRITERION FOR DECIDING THE REGION OF THE CANDIDATE FOR CEE-2009 WHO HAVE PASSED/APPEARING IN THE QUALIFYING EXAMINATION THROUGH PATRACHAR VIDYALAYA DELHI/NATIONAL INSTITUTE OF OPEN SCHOOL, DELHI PROVIDED THE CENTER OF EXAMINATION WAS/IS LOCATED WITHIN THE NATIONAL CAPITAL TERRITORY OF DELHI.

(ii) Except for the Nominees of Govt. of India, as stated later in para 1.6 (b), the admission is open to Indian Nationals only.

1.4 RESERVATIONS :

The aforesaid allocation of seats carries the following categories of reservations :

(a) SCHEDULED CASTES (SC)

15 percent of the total seats in each Institution.

(b) SCHEDULED TRIBES (ST)

7.5 percent of the total seats in each Institution.

(c) CHILDREN/ WAR WIDOWS OF DEFENCE PERSONNEL/PARA MILITARY FORCES/KILLED/ DISABLED IN ACTION (CW)

5 percent of the total seats in each Institution for children/ widows of personnel of armed/ Para Military Forces killed/ disabled in action during the hostilities in the following priority:-

- Priority I - Widows/wards of Defence Personnel/Para-Military Personnel/killed in action.
- Priority II - Wards of serving personnel and ex-servicemen/Para-Military Personnel disabled in action.
- Priority III - Widows/wards of Defence Personnel/Para-Military Personnel who died in peace time with death attributable to Military Service.
- Priority IV - Wards of Defence Personnel/Para-Military Personnel disabled in peace time with disability attributable to Military Service.
- Priority V - Wards of ex-servicemen personnel and serving personnel who are in receipt of Gallantry Awards.

(d) Physically Handicapped (PH)

3% of the total seats in each Institution.

The 3% reservation may be allocated as follows: 1% for persons with low vision or blindness, 1 % for hearing impaired, 1 % for those with loco motor disabilities and/or cerebral palsy.

(e) OTHER BACKWARD CLASSES (OBC)

Reservation of Other Backward Classes (OBC) candidates as per directive/approval of the competent authority.

NOTE :

(i) In the case of category (a) and (b), the vacant seats are inter-changeable.

(ii) In case sufficient number of eligible candidates from the categories mentioned at (c) above are not available. the vacancies will be treated as unreserved in the respective region.

(iii) The reservation under CW Category is available only to such candidates who fall under the above listed four priorities.

(iv) It is the sole responsibility of the candidate to prove his/her eligibility for claiming reservation under any of the reserved categories. The candidates under SC/ST/CW/PH reserved categories will be required to produce the original certificate of the respective reserved category issued by the competent authority (as listed in Clause 1.5) at the time of counselling. If the category certificate is not found to be in order, no benefit of the reserved category will be given.

1.5 CERTIFICATES REQUIRED

Candidates applying for any reserved seat as mentioned in para 1.4 (a), (b), (c) and (d) (i.e. SC, ST, CW and PH Categories) should submit the following certificates as the case may be at the time of counselling.

(a)+ (b) For admission to a seat reserved for Scheduled Castes/Scheduled Tribes, a certificate in original from an approved district authority stating the Scheduled Caste/Tribe, to which the candidate belongs. A list of approved authorities is given below:

(i) District Magistrate/ Additional District Magistrate/ Deputy Commissioner/ Collector/ Additional Deputy Commissioner/ Deputy Collector /1st class Stipendiary Magistrate/ City Magistrate (not below the rank of 1st Class Stipendiary Magistrate), Sub-Divisional Magistrate/ Taluka Magistrate / Executive Magistrate/ Extra Assistant Commissioner.

(ii) Chief Presidency Magistrate/ Additional Chief Presidency Magistrate/ Presidency Magistrate.

(iii) Revenue Officer not below the rank of Tehsildar.

(iv) Sub- Divisional Officer of the area where the candidate and or his/her family normally resides.

(v) Administrator/ Secretary to Administrator/ Development Officer (Laccadive & Minicoy Islands).

(c) For admission to a seat reserved for Wards/ Children/Widows of Personnel of Armed/Para Military Forces killed/ disabled in action during hostilities, entitlement card in original issued by the Record Officer of the Unit/ Regiment of Armed Personnel of the Armed Forces in case of Armed Personnel or from the Home Ministry in case of Para-Military Forces.

The Children/ widows of the officers and Men of the Armed Forces including Para-Military personnel who died or disabled on duty must submit a certificate to that effect from the following authorities:-·

(i) Secretary, Kendriya Sainik Board, Delhi.
(ii) Secretary, Rajya/Zila Sainik Board.
(iii) Officer - in- Charge, Record Office.

NOTE: A statement to the effect that "the death/disability is attributed to military service" is required to be included in the certificate.

(d) For admission to seat reserved for Physically Handicapped category, a certificate of physical disability issued by a duly notified Medical Board of a District/ Government Hospital set up for examining the physically challenged candidates under the provisions of the persons with Disability (equal opportunities, Protection of rights and full participation) Act 1995. The certificate should indicate the extent of (i.e. percentage) of the physical handicap and it should bear the photograph of the candidate concerned and it should be countersigned by one of the Doctors constituting the Board issuing the certificate.

1.6 NOMINEES OF THE GOVERNMENT OF INDIA

(a) One seat over and above the normal total intake in both the Institutions taken together for Wards/ Children of India based staff posted at Indian Missions abroad provided they have passed their qualifying examination from outside India. Nomination against this seat will be made by the Ministry of External Affairs, G.O.I., New Delhi. Any person who is sponsored by the Govt. of India on an assignment abroad will be treated to be the staff posted in Indian Missions Abroad.

NOTE: In case of countries where educational facilities are totally inadequate and are not available upto the qualifying standard or due to situation of turmoil in that country, the wards/ children of the Indian Missions based personnel who had to study in India are also eligible, if a certificate to this effect is issued by the Indian Ambassador in the Country concerned and is attached with the application.

However, if the nomination of the Ministry of External Affairs is for more than one candidate preference will be given to the candidate covered under Clause (a) above.

(b) **Six seats in Delhi College of Engineering** (Electrical -1 , Electronics and Communication 1, Mechanical - 1, Civil-1, Production-1, Computer-1) and **Three seats in Netaji Subhas Institute of Technology** (1 in Electronics and Communication, 1 in Computer and 1 in Instrumentation & Control Engineering) over and above the normal intake for candidates from friendly and developing countries. **Nominations against these seats will be made by the Government of India.**

1.7 PROCEDURE FOR ADMISSION:

(a) The admission to the B.E. Courses will be made centrally by Delhi College of Engineering/NSIT for both the Institutions i.e. Delhi College of Engineering and Netaji Subhas Institute of Technology. The Delhi College of Engineering/NSIT will release the prospectus and common admission application form, details of which will be published by Delhi College of Engineering/NSIT sometime in the 2nd/3rd week of June, 2009 in leading newspapers.

(b) The admission of the candidates belonging to the different regions and categories will be made as under:

(i)	Delhi Region (General/SC/ST/CW/PH Categories)	on the basis of the (COMBINED ENTRANCE EXAMINATION (CEE)) conducted by University of Delhi.

The details of Combined Entrance Examination (CEE) are given in Section 2.

(ii)	Outside Delhi Region (General/SC/ST/CW/PH Categories)	on the Basis of ALL INDIA ENGINEERING ENTRANCE EXAMINATION (AIEEE) conducted by Central Board of Secondary Education.

NOTE: (i) The candidates who have passed the qualifying Examination from recognized School/College/ Institute located within the National Capital Territory of Delhi are eligible for admission against 85% seats reserved for Delhi Region candidates on the basis of CEE.

(ii) The candidates who have passed the qualifying Examination from recognized School/ College/ Institute located outside the National Capital Territory of Delhi are eligible for admission against 15% seats reserved for Outside Delhi Region candidates on the basis of All India Merit/Rank of AIEEE.

(For those unable to appear in AIEEE on scheduled date of Examination for any reason, no re - examination shall be held under any circumstances).

(c) The candidates who want to seek admission in DCE and NSIT on the basis of merit in CEE-2009 /AIEEE-2009 should submit a separate application form for Counselling to the Delhi College of Engineering/NSIT to be notified after declaration of the CEE-2009 result. They should indicate their rank in the respective category at the CEE/AIEEE in the appropriate column.

(i) FOR GENERAL/SC/ST/CW CANDIDATES

In case two candidates have the same marks at the CEE-2009, the marks obtained in Qualifying Examination in subjects of Physics, Chemistry and Mathematics taken together with equal weightage will be the basis of merit for admission. In the event of marks of PCM being equal, the candidate born earlier will be given preference.

(ii) FOR PHYSICALLY HANDICAPPED CANDIDATES

As per details in Appendix "X"

For further details about admission, the Delhi College of Engineering/NSIT prospectus may be consulted.

(d) The admission to B.E. Courses under CW/PH Categories (for Delhi Region) will be made through CEE. All such candidates who are applying under CW/PH Categories will have to appear in Combined Entrance Examination-2009. A separate CEE merit list will be prepared for CW/PH Categories as is done for General, SC and ST Categories.

(e) The schedule of counselling will be notified in the prospectus of Delhi College of Engineering/NSIT. However, all admissions in Delhi College of Engineering and Netaji Subhas Institute of Technology will close on 31.08.2009.

(f) The candidates are entirely responsible to prove their eligibility for admission to B.E. courses at the time of counselling. All admissions will be subject to verification of facts from the original certificates/documents of the candidate.

The various terms and conditions mentioned in the Bulletin of Information are subject to changes made in the Ordinances, Rules and Regulations of the University from time to time as per the decision of the Academic/Executive Council.

Appearance of the candidate in the Combined Entrance Examination is provisional subject to his/her being found otherwise eligible for admission to the course concerned.

In case any candidate is found to have furnished false information or certificate etc. or is found to have withheld or concealed any material information in his/her application, he/she will be debarred from admission.

If an applicant is found to be ineligible at a later date even after admission to an Institute, his/her admission will be cancelled.

(g) The candidate must come for counselling in person or through her representative alongwith the documents mentioned below. In case the candidate or his/her repesentative does not appear before the B.E. Admission Committee 2009 for counselling on the specified date and time, his/her name will not be considered further for admission and the seat shall be offered to the next candidate in merit.

(i) The Admit Card of CEE-2009/AIEEE-2009.

(ii) The Original and attested copy of marksheet of the qualifying examination as given in Clause 1.2.1.

(iii) The Original and attested copies of certificate and marksheet of High School or equivalent examination.

(iv) The original certificate and attested copy for the reserved category, if other than the General Category.

(v) Medical fitness certificate in case of General/SC/ST/CW.

(vi) For admission to seat reserved for Physically Handicapped category, a certificate of physical disability issued by a duly notified Medical Board of a District/Government Hospital set up for examining the physically challenged candidates under the provisions of the persons with disability (equal opportunities, protection of rights and full participation) Act 1995. The certificate should indicate the extent of (i.e. percentage) of the physical handicap and it should bear the photograph of the candidate concerned and it should be countersigned by one of the Doctors constituting the Board issuing the certificate.

(h) The decision of the Delhi University regarding the eligibility/admission of any applicant shall be final.

(i) Disputes, if any, arising out of or relating to any matter whatsoever, concerning the aforesaid CEE-2009 shall be subject to the exclusive Jurisdiction of Delhi.

2. COMBINED ENTRANCE EXAMINATION (CEE)

The candidates who passed the qualifying examination listed at para 1.2.1 and seek admission to any B.E. Course under the Faculty of Technology during the session 2009-2010 must appear in the CEE/AIEEE except candidates falling under Clause1.6 above.

The candidates who are yet to appear in the qualifying examination and whose results are expected to be declared before the last date of the receipt of the application for admission are also eligible to apply for the CEE.

2.1 APPLICATION FORM FOR THE CEE

The BULLETIN OF INFORMATION enclosing the Application Form for CEE will be available from the Office of the DEAN, FACULTY OF TECHNOLOGY (DELHI UNIVERSITY), ROOM NO. HCFF-13, FIRST FLOOR (HEALTH CENTRE), DELHI COLLEGE OF ENGINEERING (NEW CAMPUS), BAWANA ROAD, DELHI - 110042 only on submission of a Pay Order or crossed Bank Draft of Rs. 400/- (including the cost of bulletin of information, application form and examination fee) for General/OBC/CW category and Rs. 200/- for SC/ST/PH category in favour of the Registrar, Delhi University, Delhi, drawn on any Bank from 09th March, 2009 between 10:00 a.m. to 4:00 p.m. (Lunch Break 1:00 p.m. to 1:30 p.m.) on all working days (Monday to Friday) as per the notification issued by the University. Please write your name, address and telephone number (if any) at the back of the Bank Draft/Pay Order.

For the convenience of the candidates, the Bulletin of Information may also be obtained from the Office of the Director, Netaji Subhas Institute of Technology, Sector-3, Dwarka, Papankalan, New Delhi - 110045 and on submission of a Bank Draft/Pay Order of Rs 400/- for General/ OBC/CW Category and Rs. 200/- for SC/ST/PH Category.

APPLICATION FORM FOR CEE BY POST

The Bulletin of Information can also be obtained by post on remitting a Pay Order or crossed Bank Draft of the value of Rs 475/- (including the cost of bulletin of information, application form, examination fee and postal charges) for General/OBC/CW category and Rs. 275/- for SC/ST/PH category in favour of the Registrar, Delhi University, Delhi, drawn on any Bank. Two self addressed slips should also be enclosed with the request in Block letters for sending the Bulletin by post. Please write your name, address and telephone number (if any) at the back of the Bank Draft/ Pay Order. The request for supply of Bulletin of Information by post should be addressed to the DEAN, FACULTY OF TECHNOLOGY (DELHI UNIVERSITY), ROOM NO. HCFF-13, FIRST FLOOR (HEALTH CENTRE), DELHI COLLEGE OF ENGINEERING (NEW CAMPUS), BAWANA ROAD, DELHI-110042.

The candidates asking for supply of Bulletin of Information by post must write on the top of the envelope “Request for Supply of Bulletin of Information”. THE REQUEST FOR SUPPLY OF BULLETIN OF INFORMATION BY POST SHOULD REACH THE DEAN, FACULTY OF TECHNOLOGY (DELHI UNIVERSITY), ROOM NO. HCFF-13, FIRST FLOOR (HEALTH CENTRE), DELHI COLLEGE OF ENGINEERING (NEW CAMPUS), BAWANA ROAD, DELHI-110042 ON OR BEFORE 02-04-2009. Request received thereafter will not be entertained, even if the request is posted before 02.04.2009.

NOTE: (i) Delhi University will not be responsible for delay/loss in transit of the request for supply of Bulletin of Information by post due to any reason whatsoever.

(ii) The Bulletin of Information cannot be obtained on cash payment or through Money Order.

(iii) The candidate are advised not to submit "The request for supply of Bulletin of Information by post" through courier services.

2.2 EXAMINATION FEE

No separate examination fee is required to be sent with the application.

The cost of Bulletin of Information inclusive of Examination Fee is not refundable.

2.3 SUBMISSION OF APPLICATION

The candidates will apply for admission to the CEE on the prescribed form available in this Bulletin. THE COMPLETED APPLICATION FORM SHOULD BE SUBMITTED TO THE DEAN, FACULTY OF TECHNOLOGY (DELHI UNIVERSITY), ROOM NO. HCFF-13, FIRST FLOOR (HEALTH CENTRE), DELHI COLLEGE OF ENGINEERING (NEW CAMPUS), BAWANA ROAD, DELHI-110042 IN PERSON OR REACH BY POST ON OR BEFORE 10-04-2009 (5:30 PM). The completed application form received after 10.04.2009 (5.30 PM) will not be entertained, even if the completed application form is posted before the last date i.e. 10.04.2009.

NOTE :

(i) A candidate seeking admission to the Combined Entrance Examination is required to send his/her application in the prescribed form appended at the end of Bulletin of Information.

(ii) Application Form should be filled in English only.

(iii) The candidate shall fill-up the Application Form in his/her own handwriting in BLOCK LETTERS written neatly and legibly with blue/black ball point pen.

(iv) Erasing, Cutting, Omission and over - writing in supplying the information may lead to cancellation of candidature. For any lapse on this account, the entire responsibility is of the Candidate.

(v) The candidates before filling in the form shall satisfy his/her eligibility to appear in the Examination. The candidate is required to go through the Bulletin of Information carefully and aquaint himself/herself with all requirements with regard to the filling of the application form.

(vi) The candidate should write his/her name, mother's name and father's name in capital letters as given in High School Certificate of Board/University.

(vii) The candidate should write his/her complete address in capital letters in the Application Form for further correspondence. Pin Code should invariability be given in the space provided for Pin Code.

(viii) It will be the responsibility of the candidate that he/she fills-in his/her correct address in the application. UNIVERSITY OF DELHI SHALL NOT BE HELD RESPONSIBLE FOR ANY LOSS IN TRANSIT OR FOR AN INCORRECT/INCOMPLETE ADDRESS GIVEN BY THE CANDIDATE ON THE APLICATION FORM.

(ix) The candidate should enter the date, month and year of birth as per English Calendar and as recorded in the Secondary Board Certificate.

Use Numerals 01 to 31 for the dates, 01 to 12 for the month last two digits for the year of birth as shown below:-

e.g. 3rd September, 1988

DD	MM	YY
0 3	0 9	8 8

19th November, 1989

DD	MM	YY
1 9	1 1	8 9

(x) The candidates are requested to put their signature in the space provided in the Application Form and Admit Card in running handwriting. Writing full name in Capital letters would not be accepted as signature and the Application form would be liable to be rejected.

(xi) The Left Hand Thumb impression to be affixed on the Application Form and two places on the Admit Card at the space earmarked for the same.

(xii) No column should be left blank in the Application Form.

(xiii) Once application form is submitted no alteration will be allowed thereafter.

(xiv) Incomplete applications form will be summarily rejected.

(xv) No change of Region/ Category will be permitted after the receipt of completed Application Form.

(xvi) The candidate should check the category as indicated on the Admission Ticket and in case there is any discrepancy, the same should be brought to the notice of the Dean, Faculty of Technology either in person or through registered letter before the date of the CEE.

(xvii) Delhi University will not be responsible for delay in receipt of completed application form beyond the last date for receipt of completed Application Form/ loss of form in transit due to any reason whatsoever.

(xviii) Attested copies of Xth Class Certificate and Marksheet and XIIth Class Certificate and Marksheet (if Passed) are to be submitted with the Application Form.

(xix) Affix Three Passport size coloured same and identical photographs, one on the Application Form (ATTESTED) and two on the Admit Card (UNATTESTED) in the space earmarked for the purpose. The photographs must be taken on or after 01.01.2009 indicating clearly the name of candidate alongwith the date of taking the photograph. The photographs should be taken without cap or goggles. Spectacles are allowed if being used regularly. Polaroid photos are not acceptable. The photograph on the application form should be attested by the Principal/ Head of the Institution in such a way that half the signature of the attesting officer appear on the photograph and the remaining on the Application Form. Attestation should be done on the bottom part of the photograph so that the photograph is not defaced. The photograph should be firmly affixed to the Application Form by gum/fevicol and should not be pinned or stapled.

(xx) Applications not complying with these instructions or with unclear photograph are liable to be rejected. The candidates may keep 6-8 identical photographs in reserve for use at the time of Entrance Examination/ Admission/ or for obtaining duplicate Admit Card.

PHOTO

(Name of the candidate)

01.01.2009

(xxi) The candidate is advised not to send the completed application form through private courier services.

(xxii) The Admit Card will be despatched by the University to the candidate through Registered Post or Speed Post. The University will not be responsible for any postal delay or irregularity resulting in non/late delivery of the Admit Card for any reason whatsoever.

(xxiii) The candidates are required to submit only one Application Form. If a candidate submits more than one Application Form his/her candidature is liable to be cancelled.

2.3.1 CHECK LIST

(1) The candidates must follow the instructions strictly as given in the Bulletin of Information.

(2) The candidates not complying with the instructions shall be summarily disqualified.

(3) The candidates must retain the Application Form No. and photocopies of his/her Application Form for future correspondence in his/her own interest.

(4) Please ensure before submitting/mailing the Application Form that:-

(i) The candidate has signed the Form and Admit Card at three places.

(ii) The Left Hand Thumb impression has been affixed on the Application Form and two places on the Admit Card at the space earmarked for the same.

(iii) The application bears the signatures of Father/Mother/Guardian (Guardian, only if parents not alive).

(iv) Recent coloured photographs (taken on or after 01-01-2009 duly pasted in the space earmarked for this purpose).

(v) The Photograph on the Application Form has been authenticated/signed by the Principal/ Head of the Institution last attended.

(vi) The application has been authenticated/signed by the Principal/ Head of the Institution last attended.

(vii) Acknowledgement Card (duly filled in by the candidate is enclosed).

(viii) You have completed Col. No.8 by writing your Category as General/SC/ST/CW and PH. Please note that all schools located in National Capital Territory of Delhi come under Delhi Region and the Schools located outside National Capital Territory of Delhi such as NOIDA, Ghaziabad, Faridabad, Gurgaon etc., are not covered under Delhi Region.

(ix) Attested copies of Xth Class Certificate and XIIth Class Certificate and Marksheet (if passed) are enclosed.

(x) The original and attested copy of Identity Card mentioning therein Accredited Centre of the candidate in case candidate belongs to National Open School/Patrachar Vidyalaya.

2.4 DUPLICATE ADMISSION TICKETS :

In case a candidate does not get his/her Admission Ticket by 26.5.2009, he/she should contact the office of the Dean, Faculty of Technology in person alongwith documentary evidence of the Application Form for CEE-2009 having been received in the Faculty of Technology by the last date for receipt of completed Application Form i.e. by 10.04.2009 on 26th, 27th, 28th & 29th May, 2009 between 10.00 a.m. to 4.00 p.m. for issue of Duplicate Admission Ticket for which the Candidate must bring two photographs similar to the ones pasted on his/her CEE Application Form.

No duplicate Admission Ticket will be issued after the Examination.

NO CORRESPONDENCE IN THIS REGARD WILL BE ENTERTAINED.

2.5 CONDUCT OF CEE

(i) The DEAN (Examinations) will arrange for the conduct of examination in Delhi only.

(ii) **THE MEDIUM OF EXAMINATION SHALL BE ENGLISH AND THE SYLLABI IN CHEMISTRY, PHYSICS AND MATHEMATICS WILL BE BASED ON STANDARD OF SENIOR SECONDARY SCHOOL CERTIFICATE EXAMINATION, CONDUCTED BY C.B.S.E., NEW DELHI. THE DETAILS ARE GIVEN IN APPENDIX-Y.**

(iii) The test will comprise of objective type questions. Each Question will have multiple (four) choices. Correct answer will be awarded four marks and one mark will be deducted for incorrect answer.

(iv) (a) The entrance examination will be conducted as per the schedule below :-

DATE	TIME	SUBJECT	NO. OF QUESTION	MAX. MARK
30.05.2009				
(Saturday)	9.30 AM	PHYSICS	60	240
	TO	CHEMISTRY	60	240
	12.30 PM	MATHEMATICS	60	240

(b) **No entry permitted beyond 9:15 A.M. All doors will be closed and no candidate will be permitted entry in the Examination Hall under any circumstances. The candidates are advised to reach the Examination Centre by reporting time so as to avoid any complication at a later stage.**

(v) Instructions to the candidates with regard to the conduct of CEE will be communicated alongwith the Admission Ticket.

For those unable to appear in CEE on scheduled date of Examination for any reason, no re-examination shall be held under any circumstances. The schedule will remain unaltered even if the date is declared as a public holiday.

2.5.1 The result of CEE is expected to be declared by the University after about 2 weeks of the conduct of CEE. It will be displayed on the Notice Board of the Examination Branch of the University of Delhi. The result will also be displayed by the Delhi College of Engineering and Netaji Subhas Institute of Technology at their respective Notice Boards. The candidates are expected to see the result on their own. No Separate communication will be sent by the University to the candidates.

The CEE result is likely to be made available on internet and it will be notified in the leading newspapers.

The detailed mark-sheets of the CEE will not be supplied to the candidates.

The candidates may apply for rechecking of their answer sheets within 7 days from the date of declaration of CEE 2009 result on payment of Rs.100/- on prescribed form available at the office of the Faculty of Technology. If there is any change in the result after rechecking, the candidate concerned will be informed accordingly before counselling .

2.5.2 As described earlier in Section 1.7, the candidates who seek admission to the B.E. Courses on the basis of their rank in CEE are required to submit their application for admission in prescribed forms available from the office of the Principal, Delhi College of Engineering/NSIT within 15 days from the date of the announcement of the CEE result.

APPENDIX -X
UNIVERSITY OF DELHI
MODALITIES FOR ADMISSION TO VARIOUS UNDER GRADUATE/POST GRADUATE COURSES FOR THE PHYSICALLY DISABLED CANDIDATES

1. Three percent (3%) seats in all undergraduate and postgraduate institutions (Including professional and technical Institutions) will be reserved for candidates with physical disabilities.

2. Reservation will also be applicable to institutions where admission is through Entrance Examinations.

3. Reservation will be implemented college-wise and as far as possible course-wise in undergraduate courses, keeping in mind the suitability of the various courses for physically handicapped students depending, inter-alia, on the nature and severity of their disability. The reservation will be implemented Department-wise in post-graduate courses as well as in those under-graduate courses where teaching is available only in one Department/College.

4. Candidate seeking admission under reservation shall be required to fulfill other criteria of admission as detailed in eligibility conditions except relaxation of 5% marks in the minimum eligibility conditions. In case of a course where admission is by entrance examination 5% concession shall be granted in the minimum eligibility condition for admission to the test.

5. Candidates with physical disabilities who are able to secure admission in the general category will not be counted in the 3% quota.

6. The 3% reservation may be allocated as follows: 1 % for persons with low vision or blindness: 1 % for hearing impaired; 1 % for those with loco motor disabilities and or cerebral palsy. However, if sufficient candidates are not available in a sub-category then candidates from other the sub categories should be considered in their stead.

7. Candidates with more than one type of reservation: This reservation shall cut across the existing reservation of SC/ST, children/widows/wives of officers and men armed forces including paramilitary forces killed/disabled in action or those who died/were disabled on duty, etc. in accordance with the principal of interlocking reservations. In other words, there will be subreservations for physically disabled candidates in each reserved category, thus a disabled SC/ST candidate would have preference over an able-bodied SC/ST candidate.

Note: It is clarified that there is no bar to a candidate to seeking admission under the physically handicapped category to seek admission either under the General Category or any other reserved category if the candidate is otherwise eligible and entitled to take the benefit of any other reservation.

8. If sufficient numbers of the candidates are not available under the reserved categories then their seats may be filled with general category candidates.

9. Colleges/Departments are free to exceed the 3% reservation quota if necessary. (Note: ordinarily the number of seats reserved would be 1 for 33, 2 for 67 and 3 for 100 and so on. However, the colleges may round off total number of reserved seats to next higher level, if the number calculated seats falls more than half way between two levels, e.g. for 54 seats the number of reserved seats would be 1.62; which may be rounded off to 2 though it may appear to be 4% quota. In essence, the nature of reservation should be enabling in spirit and the institution not feel prevented from exceeding the 3% quota.

10. The Dean Students Welfare (DSW) will arrange for professional counselling of physically challenged students to enable them to decide about courses keeping in view their aptitude, disability and future career prospects.

11. All candidates who wish to seek admission to various colleges and in courses where there is no entrance test should register themselves at the Desk for persons with disabilities at the Dean Students' Welfare (Main Campus), New Examination Hall, Near University Main Gate. The application form will be available at the Registration desk. The dates and time for availability for submission of forms will be the same as that for general category students. The application form should be accompanied by a certificate of physical disability issued by a duly notified Medical Board of a District Government Hospital set up for examining the physically challenged candidates under the provision of the Persons with Disability (equal opportunities, protection of rights and full participation) Act 1995. The certificate should indicate the extent of (i.e. percentage) of the physical handicap and it should bear the photograph of the candidate concerned and it should be countersigned by one of the Doctors constituting the Board issuing the certificate.

Note: (a) In the event of any complaint or doubt either by the University authorities or by the Principal of the College as to the genuineness of the certificate or the extent of the disability of the candidate concerned or in regard to the entitlement of the candidate to seek admission under the category of physically disabled candidates, it is open to the University authorities/ the Principal of the College to refer the candidate to a Medical Board to be constituted by the University and/or take such other steps as may be required to ascertain the correct facts and entitlement of the candidate concerned and if it is found that the candidate is not eligible or entitled under this category, cancel the admission after issuing a show cause notice to the candidate concerned giving him 15 days time to reply.

(b) The candidate would give a declaration to the effect that information furnished in the application form and the documents annexed to the same and information contained therein are true and correct and that in the event of the same being found to be incorrect in any respect his admission is liable to be cancelled, in addition to any other action that may be taken against him.

12. In courses where admission is through entrance test, the candidates should fill separate forms prescribed by each Institution/College/Faculty in duplicate. Both copies should be clearly marked for category of reservation. The Institution/College/Faculty shall send one copy of the form for registration at the DSW office. However, if the candidates desire, they may submit forms at the office of the DSW which shall arrange to dispatch the forms to colleges/departments where the candidates wish to seek admission.

13. Colleges would notify the DSW about dates of tests/interview (where-ever applicable) so these applicants can be informed accordingly. The DSW would notify these dates on the notice board and also post the same on the DU website.

14. In all cases, separate merit lists will be made for disabled candidates under the 3% quota. However, if the number of applicants for a course/institution exceeds the quota, a priority list of candidates will be prepared taking into account:

(a) Marks obtained in the qualifying examination for admission and

(b) Severity of the disability

Note : Marks obtained in the qualifying exams being same, priority will be given to candidate whose disability is more severe, e.g. complete loss of vision over partial loss of vision OR loss of a complete limb over loss of a few fingers etc.

15. On request of the Dean Students' Welfare, the CMO, WUS Health Center would constitute a medical board consisting of (a) medical specialists in the concerned field of disability, (b) rehabilitation experts and (c) nominee of the Dean of Faculty having special knowledge about the proposed discipline of study of candidate. The Medical Board shall examine the candidates to determine the extent of disability on a 10 -point scale and recommend the points to be added as weightage to the marks scored in the qualifying examination, for the purpose of admission. The Medical Board chaired by the CMO would function at the WUS Health Center, Chhatra Marg (near Patel Chest Hospital) at the main campus of the University of Delhi and any additional board if required at the WUS Health Centre, South Campus. The medical boards shall meet within one week of the last date of submission of form/announcement of result of entrance examination as the case may be. The candidates can enquire about the dates of medical examination either at the WUS Health Centre or at the office of the DSW. This information will also be available on the DU website.

16. The medical board shall send all data on disability points awarded to each candidate to be displayed at the D.S.W. office. In case of professional, technical and post-graduate courses and where admission is through entrance examination, the recommendation would be sent directly to Faculty/College with a copy to D.S.W.

17. The D.S.W. office would add the disability point to the marks in qualifying examination and allot college/subject based on preference indicated by candidate in the prescribed form.

18. The certificate issued by the Medical Board will be valid for the purpose of admission to any college where a candidate has applied within the prescribed date.

19. No college shall refuse admission to any disabled candidate who is otherwise eligible, subject to mandatory 3% quota.

20. As far as possible all admissions of physically disabled candidates should be completed by the last date prescribed for the general category candidates. However, the Dean of the Faculty/ Head of the Department/Principal of the College would keep the required number of seats vacant in the College/Department concerned until the recommendations of the medical board are received by them and the merit list of the reserved category finalized thereafter.

21. The Delhi University Disabilities Committee shall strictly monitor the implementation of the provision of the reservation in all constituent or affiliated colleges/departments/institutions of the University of Delhi.

22. Grievances regarding admissions under reservation for persons with disabilities should be reported to the Dean Student's Welfare, who will convene meeting of the Grievance Committee set up for purpose.

APPENDIX - Y
SYLLABUS FOR CEE - 2009 EXAMINATION
PHYSICS

1. Physical World and Measurement

Need for measurement; Units of measurement; Systems of units; SI units, Fundamental and derived units, Length, mass and time measurements; Accuracy and precision of measuring instruments, Errors in measurement; Significant figures.

Dimensions of physical quantities, dimensional analysis and its applications.

2. Kinematics

Motion in a straight line, Position-time graph, speed and velocity, Uniform and non-uniform motion, average speed and instantaneous velocity.

Uniformly accelerated motion, velocity-time, position-time graphs, relations for uniformly accelerated motion (graphical treatment).

Elementary concepts of differentiation and integration for describing motion.

Scalar and vector quantities; Position and displacement vectors, general vectors and notation; Equality of vectors, multiplication of vectors by a real number; Addition and subtraction of vectors; Unit vector, Resolution of a vector in a plane-rectangular components, Multiplication of vectorscalar and vector products; vectors in three dimensions (elementary idea only).

Motion in a plane, Cases of uniform velocity and uniform acceleration-Projectile motion. Uniform circular motion.

3. Laws of Motion

Force and inertia, Newton's first law of motion; Momentum, Newton's second law of motion, Impulse; Newton's third law of motion; Law of conservation of linear momentum and its applications; Equilibrium of concurrent forces; Static and Kinetic friction, Laws of friction, rolling friction, lubrication; Examples of variable-mass situation.

Dynamics of uniform circular motion; Centripetal force, examples of circular motion (vehicle on level circular road, vehicle on banked road); Inertial and non-inertial frames (elementary idea).

4. Work, Energy and Power

Work done by a constant force and a variable force; Kinetic energy, Power; Work-energy theorem.

Notion of Potential energy, potential energy of a spring, conservative forces; conservation of mechanical energy (Kinetic and potential energies), Non-conservative forces; elastic and inelastic collisions in one and two dimensions.

Different forms of energies in nature, Mass-energy equivalence (qualitative idea only).

5. **Motion of System of Particles and Rigid Body**

Center of mass of a two-particle system, generalization to N particles, momentum conservation and center of mass motion, Application to some familiar systems; center of mass of a rigid body.

Moment of a force, Torque, angular momentum, physical meaning of angular momentum, conservation of angular momentum with some examples (Planetary motion).

Equilibrium of rigid bodies, rigid body rotation and equation of rotational motion, comparison of linear and rotational motions; Moment of inertia and its physical significance, radius of gyration, parallel and perpendicular axes theorems (statements without proofs); Moment of inertia of circular ring, disc, cylinder without slipping.

Examples of Binary system in nature (Binary Stars, Earth-moon system, diatomic molecules).

6. Gravitation

The universal law of gravitation, Gravitational constant; acceleration due to gravity and its variation with the altitude, latitude, depth and rotation of the earth; Mass of the earth.

Gravitational potential energy near the surface of the earth, gravitational potential; Escape velocity, orbital velocity of satellite, Weightlessness, motion of satellite, geostationary and polar satellites; Statement of Kepler's law of planetary motion; proof of second and third law (circular orbits); Inertial and Gravitational mass.

7. **Mechanics of Solids and Fluids**

States of Matter, Inter-atomic and inter-molecular forces.

A. Solids: Elastic behaviour, Stress-Strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus, modulus of rigidity, some practical examples.

B. Fluids: Pressure due to fluid column. Pascal's law and its applications (hydraulic lift and hydraulic brakes), Effect of gravity on fluid pressure, Buoyancy, floatation and Archimedes' principle; Viscosity, Stokes' law, Terminal velocity, Streamlined flow, Reynolds number, Bernoulli's theorem and its applications. Surface energy and surface tension, angle of contact, applications of surface tension ideas in (i) formation of drops and bubbles, (ii) capillary rise.

8. **Heat and Thermodynamics**

Kinetic theory of gases-assumptions, concept of pressure, Kinetic energy and temperature; mean, rms and most probable speed, degrees of freedom, li::Iw of equipartition of energy (statement only), concept of mean free path, Avogadro's number.

Thermal equilibrium and temperature (zeroth law of thermodynamics), Heat, work and internal energy; Thermal expansion-thermometry; First law of thermodynamics, specific heat, specific heat of gases at constant volume and pressure (monoatomic, diatomic gases); specific heat of solids (Dulong and Petit's law). Thermodynamical variables and equation of state, phase diagrams; ideal gas equation, isothermal and adiabatic processes; reversible and irreversible processes; Carnot engine and refrigerator or heat pump. Efficiency and coefficient of performance of heat engines; second law of theImodynamics (statement only) and some practical applications.

Transfer of heat-conduction, convection and radiation; Thermal conductivity of solids; Black body radiation- Kirchhoffs law, Wien's displacement law, Stefan's law (statements only); Newton's law of cooling; solar constant and surface temperature of the sun.

9. Oscillations

Periodic motion -period, frequency, displacement as a function of time and periodic functions. Simple harmonic motion (S.H.M.) and its equation; Phase, uniform circular motion and simple harmonic motion;

oscillations of a spring-restoring force and force constant; Energy in S.H.M. Kinetic and potential energies; Simple pendulum -derivation of expression for its time period; Free, forced and damped oscillations (qualitative ideas only), resonance; coupled oscillations.

10. Waves

Longitudinal and transverse waves, wave motion, speed of wave motion, Displacement relation for a progressive wave; principle of superposition of waves, Reflections of waves, standing waves in strings and pipes, fundamental mode and harmonics, Beats, Doppler effect.

11. Electrostatics

Frictional electricity, charges and their conservation; Coulomb's law-Forces between two point electric charges, Forces between multiple electric charges; Superposition principle and continuous charge distribution. Electric field and its physical significance, electric field due to a point charge, electric field lines; Electric dipole, electric field due to a dipole and behaviour of dipole in a uniform electric field.

Electric potential-physical meaning, potential difference, electric potential due to a point charge, a dipole and system of charges; Equipotential surfaces, Electrical potential energy of a system of two point charges and of electric dipoles in an electrostatic field.

Electric flux, Statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell.

Conductors and insulators, presence of free charges and bound charges inside a conductor; Dielectrics and electric polarization, general concept of a capacitor and capacitance, combination of capacitors in series and in parallel, energy stored in a capacitor, capacitance of a parallel plate capacitor with and without dielectric medium between the plates; Van de Graff generator.

12. Current Electricity

Electric current, flow of electric charges in a metallic conductor, drift velocity and mobility, and their relation with electric current; Ohm's law, electrical resistance, V-I characteristics, Exceptions of Ohm's law (Non-linear V-I characteristics), electrical resistivity and conductivity, classification of materials in terms of conductivity; Superconductivity (elementary idea); Carbon resistors, colour code for carbon resistors; combination of resistances -series and parallel. Temperature dependence of resistance. Internal resistance of a cell, Potential difference and emf of a cell, combination of cells in series and in parallel.

Kirchoff's laws -illustration by simple applications, Wheatstone bridge and its applications for temperature measurements, Meter bridge -special case of wheatstone bridge.

Potentiometer- principle and applications to measure potential difference and for comparing emfs of two cells. Electric power, thermal effects of current and Joule's law; Chemical effects of current Faraday's laws of electrolysis; Electro-chemical cells-Primary and secondary cells, solid state cells.

Thermoelectricity- Origin, elementary ideas of Seebeck effect, Thermocouple, Thermo emf, neutral and inversion temperatures. Measurement of temperature using a thermocouple.

13. Magnetic Effect of Current and Magnetism

Concept of magnetic field, Oersted's experiment, Biot-Savart's law, magnetic field due to an infinitely long current carrying straight wire and a circular loop; Ampere's circutallaw and its applications to

straight and toroidal solenoids; Force on a moving charge in uniform magnetic and electric fields, Cyclotron; Force on current -carrying conductor in a uniform magnetic field. Forces between two parallel current-carrying conductors- definition of ampere. Torque experienced by a current loop in a uniform magnetic field, moving coil galvanometer -its current sensitivity and conversion to ammeter and voltmeter.

Current loop as a magnetic dipole and its magnetic dipole moment; Magnetic dipole moment of a revolving electron; Magnetic field intensity due to magnetic dipole (bar magnet) along the axis and perpendicular to the axis; Torque on a magnetic dipole (bar magnet) in a uniform magnetic field; Bar magnet as an equivalent solenoid, Magnetic field lines; Earth's magnetic field and magnetic elements; Para, dia and ferro-magnetic substances with examples, Electro-magnets and permanent magnets.

14. Electromagnetic Induction and Alternating Current

Electromagnetic induction, Faraday's laws, Induced emf and current, Lenz's law, Eddy currents, self and mutual inductances.

Alternating current, peak and rms values of alternating current/voltage, reactance and impedance. LCR oscillations, LCR series circuit (Phasor diagram) - Resonant circuits and Q-factor; Power in AC circuits, wattless current.

AC generator and Transformer.

15. Electromagnetic Waves

Electromagnetic waves and their characteristics (qualitative ideas only); Transverse nature of electromagnetic waves.

Electromagnetic spectrum (Radio, microwaves, infra-red, optical, ultraviolet, X-rays, gamma rays including elementary facts about their uses; Propagation of electromagnetic waves in atmosphere

16. Optics

Refraction of light, total internal reflection and its applications, spherical lenses, thin lens formula lens maker's formula; Magnification, Power of a lens, combination of thin lenses in contact Refraction and dispersion of light due to a prism, Scattering of light - Blue colour of the sky and reddish appearance of the sun at sun-rise and sun-set.

Optical instruments -Compound microscope, astronomical telescope (refraction and reflection type) and their magnifying powers.

Wave front and Huygen's principles; Reflection and refraction of plane wave at a plane surface using wave fronts (qualitative idea); Interference -Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light; Diffraction-diffraction due to a single slit, width of central maximum, difference between interference and diffraction; Resolving power of microscope and telescope; Polarisation, Plane polarised light, Brewster's law; Use of plane polarised light and polaroids.

17. Dual Nature of Matter and Radiations

Photo-electric effect, Einstein Photo-electric equation -particle nature of light, photo-cell, Matte waves -wave nature of particles, de-Broglie relation, Davison and Germer experiment.

18. Atomic Nucleus

Alpha-particle scattering experiment, size of the nucleus, composition of the nucleus-protons and neutrons. Nuclear instability -Radioactivity - Alpha, Beta and Gamma particles / rays and their properties, radioactive decay law, simple explanation of α - decay, β -decay and γ - decay. Mass. energy relation, mass defect, Binding Energy per nucleon, its variation with mass number, Nature of nuclear forces, nuclear reaction -Nuclear fission and Nuclear fusion.

19. Solids and Semi-Conductor Devices

Energy bands in solids/(qualitative ideas only), difference between metals, insulators and semiconductors using band theory; Intrinsic and extrinsic semi-conductors, p-n junction, Semiconductor diode-characteristics under forward and reverse bias conditions, diode as a rectifier, solar cell, photo-diode, LED, zener diode as a voltage regulator; Junction transistor, transistor action, characteristics of a transistor; Transistor as an amplifier (common emitter configuration) and oscillator; Logic gates (OR, AND, NOT, NAND and NOR); Elementary ideas about IC.

20. Principles of Communication

Elementary idea of analog and digital communication; Need for modulation; Modulation-amplitude, frequency and pulse modulations; Elementary idea about demodUlation, Data transmission and retrieval -Fax and Modem. Space Communication: Propagation of E-M. waves in atmosphere. Sky and space wave propagation. Satellite communication. Applications in Remote Sensing.

Line Communication: 2-wire lines, cables, telephone links; optical communication (optical fiber, Lasers), elementary principle of light modulation.

SYLLABUS FOR CEE - 2009 EXAMINATION
CHEMISTRY

1. Some Basic Concepts of Chemistry

Importance of studying Chemistry, physical quantities and their SI units, dimensional analysis Precision and significant figures, classification of matter, laws of chemical combination, Dalton's Atomic Theory, mole concept, atomic, molecular and molar masses. Percentage composltior and molecular formula stoichiometry of chemical reactions.

2. States of Matter

States of matter, Gaseous state - measurable properties, the gas law, Ideal gas equation - kinetic molecular theory, deviation of real gases from ideal behaviour; liquefaction of gases, critica temperature and its importance. Liquid state -properties of liquids, qualitative description of vapour pressure, surface tension, viscosity; Solid state -Classification of solids based on different binding forces.

3. Atomic Structure and Chemical bonding

Fundamental particles, Rutherford's model of an atom, nature of electromagnetic radiation, emission spectrum of hydrogen atom, concept of energy levels (orbits), weaknesses of Bohr's model, modern concept of structure of atom (elementary idea only), idea of shells, subshells and orbitals, the four quantum numbers, electronic configurations of elements, Aufbau principle (Pauli's exclusion principle and Hund's rule).

Dual nature of matter and radiation, de-Broglie relation, Uncertainty Principle, Wave-mechanica treatment of hydrogen atom (elementary), Wave functions and quantum numbers, Atomic orbitals and their shapes, Spin Quantum Number, electronic configuration and atoms, Molecularorbital method (homonuclear diatomic molecules only), Concept of bond order, Metallic bond, (simple qualitative treatment w.r.t. bond theory), Hybridisation involving s.p. and d-orbitals, Intermolecular forces.

4. Classification of Elements and Periodicity in Properties

The need for classification; the significance of (i) Mendeleev's periodic law, (ii) Atomic number and periodic law, present form of the periodic table, The IUPAC nomenclature for the elements with Z > 100, electronic configuration of the elements and periodic table, types of elements: s, p, d and f blocks, periodic trends in properties; ionization energy, electron affinrty, atomic radii, valency.

5. Thermodynamics and Chemical Energetics

Some basic concepts -systems surroundings, types of system, types of processes, intensive and extensive properties, state functions, irreversible process. Zeroth law, Fist Law of Thermodynamics -internal energy, enthalpy, work heat capacity, specific heat capacity, molar heat capacity, enthalpy changes during phase transitions, Enthalpy change in chemical reactions -standard enthalpy of formation, Hess's law of constant heat summation, bond enthalpy, measurement of enthalpy of reactions, energy of combustion reactions, sources of energy - Sun as primary source of energy, Alternative sources of energy.

Second Law of Thermodynamics, Entropy (criterion of spontaneous and non-spontaneous processes), Gibb's free energy (criterion for spontaneity of a process), Standard entropies and free energy of formation, Free energy change and Chemical Equilibrium, Free energy change and non-mechanical work, Third Law of Thermodynamics.

6. Chemical Kinetics

Average and instantaneous rate of a reaction, rate expression and order of a reaction, Integrated rate expressions of zero and first order reactions and their derivations, half life period, determination of rate constant lorder of reaction (graphical method and Ostwald Isolation method only), Temperature dependence of rate constant -Arrhenius equation, activation energy, Mechanism of reaction - elementary and complex reactions, reactions involving 2-3 steps only.

7. The Solid State

Space lattice, unit cells, cubic crystal system, Close packing in crystals, X-ray studies of crystals. Structure of simple ionic compounds (AB and AB_2 type only), Imperfection in solids, Properties of solids, (electrical, magnetic and dielectric), Amorphous solids (elementary idea only).

8. Chemical Bonding and Molecular Structure

Kossel- Lewis approach to bonding, ionic bond -lattice energy, Born -Haber Cycle, covalent bond - Lewis structure of covalent bond, resonance structures, geometry of molecules, VSEPR model, Polarity of bond, Electronegativity, Valence Bond approach, concept of resonance, Directional properties of bond, hybridization (Qualitative treatment sp, Sp^2, Sp^3).

9. Equilibrium- I - Equilibrium processes and phase equilibria

Dynamic nature of eqUilibrium, EqUilibrium in physical processes, Equilibrium in chemical processes, Law of chemical equilibrium, derivation of relationship between Kp and Kc, Le Chatelier's principle.

10. Equilibrium- II - Ionic Equilibrium in Solutions

Equilibria involving ions, various concepts of acids and bases - Arrhenius, Bronsted Lowery and Lewis, dissociation of acids and bases, acid-base equilibria, ionization of water, pH scale, hydrolysis of salts, pH calculation of salt solutions, acid-base titration using indicator. Solubility Equilibria solubility of sparingly soluble salts, solubility equilibrium and solubility product, common ion effect, elementary idea of buffer solutions.

11. Solutions

Solutions Units of concentration, solubility of gases, Solubility of solids, vapour pressure of a solution, Colligative properties (Relative lowering of vapour pressure, elevation of boiling point, depression in freezing point, osmotic pressure), Determination of molecular mass, Abnormal molecular mass.

12. Electrochemistry

Electrolytic and Galvanic cells, Electrolysis and laws of electrolysis, Electrolytic conductionconductance, conductivity, molar conductivity, Kolhrausch's law and its application, Galvanic Cells- electrode potential, electromotive force, Nernst's equations, electrode potential and electrolysis, Primary and secondary cells including fuel cells, Corrosion and its Prevention, Commercial production of chemicals -examples only, manufacture of NaOH, Na, AI, CI_2, and F_2.

13. Redox Reactions

Oxidation and Reduction -electron transfer concept, redox reactions in aqueous solution, oxidation number, balancing of chemical equations in redox reactions by oxidation number method and ionelectron method or half equation method, simple idea of electrode potential, standard electrode potential, stoichiometry of redox reactions in solutions.

14. Surface Chemistry

Adsorption - physical and chemical adsorption, Factors affecting adsorption -effect of pressure (Freundlich and Langmuir Isotherm) and effect of temperature (qualitative only), Catalysis enzymes, zeolites, Colloids -distinction between true solution, colloids and suspensions, classification based on dispersion medium and dispersed phase. Types of Colloids -Lyophilic and lyophobic, multimolecular, macromolecular and associated colloids (micelles), Methods of preparation of colloids and their properties, Emulsions -Types of emulsions oil/water and water/oil emulsifiers.

15. Principles and Processes of extraction of Elements

Modes of occurrence, chemical principles underlying -concentration of ores, reduction/oxidation (electronation/ de-electronation), refining of metals.

16. Hydrogen

Unique position in Periodic Table, occurrence, isotopes, dihydrogen -preparation (including commercial preparation), properties, reactions and uses, Hydrides -molecular, saline and interstitial Water: structure and aggregation of water molecules, physical and chemical properties, hard and soft water, water softner, heavy water, hydrogen peroxide, hydrogen economy, use of liquid hydrogen as a fuel.

17. s-Block elements

General introduction to s-block elements -abundance, occurrences, anomalous properties of the first elements in each group, diagonal relationship. **Alkali metals** -occurrence, electronic configuration,

trend in atomic and physical properties (including IE, atomic and ionic radii), reactivity and electrode potential, reactions with oxygen, hydrogen, halogens and liquid ammonia. Basic nature of oxides and hydroxides, halides, Li and Na -occurrence, extraction, properties and uses, Na_2Co_3. **The Alkaline Earth Metals** -occurrence, electronic configuration, trends in atomic and physical properties (including IE, atomic and ionic radii), Reactivity and electrode potential, reactions with non-metals, oxides hydroxides and halides. Solubility and thermal stability of their oxo salts. Magnesium- occurrence, extraction, properties and uses. Compounds of alkaline earth metals CaO, $Ca(OH)_2$, Plaster of Paris and $MgS0_4$, industrial uses of lime and limestone, cement.

18. Somep-Block elements

Boron - occurrence, isolation, physical and chemical properties borax, boric acid, boron hydrides, halides (elementary idea of boranes, diborane, borates). Uses of boron and its compounds.

Carbon -terrestrial abundance and distribution, allotropes (graphite, diamond, elementary idea of fullerences). Atomic and physical properties, chemical properties, oxides, carbides, halides, sulphides, uses of carbon. Nitrogen - terrestrial abundance and distribution, dinitrogen -isolation, atomic and physical properties, chemical reactivity, fixation of nitrogen -industrial and biological.

Ammonia- industrial preparation, Haber's process only, important properties and reactions. Oxides of nitrogen -preparation, structure (skeletal only) $-P_p-P_p$ bonding. Nitric acid, industrial p p production (Ostwald process). Uses of nitrogen and its compounds.

Oxygen -terrestrial abundance and distribution; dioxygen, isolation, atomic and physical properties, chemical reactivity, oxides, acidic, basic and amphoteric.

19. P-Block Elements

Group 13 Elements: Introduction, occurrence and uses, Atomic and physical properties, Oxidation state, trends in chemical reactivity, Aluminium: Extraction from bauxite, reaction of AI with acid and alkali.

Group 14 Elements: Introduction, occurrence and uses, Atomic and physical properties, Oxidation State, Trends in Chemical Reactivity, Forms of silica: uses and structure, Silicates (preliminary treatment), Silicones: Structures and, uses, Tin and Lead: extraction, halides and oxides (Preparation, properties and uses).

Group 15 Elements: Introduction, occurrence and uses, Atomic and physical properties, oxidation states, trends in, chemical reactivity, hydrides, oxides and halides, Phosphorus Production allotropes. Phosphine: preparation, structure, PCI_3, PCl_5' P_4O_5'.P_4O_{10} and oxoacids of Phosphorus (structure only).

Group 16 Elements: General-introduction, occurrence and uses, Atomic and physical properties, oxidation states, trends in chemical reactivity of the elements. Some important compounds: oxides-oxoacids, hydrides and halides (structure and properties), Sulphur -production, allotropes, oxides, sulphuric acid -manufacture and uses.

Group 17 Elements: General introduction, occurrence and uses, Atomic and physical properties, oxidation states, trends in chemical reactivity of the element and compounds. Hydrides, oxides and oxoacids of chlorine. Bleaching powder -preparation and properties, Interhalogen compounds (types, formulae and shapes (Ax, AX_2, AX_3, AX_4).

Group 18 Elements: introduction. Isolation and uses, Atomic and physical properties. Compounds of xenon -xenon fluorides. oxides and oxoacids (preparation, structure reaction with water).

20. d and f -Block Elements

d-block elements: Electronic configuration and characteristics of the transition elements, General trends in the chemistry of firc.t row transition elements (metallic character, IE, electrode potential, oxidation state, ionic radii, catalytic properties, coloured ions, complex formation, magnetic properties, interstitial compounds, alloy formation).

Occurrence and principles of extraction: Iron, copper, silver, zinc and mercury. Steel and some important alloys.

Compounds: preparation, properties of $CuSO_4$, $AgNO_3$, silver and mercury halides, $K_2Cr_2O_7$ and $KMnO_4$. Photography (Chemistry of developing, fixing and printing).

f-block elements: Lanthanides -Introduction, oxidation state -Chemical reactivity, Lanthanide contraction, Uses.

Actinides- Introduction, Electronic configuration, brief comparison with lanthanides.

21. Coordination Compounds and Organometallics

Coordination Compounds -introduction, legends and coordination number. IUPAC formulation and nomenclature of mono-nuclear coordination compounds. Isomerism inclUding stereoisomerisms.

Bonding -V.B. Approach, shapes, colour, magnetic properties, crystal field theory (qualitative idea only). Idea of stability of coordination compounds (a brief idea of stability constant of coordination compounds). Importance of coordination compounds in qualitative analysis, extraction of meta1s and biological systems (chlorophyll, Vitamin B_{12}, and haemoglobin).

22. Nuclear Chemistry

Natural and artificial radioactivity, nuclear reactions, artificial transmutation of elements, Newclear energy - nuclear fission and fusion, nuclear reactors, Radioactive isotopes and their uses, half-life period, radiochemical dating; Synthetic elements including transactinides (elementary idea only).

23. Organic Chemistry -Some Basic Principles

Tetravalency of carbon, hybridization, (p and s) bonds, shapes of simple molecules, functional groups:

C = C, - C = C - and functional groups containing halogen, oxygen, nitrogen and sulphur, homologous series, isomerism (structural).

General introduction to naming organic compounds -trival names and IUPAC nomenclature, Illustration with simple examples.

Electronic displacement in a covalent bond; inductive effect, electrometric effect, resonance and hyperconjugation. Fission of a covalent bond; free radicals, electrophiles, nucleophiles, carbocations and carbanions. Common types of organic reactions: substitution, addition, elimination and rearrangement reactions, Illustrations with examples.

24. Hydrocarbons

Classification of hydrocarbons, alkanes and cycloalkanes. Nomenclature, conformations of alkanes and cycloalkanes (ethane, propane, butane and cyclothexane), 3D structures and 20 projections (Sawhorse and Newmann).

Alkenes and alkynes -nomenclature, geometrical isomerism in alkenes, stability of alkenes, general methods of preparation, physical properties, chemical reactions -reactivity, mechanism of electrophilic addition, reactions in alkenes, Markownikoff's rule, peroxide effect, acidic character of alkynes, polymerization reactions -dienes, concept of delocalisation of electrons, addition reactions in dienes (1, 2 and 1, 4 addition).

Aromatic hydrocarbons -Benzene and its homologues, isomerism, nomenclature, sources of aromatic hydrocarbons (coal and petroleum), structure of benzene, resonance, delocalisation, concept of aromaticity -an elementary idea. Chemical reactions of benzene -mechanism of electrophilic substitution reaction. Directive influence of substitutents and their effect on reactivity, poly-nuclear hydrocarbons and their toxicity.

Petroleum and petrochemicals -Composition of crude oil, fractionation, uses of different fractions, quality of gasoline, LPG and CNG. Cracking and reforming, petro-chemicals.

25. Purification and Characterisation of Carbon Compounds

Purification of carbon compounds, filtration, crystalisation, sublimation, distillation, differential extraction, chromatography.

Qualitative analysis, detection of nitrogen, sulphur, phosphorus and halogens.

Quantitative Analysis -estimation of carbon, hydrogen, nitrogen, halogen, sulphur and phosphorus (basic principles only).

Determination of molecular mass -silver salt method, chloroplatinate salt method, use of mass spectrometer for determining accurate molecular mass (elementary idea only), Calculations of empirical and molecular formulae.

26. Organic Compounds with Functional Group Containing Halogens (Haloalkanes and Haloarenes)

Nature of C-X bond in haloalkanes and haloaranes, nomenclature, physical properties, chemical reactions with emphasis on mechanism of substitution reactions, difference in reactivity of C-X bond in haloalkanes and haloarenes.

Some commercially important compounds -names and structures of some compounds with simple structures and their uses.

27. Organic Compounds with Functional Groups Containing Oxygen-I (Alcohols, Phenols and Ethers)

Alcohols and Phenols: Electronic structure of functional groups, nomenclature, important methods of preparation, physical properties, chemical reactions -mechanism of dehydration of alcohols, acidity of phenols, reactivity of phenols in electrophilic substitution.

Ethers: Electronic structure of functional group, nomenclature, important methods of preparation, physical and chemical properties.

Some commercially important compounds.

28. Organic Compounds with Functional Groups containing Oxygen-II Aldehydes, Ketones, Carboxylic acids and their derivatives

Aldehydes and Ketones: Electronic structure of carbonyl group, nomenclature, important methods of preparation, physical properties, chemical reactions -reactivity of aldehydic and ketonic groups acidity of oc-hydrogen, aldol condensation, cross aldol condensation, Cannizzarro reaction, Mechanism of nucleophilic addition reaction to C = O group.

Carboxylic Acids: Electronic structure of -COGH, nomenclature, important methods of preparation, Physical properties and effect of substituents on a carbon on acid strength, Chemical reactions - mechanism of estherification.

Derivatives of Carboxylic Acids: Electronic structure of acid chloride, acid anhydride, ester and amide groups, nomenclature, important methods of preparation, comparative reactivity of acid derivatives.

Some commercially important compounds.

29. Organic Compounds with Functional Group Containing Nitrogen (Nitro, Amino, Cyano and Diazo Compounds)

Nitro Compounds: Electronic Structure of NO_2 group, nomenclature, important method of preparation, physical properties, Chemical reactions.

Amines : Structure of amino groups (Primary, Secondary and Tertiary), nomenclature, important methods of preparation, physical properties -basic character of amines, Chemical reactions separation of primary, secondary and tertiary amines.

Cyanides and Isocyanides : Structures of cyanide and isocyanide groups, nomenclature, preparation, physical properties and chemical reactions.

Diazonium Salts: Preparation and chemical reactions of benzene diazonium" chloride, importance of diazonium salts in synthetic organic chemistry.

Some commercially important compounds.

30. Stereo Chemistry

Introduction of isomerism and recapitulation of geometrical isomerism and conformations, optical activity -discovery, determination using a polarimeter, specific rotation, chirality - chiral objects, chiral molecules, configuration and Fischer projections, asymmetric carbon, elements of symmetry, compounds containing one chiral centre, enantiomers, D-L and A-S nomencrature, racemic forms, racemisation. Compounds containing two chiral centres, diastereoisomers, mesoform, resolution, importance of stereochemistry.

31. Polymers

Classification of polymers, Genera: methods of polymerization - Addition and condensation: addition-free radical, cationic and anionic polymerization, Copolymeriation, natural rubber, vulcanization of rubber, synthetic rubbers.

Condensation polymers, Molecular mass of polymers (highlighting level of complexity only), Biopolymers and biodegradable polymers.

Some commercially important polymers.

32. Biomolecules

The cell, energy cycle.

Carbohydrates: Classification, monosaccharides, Structures of pentoses and hexoses, anomeric carbon, mutarotation, simple chemical reactions of glucose, Disaccharides :

reducing and non-reducing sugars,! -sucrose, maltose and lactose, Polysaccharides; Elementary idea of structures of starch and cellulose.

Proteins: a-amino acids: peptide bond, polypeptides, primary structure of proteins, Simple Idea of secondary and tertiary structures of proteins, Denaturation 01 proteins and enzymes.

Nucleic Acids: Types of nucleic acids, primary bllilding biocks of nucleic acids (chemica, composition -DNA and RNA), primary structure of DNA and its double helix. Replication, transcription and Protein synthesis, Genetic Code.

Lipids: Classification, structure, functions in biosystems.

Hormones: Classification, structural features and functions in biosystems. Vitamins: Classification, functions of vitamins in biosystems.

33. Chemistry in Everyday Life

Chemical in medicine and health-care -Analgesics, Tranquimsers, antiseptics, disinfectants, anti-microbials, anti-fertility drugs, antihistamines, antibiotics, antacids.

Dyes -classification with examples -Indigo, methyl orange, aniline yellow, alizarin, malachite green.

Chemicals in cosmetics (creams, perfumes, talcum powder, deodorants). Advanced materials - carbon fibres, ceramics, micro alloys.

Chemicals in food -preservatives, artificial sweetening agents, antioxidants, and edible colours. Detergents -classification, some important examples.

Insect repellants - Pheromones, sex attractants. **Rocket Propellants** -characteristics, chemicals used.

34. Environmental Chemistry

SYLLABUS FOR CEE-2009 EXAMINATION
MATHEMATICS

1. Sets

Sets and their representations, Finite and infinite sets, Empty set, Equal sets, Subsets, Power set, Universal set, Venn diagrams, Complements of a set, Operations on sets (union, intersection and difference of two sets), Applications of sets.

2. Relations and Functions

Ordered pairs, Cartesian product of sets! Relations, domain, co-domain and range, Functions into and onto functions, one-one into and one-one onto functions, Constant function, Identity function, Composition of functions, Invertible functions, Binary operations.

3. Mathematical Induction

The principle of mathematical induction, Simple applications.

4. Logarithms

Meaning of logarithm of a number of a given base a, a>O, a = 1, Laws of logarithms including change of base! Common logarithm (Base 10), Characteristic and mantissa, Antilogarithms, Logarithmic tables, Application of logarithms to problems of compound interest, growth and decay (depreciation) .

5. Complex Numbers

Complex numbers of the form a+ ib, Real and imaginary parts of a complex number, Complex conjugate, Argand diagram, Representation of a complex number by a point in a plane, Modulus and argument of a complex number. Algebra of complex numbers, Triangle inequality:

IZ, + $Z_2$1 ~ IZ,I + IZ_2I and also

IZ_1 ,$Z_2$1 = IZ,I.I$Z_2$1, Polar representation of a complex number, Square root of a complex number, Cube roots of unity.

6. Linear Inequations

Solution of a linear inequation in one variable and its graphical representation, Solution of system of linear inequations in one variable, Graphical solutions of linear inequations in two variables, Solution of system of linear inequations in two variables.

7. Quadratic Equations

Solution of a quadratic equation in the complx number system by (i) Factorization! (ii) Using formula, Relation between roots and coefficients! Nature of roots, Formation of quadratic equations with given roots, Symmetric functions of roots, Equations reducible to quadratic forms.

8. Sequences and Series

Sequence and examples of finite and infinite sequences, Arithmetic progression (A.P) -first term, common difference and nth term. Sum to n terms of an A.P Arithmetic mean (A.M.)! insertion of arithmetic means between any two given numbers,. Geometric progression (GP), first term, common

ratio and nth term, Sum of n terms and infinite number of terms of a GP, Recurring demical numbers as geometric series, Geometric mean (GM.), insertion of Geometric means between any two given numbers. Harmonic Progression, Harmonic Mean (H.M.), relationship among A.M., G.M. and H.M., Arithmetic - geometric series, sum to n terms and sum of infinite arithmeticgeometric series, Special series: $\sum n$, $\sum n^2$, $\sum n^3$, Sum of series using above special series.

9. Matrices and Determinants

Concept of a matrix, types of matrices, Equality of matrices (only real entries may be considered). Operations of addition, scalar multiplication and multiplication of matrices. Statements of important results on operations of matrices and their verification by numerical problems only. Determinant of a square matrix, Properties of determinants. Minors and cofactors. Applications of determinants in (i) finding area of a triangle, (ii) solving a system of linear equations, Transpose, adjoint and inverse of a matrix, Consistency and inconsistency of system of linear equations, Solving system of linear equations, in two or three variables using inverse of a matrix.

10. Functions, Limits and Continuity

Concept of a real function, its domain and range, Types of functions and their graphs, Limit of a function, meaning and related notations. Left and right hand limits.

Fundamental theorems on limits (statement only), Proof of the standard limits:

$$\lim_{x\to a} \frac{x^n-a^n}{x-a} \; na^{n-1} \; (a > 0) \qquad \lim_{x\to a} \frac{\sin x}{x} = 1$$

Limits at infinity and infinite limits, Continuity of a function (i) at a point, (ii) over an open/closed intervals, Sum, product and quotient of continuous functions. Continuity of special functionspolynomial, trigonometric, exponential, logarithmic, inverse trigonometric functions.

11. Trigonometry

Degree measure and radian measure of positive and negative angle, relation between degree and radian, Definition of trigonometric functions with the help of a unit circle, Periodic functions, concept of periodicity of Trigonometric functions, Values of trigonometric functions of x for x=0, $\pi/6$, $\pi/4$, $\pi/3$, $\pi/2$, $3\pi/2$, Trigonometric functions of sum of difference of humers :

$\sin (x \pm y) = \sin x \cos y \pm \cos x \sin y$;

$\cos (x \pm y) = \sin x \cos y \cos x \sin y$;

$$\tan (x \pm y) \quad \frac{\tan x \pm \tan y}{1 \pm \tan x \tan v}$$

$\sin (2\pi \pm y) = \pm \sin x$, $\cos (2\pi \pm x) = \cos (-x) = x$.

$\sin (-x) = - \sin x$, $\cos \left\{ \frac{\pi}{2x} \mp x \right\} = \sin x$,

$\sin \left\{ \frac{\pi}{2x} \mp x \right\} = \cos x$, $\cos (\pi \pm x)$,

$\sin (\pi \mp x) = \sin \pm x$,

Trigonometric functions of multiples and submitiples of numbers, sip 2x = 2sinx cosx,

cos 2x = 1 - 2 $\sin^2 x$ = 2$\cos^2 x$ - 1 = $\cos^2 x$ - $\sin^2 x$,

sin 3 x 3 sin x - 4 $\sin^3 x$, $\cos^3 x$ = 4$\cos^3 x$ - 3cos x,

$$\tan 3x = \frac{3 \tan x - \tan^3 x}{1 - 3 \tan^2 x}$$

$$\sin x + \sin y = 2\sin \frac{x + y}{2} \cos \frac{x - y}{2}$$

$$\sin x + \cos y = 2\cos \frac{x + y}{2} \cos \frac{x - y}{2}$$

$$\sin x - \sin y = 2\cos \frac{x + y}{2} \sin \frac{x - y}{2}$$

$$\sin x - \sin y = 2\sin \frac{x + y}{2} \sin \frac{x - y}{2}$$

Conditional Identitien for the angles of a triangle, graph of the following trigonometric functions :

y = sin x, y = cos x, y = tan x, y = a sin x, y = a cos x, y = a sin bx, y = a cos bx

Solution of Trigonometric equations of the type $\sin\theta = \sin\alpha$, $\cos\theta = \cos\alpha$, $\tan\theta = \tan\alpha$, and equations reducible to these forms, Solution of triangles : Proof and applications of the following formulae :

(i) $$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

(ii) $$\cos A = \frac{b^2 + c^2 - a^2}{2bc}, \text{ etc.}$$

(iii) a = b cosC + c cosB, etc.

(iv) $$\sin A/2 = \sqrt{\frac{(s-c)(s-b)}{bc}}, \text{ etc.}$$

(v) $$\cos A/2 = \sqrt{\frac{s(s-a)}{bc}}, \text{ etc.}$$

(vi) $\Delta = (1/2)$ b c sin A, etc.

Problems on heights and distance, Concept of inverst trigonometric functions and their use to reduce expressions to simplest forms.

(i) $\sin^{-1}$ (sin x) = x and other similar formulae.

(ii) $\sin^{-1}$ (1/x) = -cosec-1 x and other similar formulae.

(iii) $\sin^{-1}$ (-x) = -sin-1x, $\tan^{-1}$ (-x) = -$\tan^{-1}$x
cosec^{-1} (-x) = -cosec^{-1}x, $\cos^{-1}$ (-x) π-$\cos^{-1}$x.
$\sec^{-1}$ (-x) = π - $\sec^{-1}$x, cot-1 (-x) = π - $\cot^{-1}$x

(iv) $\sin^{-1}x + \cos^{-1}x = \pi/2$, $\tan^{-1}x + \cot^{-1} x=\pi/2$,

$\text{cosec}^{-1}x + \sec^{-1}x = \pi/2$

(v) $\tan^{-1}x + \tan^{-1} y = \tan^{-1} \left(\frac{x + y}{1 - xy}\right)$ $xy<1$

(vi) $\tan^{-1}x - \tan^{-1}y = \tan^{-1} \left(\frac{x - y}{1 - xy}\right)$ $xy>-1$

(vii) $2\tan^{-1}x = \sin^{-1} \frac{2x}{1+x^2} = \cos^{-1} \left(\frac{1-x^2}{1+x^2}\right) = \tan^{-1} \frac{2x}{1-x^2}$, $|x|<1$

Applications.

12. Cartesian System of Rectangular Coordinates

Recall of Cartesian system of coordinates in a plane. Distance formula, Section formula, centroid and incentre, Area of a triangle, condition for the collinearity of three points in a plane. Slope of a line, parallel and perpendicular lines, Intercepts of a line on the coordinate axes, Locus and its equation.

13. Straight Line and Family of Straight Lines

Various forms of equations of a line - Parallel to axes, Slope Intercept form, one point slope form. Symmetric form, parametric equations of a line, Two point form, Intercept form, Normal form, General form, Intersection of lines, Equations of bisectors of angle between two lines. Angle between two lines, condition for concurrency of three lines. Distance of a point from a line, Equations of family of lines through the intersection of two lines, Translation of axes.

14. Circles

Standard form of the equation of a circle, General form of the equation of a circle, its radius and centre, Equation of the circle in the parametric form, Equation of a circle when the end points of a diameter are given, Points of intersection of a line and a circle with centre at the origin, Condition for a line to be tangent to the given circle, Equation of a tangent to a circle and length of the tangent.

15. Conic Sections

Sections of a cone, Equations of conic sections (Parabola, Ellipse and Hyperbola) in standard form, Applications.

16. Permutations and Combinations

Fundamental principle of counting, The factorial notation, Permutation as an arrangement, meaning of P (n,r,) Combination, meaning of C(n,r), Applications of permutations and combinations.

17. Binomial Theorem

Statement of Binomial Theorem, Proof of Binomial theorem for positive integral exponent using principle of mathematical induction and also by combinatorial method, General and middle terms in binomial expansions, Properties of Binomial coefficients, Binomial theorem for any index (without proof), Application of Binomial theorem.

18. Exponential and Logarithmic Series

Concept of 'e' as the sum of an infinite series, proof of $2 < e < 3$, Exponential function (e^x) as the infinite series, $a + \frac{x}{1!} + \frac{x^2}{2!} + \ldots$ and its graph

Logarithmic function (log x) and its graph. The infinite series for $\log_e (1 + x)$, $\log_e (1-x)$.

19. Mathematical Logic

Statements, Use of Venn diagrams in logic, Negation operation, Basic logical connectives and compound statements including their negations. Truth tables, Tautology, duality, Algebra of statements, Applications of logic in solving simple problems.

20. Boolean Algebra

Boolean algebra as an algebraic structure, Principle of duality, Boolean function, Conditional and bioconditional statements, Valid arguments, Switching circuits, Application of Boolean algebra to switching circuits.

21. Statistics

Mean deviation for undergrouped data, Variation for grouped and ungrouped data, Standard deviatiol1. Introduction, basic concepts and basic laws of mechanics, force, resultant of forces acting a point, parallelogram law of forces, resolved parts of a force, Equilibrium of a particle under three concurrent forces, triangle law of forces and its converse, Lami's theorem and its converse. Two parallel forces, like and unlike parallel forces, couple and its moment.

22. Probability

Random experiments and sample space, events as subsets of sample space, occurrence of an event, sure and impossible events, exhaustive events, algebra of events, meaning of equally likely outcomes, Probability of an event, theorem on probability, addition rule, multiplication rule, independent experiments and independent events [finding P (A or B), P (A and B)), Random variables, Probability distribution of a random varible.

Conditional probability, Baye's theorem and its applications, Recall of concept of random variables and its probability distribution, Mean and variance of random variables, Binomial and Poisson's distributions, their mean, variance and applications, Applications of these distributions in commerce and industry.

23. Differentiation

Derivative of a function, its geometrical and physical significance, Relationship between continuity and differentiability. Derivative of some simple functions from first principle, Derivative of sum, difference, product and quotient of functions, Derivative of polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions. Logarithmic differentiation. Derivative of functions expressed in parametric form, chain rule and differentiation by substitution. Derivatives of second order.

24. Application of Derivatives

Rates of change of quantities, Tangents and normals, increasing and decreasing functions and sign of the derivatives. Maxima and minima, greatest and least values, Rolle's theorem and Mean Value theorem (without proof). Approximation by differentials. Curve tracing of simple curves.

25. Indefinite Integrals

Integration as inverse of differentiation. Properties of integrals. Integration by substitution. Partial fractions and their use in integrating rational functions, Integral of the type:

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{a^2 \pm x^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 \pm x^2}}$$

$$\int \frac{dx}{ax^2 + bx + c}, \int \frac{(px+q)dx}{ax^2 + bx + c}$$

$$\int \frac{dx}{\sqrt{ax^2 + bx + c}}, \int \frac{(px+q)dx}{\sqrt{ax^2 + bx + c}}$$

Integration by parts, Integral of the types :

$\int e^{ax} \sin bx \, dx$, $\int \sqrt{x^2 \pm a^2}dx, \int \sqrt{a^2 - x^2}dx$

$\int \sqrt{ax^2 + bx + c} \, dx$, $\int (px + q) \sqrt{ax^2 + bx + c} \, dx$ etc.

$$\int \frac{dx}{a + b\cos x}, \int \frac{dx}{a + b\sin x}, \int \sin^{-1} x \, dx \text{ etc.}$$

26. Defenite Integrats

Definite integral as limit of a sum, Fundamental theorems of integral calculus (without proof), Evaluation of definite integrals by : (i) substitution, (ii) Using properties of definite integrals :

definite integrals by : (i) substitution, (ii) using properties of definite integrals :

$$\int_a^b f(x)dx = -\int_b^a f(x)dx$$

$$\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx \text{, } a \le c \le b$$

$$\int_a^b f(x)dx = \int_a^b f(a+b-x)dx$$

$$\int_0^{2a} f(x)dx = \int_0^a f(x)dx + \int_0^a f(2a-x)dx$$

$$\int_0^{2a} f(x)dx = 2\int_b^a f(x) \text{, if f (2a – x) = f(x)}$$

$$\int_0^{2a} f(x)dx = 0 \text{, if f (2a - x) = –f (x).}$$

$$\int_{-a}^a f(x)dx = 2\int_a^a \text{f(x) dx if f (x) is even function and}$$

= 0 if f(x) is odd function of x

27. Differential Equations

Definition, order and degree, General and particular solution of a differential equation. Formation of differential equations whose general solultion is given, Solution of differential equations by method of separation of variables, Homogeneous differential equations of first order and their solutions. Solution of linear differential equation of the type :

$\frac{dy}{dx} + P(x)\ y = Q(x),$ where P(x), and Q(x) are functions of x, Solution of second order differential equations :

$\frac{d^2y}{dx^2} + = f(x)$

28. Three Dimensional Geometry

Coordinate axes and coordinate planes in three dimensional space, Coordinate of a point in space. Distance between two points, Section formula, Direction cosines and direction ratios of a line joining two points, Projection of the join of two points on a given line, Angle between two lines whose direction ratios are given.

Cartesian and vector equation of a line through (i) a point and parallel to a given vector, (ii) through two points. Collinearity of three points, Coplanar and skew lines, shortest distance between two lines, condition for the intersection of two lines. Cartesian and vector equation of a plane (i) when the normal vector and the distance of the plane from the origin is given. (ii) passing through a point and perpendicular to a given vector, (Hi) passing through a point and parallel to two given lines or through the intersection of two other planes, (iv) containing two lines, (v) passing through three points. Angle between (i) two lines, (H) two planes, (Hi) a line and a plane, Condition of coplanarity of two lines in vector and Cartesian form, length of perpendicular from a point on a plane by both vector and Cartesian methods, vector and Cartesian equations of a sphere, its centre and radius, diameter form of the equation of a sphere.

29. Vectors

Vectors and scalars, Magnitude and direction of a vector, Types of vectors - equal vectors, unit vector, zero vector, position vector of a point, localized and free vectors, parallel and collinear vectors, negative of a vector, Components of a vector, Addition of vectors, Multiplication of a vector by a scalar, Position vector of a point dividing a tine segment in a given ratio, Application of vectors in geometry.

Scalar (or dot) product of vectors, Projection of a vector on a line, Vector (or cross) product of two vectors. Application of dot and cross products in (i) finding areas. of triangle and parallelogram, (ii) problems of plane geometry and trigonometry, (iii) finding work done by a force, (iv) vector moment of a vector about a point, Scalar triple product and its applications, Moment of a vector about a line. Coplanarity of three vectors or four points using scalar triple product. Vector triple product.

30. Elementary Dynamics

Basic concepts displacement, speed and velocity, average speed, instantaneous speed, acceleration and retardation, resultant of two velocities, Motion of a particle along a line when moving with constant acceleration, motion of a particle under gravity, Projectile motion - the path of a projectile, its horizontal range, velocity at any instant, greatest height and time of flight

31. Linear Programming

Introduction, definition of related terminology such as constraints, objective function, optimization, isoprofit, isocostlines. Advantages of linear programming, Limitations of linear programming. Application areas of linear programming, Different types of linear programming (L.P.) Problems, Mathematical formulation of L.P. problems, Graphicai method of solution for problems in two variables, feasible and infeasible regions, feasible and infeasible solutions, optimum feasible solution.