VITMEE

VIT UNIVERSITY
(Estd. u s 3 of UGC Act 1956)
VELLORE ■ CHENNAI
www.vit.ac.in

VITMEE - 2014

(VIT Master's Entrance Examination)

VELLORE INSTITUTE OF TECHNOLOGY

Information Brochure

Admissions to M.Tech/MCA Degree Programmes 2014-2015

VIT- A place to learn; A chance to grow

VITMEE – 2014

(VIT Master's Entrance Examination)

Admission to MCA / M.TECH Programmes (2014 -15)

INFORMATION BROCHURE

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1. INTRODUCTION

VIT University is gaining tenacious prominence as reputed International Institute. The holistic model of education, conceived and enriched by its illustrious founder, **Dr. G.Viswanathan**, offers refreshingly new perspectives to young minds and facilitates the accomplishment of their creative talent. Its contribution in extending the frontiers of knowledge in critical areas as also in the regeneration of effloresce of the community values is well manifest through its alumni who form a great chain of distinguished personalities throughout the world, occupying key positions in varied professional domains.

VIT offers facilities that are exceptional in every way. The environmental friendly green campus is domicile to a wealth of well equipped modern laboratories, a state- of the- art library, smart class-rooms, computing facilities for a new digital generation, excellent placement and training services and much more, to provide a perfect ambience conducive for growth through learning.

The national ethos of the University is reflected in the richly diverse student and teaching community transcending regional, lingual, religious and even national boundaries. Foreign students from Africa, Asia, Australia, England, Europe, Middle East and the United States provide an international aroma to this great seat of learning.

VIT has long since been devoted to providing quality education in various Engineering disciplines of Science and Technology and of late proliferated into frontiers of Research as well. The MCA and M.Tech. programmes, meticulously planned, are regularly updated to prepare students to take up challenging jobs in the ever changing industrial scenario and to pursue extensive research work. The University strives at incorporating the latest technology in its academic curriculum, with an intention to evolve a new breed of Post Graduate Engineers endowed with both professional and application skills to bridge the gap between academia and industry.

2. PROGRAMMES OFFERED

PROGRAMMES [Vellore Campus]	PROGRAMMES [Chennai Campus]
Master of Computer Applications [MCA] – 2 years (4 semesters)	**Master of Computer Applications [MCA] – 2 years (4 semesters)**
M.Tech. Programmes – 2 years (4 semesters) Automotive Electronics Automotive Engineering Biomedical Engineering Biotechnology Communication Engineering Computer Aided Design/Computer Aided Manufacturing Computer Science and Engineering Control and Automation Embedded Systems Energy and Environmental Engineering Information Technology [Networking] Mechatronics Manufacturing Engineering Nanotechnology Power Electronics and Drives Sensor System Technology Software Technology Structural Engineering VLSI Design (Very Large Scale Integrated Circuits Design)	**M.Tech. Programmes – 2 years (4 semesters)** Computer Aided Design / Computer Aided Manufacturing Computer Science and Engineering Communication Engineering Computer Science Engineering with Specialization in Big Data Analytics Computer Science Engineering with Specialization in Cloud Computing Embedded Systems Mechatronics Power Electronics and Drives Structural Engineering VLSI Design (Very Large Scale Integrated Circuits Design)

3. COLLABORATIVE PROGRAMMES

VIT has signed MoUs with Foreign Universities / Indian Research Centres for faculty and student exchange in the following M.Tech. programmes:

Automotive Electronics	*TIFAC-CORE & Industries; UPAEP, Mexico; ESIGELEC Graduate School of Electrical Engineering, Rouen, France; UAS Esslingen, Germany; Kookmin University, Korea.*
Automotive Engineering	*Automotive Research Association of India (ARAI), Pune; University of Applied Science, Esslingen & Dresden, Germany; Concordia University, Montreal, Canada; UPAEP, PUEBLA, Mexico, French Institute for Advance Mechanics(IFMA), France, Kookmin University, Korea*
Bio-Medical Engineering	*University of Applied Sciences, Gelsenkirschen, Germany; University of Aberdeen, Scotland, UK; Chungnam National University, Korea; Cheju National University, Cheju, Korea; Strathclyde University, UK, ESIGELEC, France, Waterford Technical University (WTU), Ireland.*
Biotechnology	*University of Coimbra, Portugal; Universita 'Degli Studi Della Tuscia Di Viterbo, Viterbo, Italy; Chungnam National University, Korea; Cheju National University, Cheju, Korea; University of Sussex, UK; Staffordshire University, UK; Leibniz University of Hannover, Germany; University of Malaga, Spain; University of Maribor, Slovenia, laval University, Quebec, Canada*
Communication Engineering	*University of Applied Sciences, Darmsdadt, Germany, ISEP, France.*
CAD / CAM	*Technical University, Dresden, Germany; Queensland University of Technology, Australia*
Computer Science and Engineering	*TU, Dresden; Konkuk University, Seoul, Korea; Leibniz University Hannover, Germany; RMIT, Australia, University of Malaya, Malaysia; ANU, Australia.*
Energy and Environmental Engineering	*University of Applied Sciences, Aachen, Germany; Technical University, Eindhoven, Netherlands; Leibniz University Hannover, Germany; Deakin University, Australia.*
Information / Software Technology	*Hunan University, Changsha, China; University of Science & Technology, China; Kookmin University, Seoul, Korea; Leibniz University of Hannover, Hannover, Germany; University of Information Technology Management in Rzeszow, Poland, RMIT, Australia; EFREI, France; Deakin University, Australia; ISEP, France; EFREI, France.*
Mechatronics	*Purdue University, USA; Deakin University, Australia; University of Applied Science, Karlsruhe, Germany; Queensland University of Technology (QUT), Australia.*
Nanotechnology	*CINVESTAV, Mexico; Max Planck Institute for metals research, Stuttgart, Germany.*
Power Electronics and Drives	*University of Applied Sciences, Darmsdadt, Germany; University Paris-Sud 11, France.*
Sensor System Technology	*University of Applied Science, Karlsruhe, Germany; ISEP, France; NCTU, Taiwan.*

4. ELIGIBILITY

4.1.Nationality

The applicant for admission should be a Resident Indian National and should have graduated from Institutions located in India.

4.2. Eligibility Criteria

- Candidates should have graduated with a full-time degree from any recognized University with a minimum aggregate of 60% for MCA and 50% for M.Tech. degree programmes.
- Consistent Record in X and XII Std is required.
- Candidates appearing for their final degree exam / final semester exam in the current year are also eligible to apply.
- Candidates should have completed their final Semester/year exams before the selection interview at VIT University.
- It is compulsory for candidates who are selected to produce their final year marks' statement and Provisional degree certificate before **August 15th, 2014**, failing in this attempt will lead to the cancellation of the admission.

4.3. Academic Qualifications

For details of academic qualification, please see Page No. **10**

5. ADMISSION PROCEDURE

- Admission to both **MCA and M.Tech** programmes will be based on the Candidates performance in VITMEE conducted by VIT University**.**
- The names of short-listed candidates will be called for attending an interview who will be published in our website: **www.vit.ac.in.**
- Candidates selected to attend the interview will be informed of the date and time through the website and also through SMS if mobile number is provided.
- Candidates selected would have to pay a deposit of ₹**10,000** towards counselling fee. Counselling fee is Non-Refundable, but it will be adjusted in the tuition fees once the candidate joins the university.

- This amount should be paid by way of a Demand Draft drawn in favour of **"VIT University"**, payable at Vellore (only computerised DD alone will be accepted).
- Candidates who fail to pay the advance at the interview will not be considered for Admission.

5.1. General information

- There are few seats reserved for candidates sponsored by Research Organisations / Industries for the M.Tech. degree programmes.
- Sponsored candidates should submit their applications through the proper channel in a proforma given in Appendix-V.
- The candidates must sign the attendance sheet at the appropriate places.
- **The Admit Card should be preserved and produced for verification at the time of Interview / admission.**
- **Candidates are not eligible for admission in case there is violation of any instruction and adoption of any unfair means in the examination hall will make the candidate are not eligible for admission.**
- **Application Fee is Non Refundable.**

Placement Requirements

Industries offering Placement at VIT have stipulated a minimum of 60% marks for candidates in their undergraduate programmes and in class X and XII.

Maximum of 2 years of academic gap is permitted

5.2 Pattern of the Question Paper

- The computer based test (CBT) question Paper consists of 110 questions, with a maximum of 100 marks.
- NO negative marks for wrong answers.

6. APPLICATION FORMS

Candidates can apply through online at **www.vit.ac.in/vitmee**

Your application can be sent through either Registered Post or Speed Post.

6.1 Receipt of Completed Application Forms

Any application received after last date will not be considered.

Any delay in receiving the application by the candidate will not be considered as a valid reason for late submission after the last date. The Institute is not responsible for any postal delay, irregularity or loss in postal transit.

7. ADMIT CARD

- The Admit Card will be issued only to those candidates who have submitted their completed application forms in all aspects before the last date.

- Admit cards can be download from www.vit.ac.in/vitmee2014. Admit Card will not be faxed or sent by e-mail personally.

- The candidates must not mutilate the Admit card or alter any entry made therein after it has been authenticated and received by them.

- The Admit card is not transferable to any other person. Impersonation is a legally punishable offence.

- The Admit card will contain your name, registration number, photograph, your postal address, slot, date of examination and also the address of your test centre, test schedule and set of instructions for you to read carefully and prepare accordingly for the test.

- The candidate should carefully examine the Admit card once received. Any discrepancy as such should be immediately brought to the notice of the Director (PG Admissions).

- No candidate will be permitted to write the test without a valid Admit Card. The Admit Card should be presented to the invigilators for verification.

- The Admit Card is an important document. It should be preserved and produced at the time of Interview and Admission also.

8.INTERVIEW/COUNSELLING (will be held at Vellore & Chennai)

- The candidate should produce the admit card at the time of interview. Candidates will be short-listed for an interview on the basis of their performance in the Entrance Examination conducted by VIT University

- Selected candidates should pay an advance of ₹10,000/- towards counselling fee. Counselling fees is Non-Refundable, but it will be adjusted in the tuition fees once the candidate joins the University. (Computerised DD only accepted)

- This amount should be paid by means of Demand Draft drawn in favour of **"VIT University"**, payable at Vellore.

- The candidate's name will be removed from the admission list, if he / she fails to pay the advance at the time of the Interview.

8.1. Documents to be produced at the time of Interview

The Candidate shall produce the following documents in original for verification, along with one-set of photocopies while reporting for the Interview. Candidates will not be allowed to participate in the interview without these documents.

- Admit Card of the Entrance Examination
- X and XII Std. Marks statement
- Mark Sheets of all semesters / years of the qualifying examination upto pre-final / final year as applicable
- Qualifying Degree / Provisional Certificate (If already received)
- Transfer Certificate obtained from the Institute last studied (If already received)
- Valid GATE score card for Candidates applying for M.Tech. (if applicable)
- Service Certificate issued by the Employer. (For sponsored candidates - for M.Tech. Programmes only)
- Community Certificate (for all categories except OC/General).

• DEMAND DRAFT for ₹10,000, drawn in favour Of **"VIT University"**, payable at Vellore.

Only after verification of documents, the candidate will be allowed to participate in the Interview. Authentic records pertaining to marks sheet of the qualifying examination and state of eligibility, as indicated in section 4, will be checked. If a candidate fails to produce any of the above documents, he/she will not be considered for admission.

After remittance of the non-refundable deposit and obtaining the provisional admission letter, if the candidate fails to qualify in the prescribed qualifying examination, the provisional admission accorded will be cancelled.

Allotment of seat for a programme once made is final and cannot be changed under any circumstances.

9. DOCUMENTS TO BE SUBMITTED AT THE TIME OF ADMISSION

The following documents in original are required to be submitted at the time of Admission:
• X and XII Std. Marks tatement
• Mark Sheets of all semesters / years of the qualifying examination upto pre-final / final year as applicable
• Qualifying Degree / Provisional Certificate (If already received)
• Transfer Certificate obtained from the Institute last studied. (If already received)
• Migration Certificate
• Valid GATE score card for Candidates applying For M.Tech.
• Service Certificate issued by the Employer. (For sponsored candidates - for M.Tech. programmes only)
• Community Certificate (for all categories except OC / General)
• Conduct Certificate
• Admission letter and a photocopy of the programme fee receipt
• 4-recent passport size colour photographs

• An undertaking for good conduct and behaviour in a prescribed form(to be issued by the University at the time of admission)
• Affidavit to be signed Separately by student & parent in ₹20/- Stamp Paper(Format available at www.vit.ac.in)
• Two Xerox sets of all the original certificates (Candidates are advised to make a required number of photocopies for their future use before handing over their originals to the Admissions Office).

10. TUITION AND SPECIAL FEES

10.1 MODE OF PAYMENT

All payments are to be made only in the form of a crossed Demand Draft drawn in favour of **"VIT University"**, payable at Vellore (only computerised DD is accepted). Various tiers of scholarships and teaching assistantships are available for high scores in valid GATE and VITMEE.

Programmes	Category 1 Annual fees with scholarship*	Category 2 Annual fees*
MCA	1,14,000	N/A
M.Tech – CSE, CSE with Specialization in Cloud Computing, CSE with Specialization in Big Data Analytics, IT, VLSI Design, Biotechnology, Software Technology, Embedded Systems	1,54,000	2,84,000
M.Tech – Automotive Electronics, Nanotechnology, Communication Engg.	1,54,000	2,31,500
M.Tech – Biomedical Engg. CAD/CAM, Mechatronics, Power Electronics & Drives, Sensor System, Energy & Environmental, Structural Engg.	1,29,000	2,06,500
M.Tech – Control and Automation	1,29,000	N/A
M.Tech – Automotive Engg.	1,54,000	N/A
M.Tech – Manufacturing Engg.	1,54,000	N/A

Note: 1) One time payment for Category 1 and Category 2

- Admission fee ₹ 5,000
- Caution Deposit (refundable) ₹ 2,000

2) Refer the Hostel fee details in: http://www.vit.ac.in/admissions/HostelCharges.asp

* Fees Includes Tuition fee and Special fee (Examination, Library etc.,)

It is mandatory that student should own a laptop. They can bring their own laptop and show it to us or can buy it through VIT. VIT will let the student know the cost and the configuration of the quality laptop. Students can pay the amount after joining the programme [Compulsory for M.Tech. CSE, IT, Software Technology and MCA candidates].

10.2. SCHOLARSHIPS

• Monthly stipend of ₹ 4000/- for top six GATE Scores in each M.Tech. Programme.

• Top VITMEE / GATE scorers will get a stipend of 3600 Euros **(ie. ₹2.40 lakhs)** for a double degree programmes in Communication Engineering from UAS, Darmstadt, Germany (under DADD fellowship) and in Sensor Systems from UAS, Karlsruhe.

10.3. Refund of Fees
The refund will be made as per the norms of the UGC.

10.4. Submission of 'No Dues' Certificate
A candidate who desires to leave the Institute after joining the programme will have to submit a 'NO DUES' Certificate from his/her respective Director to get back the certificates. This should be accompanied by the application for withdrawal and the original fee receipt and original provisional admission letter. The certificates will be issued only on production of 'NO DUES' Certificate in the prescribed form, obtained from the Admission Section.

11. HOSTEL – Vellore and Chennai Campuses

Hostel accommodation is available for both men and women separately at Vellore and Chennai campuses. For details please log on to VIT Website: www.vit.ac.in.

GENERAL DISCIPLINE
All candidates admitted to the University shall maintain good conduct, pay the requisite tuition fees and other charges by the due dates, attend their classes regularly and abide by the rules and regulations of the Institution. If at any point of time, the conduct and character of a candidate is not satisfactory or is of a suspicious nature, the management reserves the right, without assigning any reason, to make him / her vacate the hostel or expel him / her from the University.

Ragging is totally prohibited in the institution, and anyone found guilty of ragging and / or abetting ragging, whether actively or passively, or being a part of a conspiracy to promote ragging, is liable to be punished in accordance with these regulations as well as under the provisions of any penal law for the time being in force. Ragging juniors in any form is forbidden. If any one is found is ragging his/her juniors, he/she can be rusticated from the Institute.

12. IMPORTANT INSTRUCTIONS PERTAINING TO CONDUCT OF COMPUTER BASED TEST (CBT) ENTRANCE EXAMINATION

DATE : 7th and 8th June, 2014

TIME : 10.00 am – 12.00 noon &

2.30 pm – 4.30 pm

§ Candidate is expected to arrive at the examination hall atleast 1 hour before the start of examination, with Admit Card (hard copy). If the candidate does not report on time, they are likely to miss the general instructions given in Exam Hall.

§ Candidate will not be permitted to enter into examination hall after 10:30am/3.00pm

§ Candidate will not be permitted to leave the exam hall until 12 noon/4.30 pm, even though the exam had been completed.

§ Candidates are requested to keep the Admit Card safely with them and bring it during the Admission Process. Candidate should produce it on demand.

§ A candidate who does not possess the admit card issued by VIT Institute shall not be permitted to attend VITMEE exam under any circumstances.

§ Candidate is instructed to complete Registration Process with the help of Hall Invigilators

§ Candidate will be allotted a computer system by Hall Invigilator to attend the Computer Based Test (CBT)

§ Candidate is not permitted to carry any text material (printed / written), calculators, slide rulers, log tables, electronic watches with facility of calculator, mobile phones or any other electronic devices.

§ Candidate should bring a pencil or pen to carry out any rough calculations.

§ Test will start exactly at the time specified in Admit Card and an announcement will be made by Hall Invigilator to start and stop the exam.

§ During the exam process, the Hall Invigilator can request the admit card to verify the candidate.

§ Under any circumstances the candidate may not be permitted to take an extra time, unless otherwise permitted by Center Superintendents.

§ The Candidate will be permitted to attend a mock test (online) as mentioned in Admit Card / VIT web site. (Candidates are required to check the VIT web site for regular updates)

§ Exam would comprise of multiple choice questions with question number appearing at the top center of computer screen and the time left for the exam to be completed.

§ For each question, candidate will has to select the right option using the mouse.

§ Candidates will be allowed to change their answer any time during the exam duration.

VITMEE EXAM DATES

VITMEE will be conducted on both 7th and 8th June, 2014, between 10 am to 12 noon and 2.30 pm to 4.30 pm on both the days. VIT will inform the candidates the exact date and time to the candidates which will be uploaded in website.

Test Slot booking instructions:

1. VITMEE 2014 test slot booking is a web based online scheduling system.

2. Once the candidate submits the online application, the candidate will receive an e-mail (as per the id

specified in the VITMEE-2014 online application form) with a website link and the corresponding login credentials (user id & password)

3. Candidates are required to check the VIT website (www.vit.ac.in) on a regular basis for any important updates.

4. The online test slot booking will be opened during the last week of May 2014 and the exact date will be updated in VIT Website

5. Candidates can then login to the link, choose from the available options on test schedule (date & time), test center and book the test slot as per their choice.

6. The schedule booking will be done on first-come-first serve basis, subject to the availability of slots / seats

7. A slot once booked cannot be changed. Requests for change of date, slot or test center will not be entertained under any circumstance.

8. In case of non availability of slots in a center of choice, the candidates may choose to book a slot in an alternate center.

9. It is the responsibility of the candidate to book their test schedule in VITMEE-2014 in the given time frame. VIT will not be held accountable for the non booking of test slot by the candidate.

10. A confirmation mail will be automatically sent to the e-mail address of the candidate, who has booked his/her schedule through the VITMEE-2014 booking system.

ACADEMIC QUALIFICATIONS

MCA PROGRAMMES	ELIGIBILITY
MCA	Recognized Bachelor's Degree of Minimum 3 Yrs duration in BCA, B.Sc (IT/Computer Science) with Mathematics as a course at 10+2 level or at Graduate Level. Obtained at least 60% at the qualifying Examination.

M.TECH PROGRAMMES	ELIGIBILITY
Automotive Engineering Run in collaboration with Automotive Research Association of India, (ARAI), Pune	B.E/B.Tech. Degree in Mechanical / Automobile / Production / Manufacturing Engineering or Mechatronics or any equivalent degree.
Computer Aided Design / Computer Aided Manufacturing	B.E/B.Tech. Degree in Mechanical / Automobile or Production Engineering or any equivalent degree.
Energy and Environmental Engineering	B.E/B.Tech. in Civil / Mechanical / Biotechnology / Chemical / Electrical / Biochemical / Environmental / M.Sc in Chemistry, Microbiology, Environmental Science, Biotechnology, Biochemistry.
Mechatronics	B.E/B.Tech. Degree in Mechanical / Automobile / Manufacturing / Production / Electrical & Electronics / Electronics & Communication / Electronics & Instrumentation / Instrumentation & Control / Computer Science / Information Technology / Mechatronics or any equivalent degree
Manufacturing Engineering	B.E/B.Tech. Degree in Mechanical / Production / Manufacturing / Automobile Engineering or any equivalent degree
Structural Engineering	B.E/B.Tech. Degree in Civil Engineering / Civil & Structural Engineering or any equivalent degree
Information Technology (Networking) / Software Technology	B.E/B.Tech. Degree in any branch / M.S / M.Sc. Computer Science or Information Technology or Software Engineering / MCA or any other equivalent degree with valid GATE score in Computer Science
Nanotechnology	B.E/B.Tech. Degree in ECE / EEE / E&I / M.Sc. Physics with Spl. In Electronics / Material Science / Solid State Physics / B.Tech Nanotechnology / M.Sc. Nanotechnology / or any equivalent degree
Communication Engineering	B.E/B.Tech. Degree in Electrical / Electronics / EEE/ ECE/ Telecommunication, E&I/ Computer Sciences* (* Bridge course needed) M.Sc. Physics with Electronics spl. / Electronics or any equivalent degree
Sensor System Technology	B.E/B.Tech. Degree in EEE / ECE / E&I / CSE / Instrumentation & Control / M.Sc. Physics with Electronics / Electronics or any equivalent degree
VLSI Design (Very Large Scale Integrated Design)	B.E/B.Tech. Degree in Electrical / Electronics / EEE / ECE / E&I / M.Sc. Physics with Electronics / Electronics or any equivalent degree
Automotive Electronics in collaboration with TIFAC-CORE industry partners	B.E/B.Tech. Degree in ECE / Telecommunication / CSE / EIE / IT / EEE / Mechatronics or any equivalent degree
Power Electronics and Drives	B.E/B.Tech. Degree in Electrical / Electronics / EEE / ECE / E&I or any equivalent degree
Computer Science and Engineering	B.E/B.Tech. Degree in any branch / M.S / M.Sc. Computer Science or IT or Software Engineering / MCA or any other equivalent degree **.
CSE in Cloud Computing / Big Data Analytics	B.E/ B.Tech Degree in any Branch / MCA or any other equivalent degree.
Biotechnology	B.E/B.Tech. Degree in Chemical/Leather Technology/Biotechnology/Industrial Biotechnology/Bio-chemical/Bio-Medical/Bio-Informatics or a Bachelor's Degree in Pharmacy or M.Sc. Degree in Biochemistry/Biotechnology/Microbiology/Bio-Physics/Biology/Botany/Zoology/Genetics/MBBS/M.Sc.(Ag) & M.V.Sc.
Biomedical Engineering	B.E/B.Tech Degree in Bio-Medical Engg/Bio-Medical Instrumentation/Medical Electronics/ECE/EIE/Biotechnology/Bio-Informatics/M.Sc in Biophysics/ Electronics/Physics/Bio-Medical Sciences/ Bio-medical Instrumentation/Bioinformatics or MBBS/Degree in Physiotherapy/Occupational therapy of 4 years degree programme.
Embedded Systems	B.E/B.Tech. Degree in ECE/EEE/Mechatronics/EIE.
Control and Automation	B.Tech(EEE)/B.Tech(ECE)/B.Tech(E&I)/any other Equivalent UG degree.

** with valid GATE score

APPENDIX - I
SYLLABUS for ENTRANCE EXAMINATION

CI – CIVIL ENGINEERING

ENGINEERING MATHEMATICS

Linear Algebra

Matrix algebra, Systems of linear equations, Eigen values and eigenvectors.

Calculus

Functions of single variable, Limit, continuity and differentiability, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

Differential equations

First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy's and Euler's equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation.

Complex variables

Analytic functions, Cauchy's integral theorem, Taylor and Laurent series.

Probability and Statistics

Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Poisson, Normal and Binomial distributions.

Numerical Methods

Numerical solutions of linear and non-linear algebraic equations Integration by trapezoidal and Simpson's rule, single and multi-step methods for differential equations.

STRUCTURAL ENGINEERING
Mechanics

Bending moment and shear force in statically determinate beams. Simple stress and strain relationship Stress and strain in two dimensions, principal stresses, stress transformation, Mohr's circle. Simple bending theory, flexural and shear stresses, unsymmetrical bending, shear centre. Thin walled pressure vessels, uniform torsion, buckling of column, combined and direct bending stresses.

Structural Analysis

Analysis of statically determinate trusses, arches, beams, cables and frames, displacements in statically determinate structures and analysis of statically indeterminate structures by force/ energy methods, analysis by displacement methods (slope deflection method), influence lines for determinate and indeterminate structures. Basic concepts of matrix methods of structural analysis.

Concrete Structures

Concrete Technology- properties of concrete, basics of mix design. Concrete design-basic working stress and limit state design concepts, analysis of ultimate load capacity and design of members subjected to flexure, shear, compression and torsion by limit state methods. Basic elements of prestressed concrete, analysis of beam sections at transfer and service loads.

Steel Structures

Analysis and design of tension and compression members, beams and beam columns, column bases. Connectionssimple and eccentric, beam-column connections, plate girders and trusses. Plastic analysis of beams and frames.

GEOTECHNICAL ENGINEERING

Soil Mechanics

Origin of soils, soil classification, three - phase system, fundamental definitions, relationship and interrelationships, permeability and seepage, effective

stress principle, consolidation, compaction, shear strength.

Foundation Engineering

Sub-surface investigations- scope, drilling bore holes, sampling, penetration tests, plate load test. Earth pressure theories, effect of water table, layered soils. Stability of slopes-infinite slopes, finite slopes. Foundation types foundation design requirements. Shallow foundations bearing capacity, effect of shape, water table and other factors, stress distribution, settlement analysis in sands and clays. Deep foundations - pile types, dynamic and static formulae, load capacity of piles in sands and clays, negative skin friction.

WATER RESOURCES ENGINEERING
Fluid Mechanics and Hydraulics

Properties of fluids, principle of conservation of mass, momentum, energy and corresponding equations, potential flow, applications of momentum and Bernoulli's equation, laminar and turbulent flow, flow in pipes, pipe networks. Concept of boundary layer and its growth. Uniform flow, critical flow and gradually varied flow in channels, specific energy concept, hydraulic jump. Forces on immersed bodies, flow measurements in channels, tanks and pipes. Dimensional analysis and hydraulic modeling. Kinematics of flow, velocity triangles and specific speed of pumps and turbines.

Hydrology

Hydrologic cycle, rainfall, evaporation, infiltration, stage discharge relationships, unit hydrographs, flood estimation, reservoir capacity, reservoir and channel routing. Well hydraulics.

Irrigation

Duty, delta, estimation of evapo-transpiration. Crop water requirements. Design of lined and unlined canals, waterways, head works, gravity dams and spillways. Design of weirs on permeable foundation. Types of irrigation system, irrigation methods. Water logging and drainage, sodic soils.

ENVIRONMENTAL ENGINEERING

Water requirements

Quality standards, basic unit processes and operations for water treatment. Drinking water standards, water requirements, basic unit operations and unit processes for surface water treatment, distribution of water. Sewage and sewerage treatment, quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, sludge disposal, effluent discharge standards. Domestic wastewater treatment, quantity of characteristics of domestic wastewater, primary and secondary treatment Unit operations and unit processes of domestic wastewater, sludge disposal.

Air Pollution

Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

Municipal Solid Wastes

Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

Noise Pollution

Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

TRANSPORTATION ENGINEERING
Highway Planning

Geometric design of highways, testing and specifications of paving materials, design of flexible and rigid pavements.

Traffic Engineering

Traffic characteristics, theory of traffic flow, intersection design, traffic signs and signal design, highway capacity.

CS – COMPUTER SCIENCE AND ENGINEERING , INFORMATION TECHNOLOGY & SOFTWARE TECHNOLOGY

Engineering Mathematics
Mathematical Logic:

Syntax of First Order Logic, Semantics of First Order Logic, a Sequent Calculus, the Completeness Theorem, the Limitations of First Order Logic.

Differential and Integral Calculus :

Limit, Continuity, Differentiability, Leibniz theorem, Mean Value Theorems, Taylor's theorem, Integrals, Improper integrals, Total Differentiation, Partial derivatives ,Maxima and Minima, vector calculus, Linear differential equations.

Probability and Statistics:

probability, conditional probability, Baye's theorem, means, median, mode, moments, standard deviation. Random variables, Uniform, Binomial, Poisson, normal distributions, Correlation and regression, Sampling and Tests of significance.

Numerical Methods:

solutions to algebraic and transcendental equations(Bisection and Newton Raphsons' methods), simultaneous linear algebraic equations(Gauss elimination, Crouts, Gauss seidal and relaxation), Interpolation methods (forward, backward and central), numerical integration (Trapezoidal, Simpson's and Weddle's) eigen values and eigen vectors, Numerical solutions to ordinary (Euler, modified Euler, Runga Kutta 4th order) and partial differential (parabolic, elliptic and Hyperbolic) equations.

Linear Algebra and Transforms:

linear vector space, determinants, matrices, eigen values, eigen vectors, elements of complex analysis, laplace transforms, Fourier analysis.

Theoretical Computer Science
Discrete Mathematics:

sets, relations and functions, algebra of matrices and determinants, algebraic structures, Boolean algebra and applications, order relations and structures, graph theory, logic and combinatorics.

Theory of computation:

Regular languages and finite automata, context free languages and Push down automata, recursively enumerable sets and Turing machines, undecidability.

Analysis of algorithms and computational complexity:

Asymptotic analysis (best , worst, average case) of time and space, Upper and lower bounds on the complexity of specific problems, NP-completeness, code and query tuning techniques, numerical analysis, power analysis & resiliency, intractable problems.

Computer Hardware
Electronics:

Network analysis, semiconductor devices, bipolar transistors, FET's, Power supplies, amplifier, Oscillators, Operational amplifiers, elements of digital electronics, logic circuits.

Digital logic:

Number systems and codes, Gates, TTL circuits, Boolean algebra and Karnaugh maps, Arithmetic logic units, Flip flops, registers and counters, Memories, Combinational and sequential logic circuits .

Computer Architecture and organization:

Machine instructions and addressing modes, ALU and data path, Register Transfer Language , hardware and micro programmed control, memory interface, RAM, ROM I/O interface (Interrupt and DMA modes), serial communication interface, instruction pipelining, Cache , main and secondary memory storage, organization and structure of disk drives, RAID architectures Microprocessors: 8085, 8086, Interfacing and memory addressing.

Software systems
Data structures:

Notion of abstract data types, stack, Queue, List, set, string, Tree, binary search trees, heap, graph.

Programming methodology:

Introduction to programming, pointers, arrays, control structures, Iterative control structures, functions, recursion, testing, debugging, code review, structures, files.

Algorithms for problem solving:

Tree and graph traversal, connected components, spanning trees, shortest paths, hashing, sorting, searching, design paradigms (Greedy, dynamic programming, divide and conquer).

Programming language processors:

Compiler, Interpreter, assembler, Linker, Loader, Macro processors, phases of compilers, Lexical analysis, parsing, Top-down parsing and bottom up parsing, syntax directed translation, runtime environment, Symbol table, type checking, intermediate Code generation, Code optimization, code generation.

Operating systems:

Memory management, page faults, overlay, processor management, device management, dead locks, Process, thread and inter process communication, CPU scheduling, file systems, I/O systems, protection and security.

System & program development methodology:
Software paradigms, principles of programming in any language, documentation, system analysis and design methodologies, User Interface Design (UID), software construction, software testing, software quality, Object Oriented Aanlaysis and Design (OOAD) concepts.

Management Information systems:
Aspects of Management and Information systems, decision support and operation support system, systems approaches to MIS, computers and information system in business.

Databases management systems:
Data, database and DBMS, Data dictionary/directory, schema, description of database structure, forms of DBMS systems, Hierarchical, network and RDBMS, DDL, DML, stored data structure language and query language, Recent trends in database management systems, Memory management techniques used in computers, query languages(SQL), file structures (sequential files, indexing, B* trees) Transactions and concurrency control, Basic concepts of transaction processing, ACID properties of transactions, serializability of transactions, concurrency control, recovery, OLAP.

Computer networks & Data communications:
Analog versus Digital communication, modems, multiplexers, and concentrators, serial versus parallel communication, simplex, duplex, and half duplex communication, synchronous and asynchronous communication, Error detection/correction methods, data link control protocols, balanced and unbalanced interfaces, communication media, ISO/OSI stack, Sliding window protocol, LAN Technologies (Ethernet, Token ring) , TCP/UDP, IP, switches, gateways, and routers.

Web technologies:
HTML, XML, Concepts of network and internet, WWW and HTTP, web server, web applications, load balancing and application server, web securities.

Computing Technologies:
Client server computing, Logical layers in client server architecture, Two-tier versus Three-tier, Distributed computing, Middleware, Mobile Computing, Cloud Computing.

CE – CHEMICAL ENGINEERING

Laws of thermodynamics - reversible nad irreversible process - concept of ideal gas and real gas - equations of states - Maxwell relations - adiabatic and isothermal compression - phase equilibrium - Gibbs phase rule - system of variable composition - vant Hoffs equation - applications of Gibbs - Duhem equation.

Law of conservation of mass and energy - material balance energy balance and their applications - unit operation and unit process - psychrometry - combustion calculations.

Classification of fluids - fluid statics - basic equations of fluid flow - Bernoulli's equation - laminar flow – friction in flow through beds of solids - packed beds - fluid moving machinery - classification of pumps and its characteristics.

Introduction to particulate solids - particle separation - size reduction - motion of a particle through fluid - classification of particulate solids - centrifugal classifier - sedimentation techniques - flotation - filtration equipments - agitation and mixing of liquids.

Fourier's law of heat conduction - concept of thermal conductivity - heat transfer through fins - convective heat transfer - transfer of heat in flowing fluids - laminar and turbulent flow - heat transfer with and without phase change - types of evaporators - multiple effect evaporators.

Differential and integral method of analysis of rate data - ideal reactor design - Residence time distribution - C, E and F curves.

Basic principles of unit operation and unit process - schematic representations of unit operations - manufacture of sulfur, hydrochloric acid, cement, glass, products used in photography, ceramics and refractory, industrial gases, paints, pigments, fertilizers - fermentation process for the production of ethanol - manufacture of citric acid, antibiotics, penicillin, soaps, detergents — petroleum refining process - process for the production of petrochemical precursors - production of resins, nature and synthetic rubber.

Diffusion in liquids - development of rate equation for mass transfer - contracting devices for improving mass transfer characteristics - humidification, drying and crystallization - distillation, continuous rectification operation, absorption, liquid-liquid extraction and leaching - fundamental principles and design of the pressure, reaction vessels and related equipments in the above process.

Overview of industrial biochemical processes — industrially important microbial strains - enzymes used in industry, medicine and food - industrial production, purification and immobilization of enzymes - reactors types, characteristics and design - growth characteristics of microbial cells - free cell and immobilized cell reactors - downstream processing and effluent treatment.

CH – CHEMISTRY

Atomic Structure
Planck's quantum theory - wave particle duality - Heisenberg's principle - Schrodinger wave equation — particle in a box and hydrogen atom - VB and MO theories.

Spectroscopy
Rotational and vibrational spectra - harmonic anharmonic oscillator and Rigid Rotor - selection rules - fundamentals, overtones and combinational bands - calculation of force constants (diatomic molecules) - Group frequencies - electronic spectroscopy - potential energy diagram — term symbols - selection rules — L-S and J-J coupling — Frank Condon principle - oscillator's strength - effect of solvents on spectra.

Thermodynamics
Laws of thermodynamics — First law - second law - third law (terms and their relations).

Chemical kinetics and equilibrium
Rate constant of chemical reactions, temperature dependence, collision and transition state theories - consecutive and parallel reactions - chemical equilibrium and response of chemical equilibrium to temperature and pressure.

d and f block elements
General characteristics of d and f block elements; Coordination chemistry; structure and isomerism; stability; theories of metal-ligand bonding (CFT and LFT); mechanisms of substitution and electron transfer reactions of coordination complexes. Electronic spectra and magnetic properties of transition metal complexes, lanthanides and actinides. Metal carbonyls, metal-metal bonds and metal atom clusters, metallocenes; transition metal complexes with bonds to hydrogen, alkyls, alkenes and arenes; metal carbenes; use of organometallic compounds as catalysts in organic synthesis. Bioinorganic chemistry of Na, K, Mg, Ca, Fe, Co, Zn, Cu and Mo.

Solid State
Crystal systems and lattices, Miller planes, crystal packing, crystal defects; Bragg's law, ionic crystals, band theory, metals and semiconductors, different structures of AX, AX2, AX3 compounds, spinels.

Instrumental methods of analysis
Atomic absorption and emission spectroscopy including ICP-AES, UV-Visible spectrophotometry, NMR, Mass, Mossbauer spectroscopy (Fe and Sn), ESR spectroscopy, chromatography including GC and HPLC, electroanalytical methods (coulometry, cyclic voltammetry, polarography - amperometry, and ion selective electrodes). Structural determination of organic and inorganic compounds using UV-Visible, IR, NMR and mass spectroscopy.

Stereochemistry

Chirality of organic molecules with or without chiral centres. Specification of configuration in compounds having one or more stereogenic centres. Enantiotopic and diastereotopic atoms, groups and faces. Stereospecific synthesis. Conformational analysis of acyclic and cyclic compounds. Geometrical isomerism. Configurational and conformational effects on reactivity and selectivity / specificity.

Reaction Mechanism

Electrophilic and Nucleophilic substitution reactions in aliphatic and aromatic compounds and their mechanisms - Addition and Elimination reactions and their mechanisms - Reaction intermediates carbocations, carbanions, carbenes, nitrenes and free radicals.

Organic synthesis

Synthesis, reactions, mechanisms and selectivity involving the following - alkenes, alkynes, arenes, alcohols, phenols, aldehydes, ketones, carboxylic acids and their derivatives, halides, nitro compounds and amines. Use of compounds of Mg, Li, Cu, B and Si in organic synthesis. Concepts in multistep synthesis - retrosynthetic analysis, disconnections, synthons, synthetic equivalents, umpolung in chemistry, selectivity, protection and deprotection of functional groups.

Heterocyclic compounds

Structure and reactions of furan, pyrrole, thiophene, pyridine, indole and their derivatives.

Biomolecules

Structure, properties and reactions of mono- and disaccharides, physicochemical properties of amino acids, chemical synthesis of peptides, structural features of proteins, nucleic acids, steroids, terpenoids, carotenoids, and alkaloids.

EE – ELECTRICAL AND ELECTRONICS ENGINEERING

ENGINEERING MATHEMATICS

Linear Algebra: Matrix Algebra, Systems of linear equations, Eigen values and eigen vectors.

Calculus: Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial Derivatives, Maxima and minima, Multiple integrals, Fourier series. Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

Differential equations: First order equation (linear and nonlinear), Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy's and Euler's equations, Initial and boundary value problems, Partial Differential Equations and variable separable method.

Complex variables: Analytic functions, Cauchy's integral theorem and integral formula, Taylor's and Laurent' series, Residue theorem, solution integrals.

Probability and Statistics: Sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Discrete and continuous distributions, Poisson, Normal and Binomial distribution, Correlation and regression analysis.

Numerical Methods: Solutions of non-linear algebraic equations, single and multi-step methods for differential equations.

Transform Theory: Fourier transform, Laplace transform, Z-transform.

ELECTRICAL ENGINEERING

Electric Circuits, Fields and Devices: Network graph, KCL, KVL, node and mesh analysis, transient response of dc and ac networks; sinusoidal steady-state analysis, resonance, basic filter concepts, ideal current and voltage sources, Thevenin's Norton's and Superposition and Maximum Power Transfer theorems, two-port networks, three phase circuits; Gauss Theorem, electric

field and potential due to point, line, plane and spherical charge distributions; Ampere's and Biot-Savart's laws; inductance; dielectrics; capacitance, Rectifier diodes, transistors, MOSFETs, Biasing, Half and Full wave rectification, JFETs.

Signals and Systems: Representation of continuous and discrete-time signals; shifting and scaling operations; linear, time-invariant and causal systems; Fourier series representation of continuous periodic signals; sampling theorem; Fourier, Laplace and Z transforms.

Electrical Machines: Single phase transformer – equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformers - connections, parallel operation; auto-transformer; energy conversion principles; DC machines - types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors; three phase induction motors - principles, types, performance characteristics, starting and speed control; single phase induction motors; synchronous machines - performance, regulation and parallel operation of generators, motor starting, characteristics and applications; servo and stepper motors.

Power Systems: Basic power generation concepts; transmission line models and performance; cable performance, insulation; corona and radio interference; distribution systems; per-unit quantities; bus impedance and admittance matrices; load flow; voltage control; power factor correction; economic operation; symmetrical components; fault analysis; principles of over-current, differential and distance protection; solid state relays and digital protection; circuit breakers;

system stability concepts, swing curves and equal area criterion; HVDC transmission and FACTS concepts.

Control Systems: Principles of feedback; transfer function; block diagrams; steady-state errors; Routh and Niquist techniques; Bode plots; root loci; lag, lead and lead-lag compensation; state space model; state transition matrix, controllability and observability.

Electrical and Electronic Measurements: Bridges and potentiometers; PMMC, moving iron, dynamometer and induction type instruments; measurement of voltage, current, power, energy and power factor; instrument transformers; digital voltmeters and multimeters; phase, time and frequency measurement; Q-meters; oscilloscopes; potentiometric recorders; error analysis.

Analog and Digital Electronics: Characteristics of diodes, BJT, FET; amplifiers - biasing, equivalent circuit and frequency response; oscillators and feedback amplifiers; operational amplifiers - characteristics and applications; simple active filters; VCOs and timers; combinational and sequential logic circuits; multiplexer; Schmitt trigger; multi-vibrators; sample and hold circuits; A/D and D/A converters; 8-bit microprocessor basics, architecture, programming and interfacing.

Power Electronics and Drives: Semiconductor power diodes, transistors, thyristors, triacs, GTOs MOSFETs and IGBTs - static characteristics and principles of operation; triggering circuits; phase control rectifiers; bridge converters - fully controlled and half controlled; principles of choppers and inverters; basic concepts of adjustable speed dc and ac drives.

EI – INSTRUMENTATION ENGINEERING

ENGINEERING MATHEMATICS

Linear Algebra: Matrix Algebra, Systems of linear equations, Eigen values and eigen vectors.

Calculus: Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial Derivatives, Maxima and minima, Multiple

integrals, Fourier series. Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

Differential equations: First order equation (linear and nonlinear), Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy's and Euler's equations, Initial and

boundary value problems, Partial Differential Equations and variable separable method.

Complex variables: Analytic functions, Cauchy's integral theorem and integral formula, Taylor's and Laurent' series, Residue theorem, solution integrals.

Probability and Statistics: Sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Discrete and continuous distributions, Poisson, Normal and Binomial distribution, Correlation and regression analysis.

Numerical Methods: Solutions of non-linear algebraic equations, single and multi-step methods for differential equations.

Transform Theory: Fourier transform, Laplace transform, Z-transform.

INSTRUMENTATION ENGINEERING

Basics of Circuits and Measurement Systems: Kirchoff's laws, mesh and nodal Analysis. Circuit theorems. Oneport and two-port Network Functions. Static and dynamic characteristics of Measurement Systems. Error and uncertainty analysis. Statistical analysis of data and curve fitting.

Transducers, Mechanical Measurement and Industrial Instrumentation: Resistive, Capacitive, Inductive and piezoelectric transducers and their signal conditioning. Measurement of displacement, velocity and acceleration (translational and rotational), force, torque, vibration and shock. Measurement of pressure, flow, temperature and liquid level. Measurement of pH, conductivity, viscosity and humidity.

Analog Electronics: Characteristics of diode, BJT, JFET and MOSFET. Diode circuits. Transistors at low and high frequencies, Amplifiers, single and multi-stage. Feedback amplifiers. Operational amplifiers, characteristics and circuit configurations. Instrumentation amplifier. Precision rectifier. V-to-I and I-to-V converter. Op-Amp based active filters. Oscillators and signal generators.

Digital Electronics: Combinational logic circuits, minimization of Boolean functions. IC families, TTL, MOS and CMOS. Arithmetic circuits. Comparators, Schmitt trigger, timers and mono-stable multi-vibrator. Sequential circuits, flip-flops, counters, shift registers. Multiplexer, S/H circuit. Analog-to-Digital and Digitalto-Analog converters. Basics of number system. Microprocessor applications, memory and input-output interfacing. Microcontrollers.

Signals, Systems and Communications: Periodic and aperiodic signals. Impulse response, transfer function and frequency response of first- and second order systems. Convolution, correlation and characteristics of linear time invariant systems. Discrete time system, impulse and frequency response. Pulse transfer function. IIR and FIR filters. Amplitude and frequency modulation and demodulation. Sampling theorem, pulse code modulation. Frequency and time division multiplexing. Amplitude shift keying, frequency shift keying and pulse shift keying for digital modulation.

Electrical and Electronic Measurements: Bridges and potentiometers, measurement of R, L and C. Measurements of voltage, current, power, power factor and energy. A.C & D.C current probes. Extension of instrument ranges. Q-meter and waveform analyzer. Digital voltmeter and multimeter. Time, phase and frequency measurements. Cathode ray oscilloscope. Serial and parallel communication. Shielding and grounding.

Control Systems and Process Control: Feedback principles. Signal flow graphs. Transient Response, steadystate- errors. Routh and Nyquist critera. Bode plot, root loci. Time delay systems. Phase and gain margin. State space representation of systems. Mechanical, hydraulic and pneumatic system components. Synchro pair, servo and step motors. On-off, cascade, P, P-I, P-I-D, feed forward and derivative controller, Fuzzy controllers.

Analytical, Optical and Biomedical Instrumentation: Mass spectrometry. UV, visible and IR spectrometry. X-ray and nuclear radiation measurements. Optical sources and detectors, LED, laser, photo-diode, photo-

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resistor and their characteristics. Interferometers, applications in metrology. Basics of fiber optics. Biomedical instruments, EEG, ECG and EMG. Clinical measurements. Ultrasonic transducers and Ultrasonography. Principles of Computer Assisted Tomography.

EC – ELECTRONICS AND COMMUNICATION ENGINEERING

ENGINEERING MATHEMATICS

Linear Algebra: Matrix Algebra, Systems of linear equations, Eigen values and eigen vectors.

Calculus: Mean value theorems, Theorems of integral calculus, Evaluation of definite and improper integrals, Partial Derivatives, Maxima and minima, Multiple integrals, Fourier series. Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems.

Differential equations: First order equation (linear and nonlinear), Higher order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy's and Euler's equations, Initial and boundary Value problems, Partial Differential Equations and variable separable method.

Complex variables: Analytic functions, Cauchy's integral theorem and integral formula, Taylor's and Laurent' series, Residue theorem, solution integrals.

Numerical Methods: Solutions of non-linear algebraic equations, single and multi-step methods for differential equations.

Transform Theory: Fourier transform, Laplace transform, Z-transform.

NETWORK
Network graphs: Matrices associated with graphs; incidence, fundamental cut set and fundamental circuit matrices. Solution methods; nodal and mesh analysis. Network theorems; superposition, Thevenin and Nortan's, maximum power transfer, wye-delta transformation, steady state sinusoidal analysis using phasors, fourier series, linear constant coefficient differential and difference equations; time domain analysis of simple RLC circuits. Laplace and Z transforms: frequency domain analysis of RLC circuits, convolution, 2-port network parameters, driving point and transfer functions, state equation for networks.

ANALOG CIRCUITS: Characteristics and equivalent circuits (large and small signal) of diodes, BJT, JFETs and MOSFET simple diode circuits: clipping, clamping, rectifier, biasing and bias stability of transistor and FET amplifiers. Amplifiers: single and multi-stage, differential, operational, feedback and power. Analysis of amplifiers; frequency response of amplifiers. Simple op-amp circuits. Filters. Sinusoidal oscillators: criterion for oscillation; single-transistor and op-amp configurations. Function generators and waveshaping circuits, Power supplies.

DIGITAL CIRCUITS
Boolean algebra; minimization of Boolean functions; logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinational circuits: arithmetic circuits, code converters, multiplexers and decoders. Sequential circuits: latches and flip-flops, counters and shift-registers. Comparators, timers, multivibrators. Sample and hold circuits, ADCs and DACs. Semiconductor memories. Microprocessor (8085): architecture, programming, memory and I/O interfacing

CONTROL SYSTEMS
Basic control system components; block diagrammatic description, reduction of block diagrams, properties of systems: linearity, time-invariance, stability, causality. Open loop and closed loop (feedback) systems. Special properties of linear time-invariance (LTI) systems-transfer function, impulse response, poles, zeros, their significance and stability analysis of these systems. Signal flow graphs and their use in determining transfer functions of systems; transient and steady state analysis of LTI system and frequency response. Tools and techniques for LTI control system analysis: Root, loci, Routh_Hurwitz criterion, Bode and Nyquist plots;

Control system compensators: elements of lead and lag compensations, elements of proportional-integral-Derivative (PID) control. State variable representation and solution of state equation for LTI systems.

COMMUNICATION SYSTEMS

Fourier analysis of signals - amplitude, phase and power spectrum, auto-correlation and cross-correlation and their Fourier transforms. Signal transmission through linear time-invariant (LTI) systems, impulse response and frequency response, group delay phase delay. Analog modulation systems-amplitude and angle modulation and demodulation systems, spectral analysis of these operations, superheterodyne receivers, elements of hardwares realizations of analog communication systems. Basic sampling theorems. Pulse code modulation (PCM), differential pulse code modulation (DPCM), delta modulation (DM). Digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK). Multiplexing - time division and frequency division. Additive Gaussian noise; characterization using correlation, probability density function (PDF), power spectral density (PSD). Signalto- noise ratio (SNR) calculations for amplitude modulation (AM) and frequency modulation (FM) for low noise conditions.

ELECTROMAGNETICS

Elements of vector calculus: gradient, divergence and curl; Gauss and strokes theorems, maxwells equation: differential and integral forms. Wave equation. Poynting vector. Plane waves: propagation through various media; reflection and refraction; phase and group velocity; skin depth Transmission lines: Characteristic impedence; impedence transformation; smith chart; impedence matching pulse excitation. Wave guides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Antennas; Dipole antennas; antenna arrays; radiation pattern; reciprocity theorem, antenna gain.

LS – LIFE SCIENCES

Biophysics

Levels of structures in Biological macromolecules. Basic strategies in biophysics. Forces that determine protein and nucleic acid structure, Prediction of proteins structure nucleic acids, Properties of lipid bilayers, Biochemical Kinetics studies, unimolecular reactions, methods of determining macromolecular structures inclusive of the spectroscopic techniques like UV-vis absorption, IR absorption, circular dichroism fluoresence NMR and X-ray and neutron diffraction techniques.

Biochemistry

Structure and properties, Amino acids, peptides, proteins and conjugated proteins, protein hydration, coagulation, denaturation - gelation, protein-protein interactions, cytosolic and membrane properties, purines, pyrimidines, nucleosides, nucleotides, polynucleotides, Ribonucleic acids and deoxyribonucleic acids, TCA cycle, glycolysis, pentose phosphate pathway, Embden Meyerhof pathway, urea cycle, metabolic regulation, respiratory chain, TP cycle, energy rich compounds, integrated metabolism,

Carbohydrates - linear and branched carbohydrates, N containing carbohydrates, cell wall carbohydrates, metabolism of carbohydrates, Fats and oils-structure and properties of saturated and unsaturated fatty acids, glycerolipids, phospholipids, sphingolipids, glycolipids, steroids, Vitamins and minerals-types, structure and functional properties of vitamins, utility of essential minerals sources and trace elements.

Biotechnology

Importance and economics of downstream processing in biotechnology process-problems and requirements of bioproduct purification, process design criteria, primary separation and recovery process, membrane based separations, precipitation methods, different types of purification and chromatographic techniques. Types of reactors - ideal reactors, integral method of analysis for reactions, simultaneous, consecutive and combined reactions, models for non-ideal flow. Industrial biotechnology - isolation, preservation and improvement of industrial microbes for overproduction of primary and secondary metabolites, economics of modern industrial processes, fermentation processes

and biological waste treatment processes.

Introduction to bioinformatics - sequence databases, search and their use, sequence alignment, ultrasonic trees, parsimony, phylogenetic alignment, connection between multiple alignment and tree construction, DNA mapping and sequencing, sequence assembly and gene prediction, molecular predictions with DNA strings.

Cell Structure and Function of the Organelles

Eukaryotic and Prokaryotic cells, cell division, mitosis & meiosis cell cycle and molecules that control cell cycle, endocytosis and Exocytosis. Ultrastructure of cellular organelles, viz. Mitochondria, ER, Golgi, Chloroplast, plasma membrane, centriole, nuclear and membrane bound receptors, Signal Transduction, Signal Amplification Techniques of propagation of prokaryotic and Eukayotic cells, Autocrine, Paracrine and Endocrine models of action, Cell line, generation of cell lines.

Molecular Biology

Structure of DNA and histone molecules, Replication of eukaryotic chromosomes, nucleoid the complex replication apparatus, process of transcription and, Structure of tRNA, mRNA, rRNA, Deciphering of the genetic code, Translation, Mutation. General principles of cloning.

Recombinant DNA

Genetic elements that control gene expression, method of creating recombinant DNA molecules creating transgenic animals, plants microbes, safety guidelines of creating recombinant DNA research, restriction enzymes and mapping of DNA, plasmid and phage and other vectors. Construction of genomic and cDNA libraries, methods of nucleic acid. Patents and methods of application of patents, legal implications bioremediation.

Ecosystems, energy flow, ecological succession , pollution. Conventional and Non conventional sources of energy. Bio-geo chemical cycles. Biodiversity and wild life conservation. Social issues and the environment.

Genetics

Classical genetics, Mendel's genetics, crossing over, linkage, Chromosome maps, chromosomal theory of heredity, cytoplasmic inheritance, Sex determination, sex linked inheritance, microbial genetics, population genetics, polyploidy, pedigree analysis, eugenics, mutation.

Microbiology

Basic concepts of Microbiology, classification, morphology, anatomy, physiology of bacteria, viruses, fungi, parasite. Microbes of various plant and animal diseases. Industrial microbiology, Microbial biotechnology, Mircrobial diversity and ecology.

Immunology

Basic concepts of immunology, types of immunity, biotechnological applications; organs of immune, response Innate and adaptive immunity, clonal selection theory, hypersensitivity, hybridoma technology, vaccine development, epitope mapping and immunomics, immunological tolerance and transplantation biotechnology.

Plant Sciences

Taxonomy and systematic botany, Plant structure and development, morphology and anato my, embryogenesis of mono and dicots. Phytohormones, respiration, nutrition, transpiration. Photosynthesis,C3 and C4, & CAM plants, photoperiodism, concepts of ecosystems and energy flow in biosphere.

ME – MECHANICAL ENGINEERING

MATHEMATICAL FUNDAMENTALS

Engineering Mathematics

Geometry Equations of straight line, common normal between straight lines in space; Equations of circles, ellipse, etc.; Parametric representation.

Linear Algebra

Matrix algebra, Systems of linear equations, Eigen values and eigenvectors.

Calculus

Functions of single variable, Limit, continuity and

differentiability, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives,

Differential equations

First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy's and Euler's equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation.

Control Theory

Open and closed loop systems; Laplace transforms; Transfer function; Block Diagram analysis; Concepts of stability; Input signals and system response; Nyquist stability criterion; Bode plot.

Probability and Statistics

Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Permutations and combinations, Random variables, Poisson, Normal and Binomial distributions. Properties of normal curve; Statistical quality control

APPLIED MECHANICS AND DESIGN

Engineering Mechanics

Free body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion, including impulse and momentum (linear and angular) and energy formulations; impact.

Strength of Materials

Stress and strain, stress-strain relationship and elastic constants, Mohr's circle for plane stress and plane strain, thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; thermal stresses; Stress concentration factor; Fatigue Strength and S-N curve; failure theories.

Theory of Machines

Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of slider-crank mechanism; flywheels.

Vibrations

Free and forced vibration of single degree of freedom systems; effect of damping; vibration isolation; resonance, critical speeds of shafts.

Technical drafting

Engineering drawing practice; Indian standards for technical drawing. Machine Elements Basic concepts of machine elements and their design;

FLUID MECHANICS AND THERMAL SCIENCES

Fluid Mechanics

Fluid properties; viscous flow of incompressible fluids; fluid statics, manometry, buoyancy; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; flow through pipes, head losses in pipes, bends etc.

Heat-Transfer

Modes of heat transfer; one dimensional heat conduction, fins; dimensionless parameters in free and forced convective heat transfer, radiative heat transfer, black and grey surfaces, shape factors; heat exchanger performance, LMTD and NTU methods.

Thermodynamics

Zeroth, First and Second laws of thermodynamics; thermodynamic system and processes; Carnot cycle. irreversibility and availability; behaviour of ideal and real gases, properties of pure substances, calculation of work
and heat in ideal processes; analysis of thermodynamic cycles related to energy conversion.

Applications

Power Engineering

Steam Tables, Rankine, Brayton cycles with regeneration and reheat. I.C. Engines air-standard Otto, Diesel cycles. Sterling cycle.

Refrigeration and air-conditioning

Vapour refrigeration cycle, heat pumps, gas refrigeration, Reverse Brayton cycle; moist air psychrometric chart, basic psychrometric processes.

Turbo machinery

Pelton-wheel, Francis and Kaplan turbines, impulse and reaction principles, velocity diagrams.

MANUFACTURING AND INDUSTRIAL ENGINEERING

Engineering Materials

Structure and properties of engineering materials, heat treatment, stress-strain diagrams for engineering materials.

Metal Casting

Design of patterns, moulds and cores; solidification and cooling; riser and gating design, design considerations.

Forming

Load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy

Joining

Physics of welding, brazing and soldering; adhesive bonding;

Machining and Machine Tool Operations

Mechanics of machining, single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, principles of design of jigs and fixtures.

Metrology and Inspection

Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.

Production Planning and Control

Forecasting models, aggregate production planning, scheduling, materials requirement planning.

Inventory Control

Deterministic and probabilistic models; safety stock inventory control systems.

Operations Research

Linear programming, simplex and duplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.

SOME CURRENT TRENDS IN DESIGN AND MANUFACTURING

Mechatronics System Design

Pneumatic and hydraulic systems; Eletro-pneumatic and electro-hydraulic systems; Pneumatic, hydraulic and electric motors and actutators; Concepts of microcontrollers, Feedback devices; Point-to-point, continuous-path and servo control; Types of CNC machines and robots. Programmable logic controllers; CNC and robot programming. Some current developments in modern machine tools, robotics, mechatronics; Basic topics related to micro-electro mechanical systems (MEMS).

Computer Integrated Manufacturing

Basic concepts of CAD/CAM and their integration tools. Exchange of product design and manufacturing data; CNC and robot programming methods. CAD/CAM Software and Virtual Product Development; Rapid Manufacturing Technologies; Concepts of Machine vision and Jigless manufacturing;

Computer Aided Engineering

Finite Element Methods; Computational Fluid Dynamics; Mechanical Systems Simulation; Tools for conventional mechanisms and MEMS design.

Automotive Engineering

Development in Bio-fuels, other alternative fuels and hydrogen as future fuel; Emission standards; Electronic injection systems; Passenger comfort and safety devices; Indian auto industry and Automotive vehicles in Indian market.

NT - NANOTECHNOLOGY

Quantum Physics: Basis of Quantum Physics, de Broglie's concept, operators, physical imperfection of wave function, normalised and orthogonal wave function, Heisenberg's uncertainty Principle.

Solid State Physics: Crystal structure, Bravais lattices and its basics, Miller indices, X-ray diffraction and Bragg's law, free electron theory of metals. Fermi energy and density of states, origin of energy bands, concept of holes and effective mass. Energy levels in One Dimension, Fermi-Dirac Dis tri bution, effect of Temperature on the Fermi-Dirac Distribution, free electron Gas in Three Dimension, crystal imperfections: Point imperfections – Vacancy, Substitution and interstitial impurity.

Electricity and Magnetism: Coulomb's law, Gauss's law. Electric field and potential. Electrostatic boundary conditions, Conductors, capacitors, dielectrics, dielectric polarization, volume and surface charges, electrostatic energy. Biot-Savart law, Ampere's law, Faraday's law of electromagnetic induction Maxwell's equations and static and time varying equations, Poynting's theorem, Lorentz Force and motion of charged particles in electric and magnetic fields. Elementary ideas about dia-, para- and ferromagnetism, Langevin's theory of paramagnetism, Curie's law.

Materials: Different types of materials: Metals, Semiconductors, Composite materials, Ceramics, Alloys, Polymers. Chemical Bonding-Atomic Bonding in solids, Types of bond: Metallic, Ionic, Covalent and van der Waals bond; Hybridisation; Molecular orbital theory

Fabrication: Nanoparticles synthesis- Carbon Nanotubes, Metal nanoparticles, Q-Dots, Nanowires Thin film synthesis- Chemical Vapor Deposition, Physical Vapor Depostion, Self-Assembly, Lithography- Optical & Electron Lithography, Resists.

Characterisation: Electron microscopes, scanning electron microscopes, transmission electron microscope, scanning probe microscopy, atomic force microscopy, scanning tunneling microscope, Spectroscopy- FTIR, UV-Vis, Raman, NMR .

Electronics: Intrinsic and extrinsic Semiconductors. Fermi level. p-n junctions, transistors. band-gap Bipolar Junction Transistor (BJT), Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor Field Effect Transistor (MOSFET) and Metal-Semiconductor Junction Field Effect Transistor (MESFET): various Structures, their functioning, I-V characteristic studies and applications, Transistor circuits in CB, CE, CC modes. Amplifier circuits with transistors. Operational amplifiers OR, AND, NOR and NAND gates.

PM – PHARMACY

Medicinal Chemistry

Structure, nomenclature, classification, synthesis, SAR and mechanism of action of the following categories of drugs, which are official in Indian pharmacopoeia and British pharmacopoeia. Introduction to drug design. Stereochemistry of drug molecules. Analgesics - NSAIDS, Antidepressants, Anxiolytics, Neuroleptics, Hypnotics and sedative. Anticonvulsan ts, Antihistaminics, Local anaesthetics, Antianginal agents, Cardiotonic agent, Diuretic, Cardiovascular drugs, Anticoagulants, Coagulants, Antihypertensive drugs - Adrenergic and Cholinergic drugs Cardiotonic agents,

Hypolipidemic agents, Hypoglycemic agents, Antiplatelet agent, Chemotherapeutic agents, Antibiotics, Antibacterials, Antiprotozoal drugs, Sulphonamides, Antimalarial, Antiviral, Antitubercular, Antiamoebic drugs, Anticancer drugs, Diagnostic agents. Preparation and storage, and uses of official radio pharmaceuticals, Vi tamins and Harmones, Eicosonoids and applications.

Natural Products

Pharmacognosy and Phytochemistry, Chemical tests for identification, chemistry, isolation, characterizations

and estimation of phytopharmaceuticals belonging to the groups of terpenoids, steroids, Bioflavanoids, Purines, Alkaloids, Guggul lipids, Glycosides. Pharmacognosy of crude drugs that contain the above constituents. Standardization of raw materials and Herbal products, WHO guideline quantitative microscopy including modern techniques used for evaluation, Biotechnological principles and techniques for plant development, tissue culture.

Pharmaceutics

Formulation and preparation of cosmetics - lipstick, shampoo, nail preparation, creams, and dentifries, quality control of tablets, capsules, liquid dosage forms, parentral preparations of ointment and creams, suppositories, and controlled release product, Quality control of containers, closures, caps, and secondary packing material like paper and board for pharmaceuticals, safety and legislation for cosmetic products, pharmaceutical calculations, Development, Manufacturing standards, Quality control limits, labeling, as per the pharmacopoeical requirement. Storage of different dosage forms and new drug delivery systems, Biopharmaceutics and pharmacokinetics and their importance in formulations.

Microbiology

Principles and methods microbiological assays as per Indian pharmacopoeia, methods of preparations of official sera and vaccines, Serological and diagnostics tests, Enzymes immuno assay, concept and methodology, Sterility testing - methodology and interpretation, Applications of microorganisms in Bioconversions and in pharmaceutical industry.

Clinical Pharmacy

Adverse drug reaction, Drug - Drug interaction, and Drug - Food interactions, Medication History, interview and patient counseling.

Therapeutic drug monitoring, Dosage regimen in pregenancy and lactation, pediatrics and Geriatrics, Renal and Hepatic impairment.

Pharmaceutical Analysis

Principles, Instrumentation and applications of the following, Absorption spectroscopy UV visible, IR, Flamephotometry, Potentiometry, Fluorimetry, Conductometry and Polarography, Pharmacopoeial assays. Principles of NMR, ESR, Mass spectroscopy, X-ray diffraction,optical Rotatory disperssion, statistical analysis and different chromatographic methods, Quality control of Radio pharmaceuticlas and Radio Chemical methods in analysis.

Pharmaceutical Jurisprudence

Pharmaceutical Ethics, Pharmacy Acts, Drugs and Cosmetics Acts and rules with respect to manufacture, sales and storages.

Bio-chemistry

Metabolism of Carbohydrates, lipids, proteins, methods to determine, kidney and liver function, Lipid profiles, General principles of immunology, immunological, Biochemical role of Harmones, Vitamins, Enzymes, Nucleic acids, Bio energetics.

Pharmacology

Pharmacology of Autocoids, Harmones, Hormone antagonists, Chemotherapeutic agents including Anticancer drugs, Bioassays, Immuno Pharmacology, General Pharmacological Principles including toxicology, Drug interaction. Pharmacology of drug acting on central nervous systems, cardiovascular systems, Autonomic nervous systems, Gastro intestinal systems and Respiratory systems, Drug acting on the renal systems, Drug acting on the blood and blood forming organs.

PH – PHYSICS

Mathematical Physics

Fourier series - Fourier transform - properties – convolution theorem - Application to solve differential equations - Laplace 's transform - properties - application to ordinary and partial differential equations-Cayley Hamilton Theorem - Eigen value problems

Spectroscopy

Atomic and Molecular Physics: Spectra of one – and many – electron atoms; LS and jj coupling; hyperfine structure; Zeeman and Stark effects; electric; electric dipole transitions and selection rules; X-ray spectra; rotational and vibrational spectra of diatomic molecules; electronic transition in diatomic molecules, Franck-Condon principle; Raman effect; NMR and ESR

Electro Magnetic Theory

Faraday's laws of induction - Maxwell's displacement current - Maxwell's equations - vector and scalar potentials - Gauge invariance - wave equation and plane wave solutions - Coulomb and Lorentz Gauges - energy and momentum of the field - Poynting's theorem.

Quantum Mechanics

Time Independent and Time Dependant Schrodinger wave equations, Justification of Schrodinger equation – the Schrodinger receipe - probabilities and normalization - Applications - particle in a box - simple harmonic oscillator – Dirac relativistic equations.

Statistical Mechanics

Equation of state - gas degeneracy - Bose-Einstein condensation - thermal properties of Bose-Einstein gas - liquid Helium - Tisza's two fluid model - Landau's theory of liquid Helium II - Black body radiation - phonons- Einstein and Debye models for lattice specific heat.

Experimental Design

Measurement of fundamental constants e, h, c - Measurement of High & Low Resistances, L and C - Detection of X-rays, Gamma rays, charged particles, neutrons etc - Ionization chamber - proportional counter - GM counter - Scintillation detectors - Solid

State detectors - Measurement of Magnetic field - Hall effect, magnetoresistance - X-ray and neutron diffraction - Vacuum Techniques - basic idea of conductance, pumping speed etc - Pumps - Mechanical pump - Diffusion pump - Gauges Thermocouple - Penning - Pirani - Hot Cathode - Low Temperature - Cooling a sample over a range upto 4 K and measurement of temperature.

Lasers

Ruby laser - Nd - YAG laser - colour centre lasers – Helium - Neon laser - Carbondioxide laser - excimer lasers – liquid dye laser - semiconductor lasers - Homojunction laser - Heterjunction laser - Quantum well laser.

Nonlinear Fiber Optics

Introduction - Second harmonic generation (SHG) - optical mixing - phase matching - Third harmonic generation (THG) - parametric generation of light - Optical parametric oscillator - self-focussing of light.

Solid State Physics

Types of lattices - Miller indices - Simple crystal structures - Crystal diffraction - Bragg's law - Reciprocal Lattice (BCC, FCC) - Brillouin zone - Structure factor – Atomic form factor - Cohesive energy of ionic crystals – Madelung constant - Types of crystal binding.

Materials Science

Phase diagram - phase rule - single component system - binary phase diagram - microstructural changes during cooling - Lever rule - Magnesia - Alumina system – Copper - Zinc system -Iron - Carbon system - Applications of phase diagram.

MA - MATHEMATICS

Linear Algebra: Finite dimensional vector spaces; Linear transformations and their matrix representations, rank; systems of linear equations, eigen values and eigen vectors, minimal polynomial, Cayley-Hamilton Theroem, diagonalisation,

Hermitian, Skew-Hermitian and unitary matrices; Finite dimensional inner product spaces, Gram-Schmidt orthonormalization process, self-adjoint operators.

Complex Analysis: Analytic functions, conformal mappings, bilinear transformations; complex integration: Cauchy's integral theorem and formula; Liouville's theorem, maximum modulus principle Taylor and Laurent's series; residue theorem and applications for evaluating real integrals.

Real Analysis: Sequences and series of functions, uniform convergence, power series, Fourier series, functions of several variables, maxima, minima Riemann integration, multiple integrals, line, surface and volume integrals, theorems of Green's, Stokes and Gauss Metric spaces, completeness, Weierstrass approximation theorem, compactness; Lebesgue measure, measurable functions; Lebesgue integral, Fatou's lemma, dominated convergence theorem.

Ordinary Differential Equations: First order ordinary differential equations, existence and uniqueness theorems, systems of linear first order ordinary differential equations, linear ordinary differential equations of higher order with constant coefficients; linear second order ordinary differential equations with variable coefficients; method of Laplace transforms for solving ordinary differential equations, series solutions; Legendre and Bessel functions and their orthogonality.

Algebra: Normal subgroups and homomorphism theorems, automorphisms; Group actions, Sylow's theorems and their applications; Euclidean domains, Principle ideal domains and unique factorization domains. Prime ideals and maximal ideals in commutative rings; Fields, finite fields.

Functional Analysis: Banach spaces, Hahn-Banach extension theorem, open mapping and closed graph theorems, principle of uniform boundedness; Hilbert spaces, orthonormal bases, Riesz representation theorem, bounded linear operators.

2 Analysis: Numerical solution of algebraic and transcendental equations: bisection, secant method, Newton-Raphson method, fixed point iteration; interpolation: error of polynomial interpolation, Lagrange, Newton interpolations Numerical differentiation; numerical integration: Trapezoidal and Simpson rules, Gauss Legendre quadrature, method of undetermined parameters; least square polynomial approximation; numerical solution of systems of linear equations: direct methods (Gauss elimination, LU decomposition); iterative methods (Jacobi and Gauss-Seidel); matrix eigenvalue problems: power method. Numerical solution of ordinary differential equations: initial value problems: Taylor series methods, Euler's method, Runge-Kutta methods.

Partial Differential Equations: Linear and quasilinear first order partial differential equations, method of characteristics; second order linear equations in two variables and their classification; Cauchy, Dirichlet and Neumann problems; solutions of Laplace, wave and diffusion equations in two variables; Fourier series and Fourier transform and Laplace transform methods of solutions for the above equations.

Mechanics: Virtual work, Lagrange's equations for holonomic systems, Hamiltonian equations.

Topology: Basic concepts of topology, product topology, connectedness, compactness, countability and separation axioms, Urysohn's Lemma.

Probability and Statistics: Probability space, conditional probability, Bayes theorem, independence, Random variables, joint and conditional distributions, standard probability distributions and their properties, expectation, conditional expectation, moments; Weak and strong law of large numbers, central limit theorem Sampling distributions, UMVU estimators, maximum likelihood estimators, Testing of hypotheses, standard parametric tests based on normal, χ^2, t, F-distributions; Linear regression; Interval estimation.

Linear programming: Linear programming problem and its formulation, convex sets and their properties, graphical method, basic feasible solution, simplex method, big-M and two phase methods; infeasible and unbounded LPP's, alternate optima Dual problem and duality theorems, dual simplex method and its application in post optimality analysis; Balanced and unbalanced transportation problems, Hungarian method for solving assignment problems.

Calculus of Variation and Integral Equations: Variation problems with fixed boundaries; sufficient conditions for extremum, linear integral equations of Fredholm and Volterra type, their iterative solutions.

MC - MCA SYLLABUS FOR ENTRANCE EXAMINATION

GENERAL ENGLISH:

Questions in this section will be designed to test the candidates' general understanding of the English language. There will be questions on the following topics. Comprehension, Vocabulary, Basic English Grammar (like usage of correct forms of verbs, prepositions and articles), Word power, Synonyms and Antonyms, Meanings of words and phrases, Technical writing.

MATHEMATICS :

Algebra: Fundamental operations in Algebra, Expansion, factorization, Quadratic equations, indices, logarithms, arithmetic, geometric and harmonic progressions, binomial theorem, permutations and combinations.

Calculus: Functions of single variable, limit, continuity and differentiability, Mean value theorems, indeterminate forms and L'Hospital rule, Maxima and minima, Taylor's series, Fundamental and mean value-theorems of integral calculus, total derivatives, Lagrange method of multipliers.

Differential Equations: Differential equations of first order and their solutions, linear differential equations with constant coefficients, homogenous linear differential equations.

Algorithms: Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and conquer; Connected components, Spanning trees, Shortest paths. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds.

Probability: Probability theory, Dependent and independent events, frequency distributions, and measures of dispersions, Skewness and Kurtosis, random variable and distribution functions, mathematical expectations, Binomial, Poisson, normal distributions.

Date Structures: Arrays, Stacks, Queues, linked Lists. Sorting techniques, Searching Techniques, Trees and Graph terminology and representation in memory, binary search tree, traversal techniques of graphs and Trees.

Computer Networks: Network models, Internet model, OSI model, Physical Layer - Analog and Digital Signals, Analog and Digital Transmission, Coding, Sampling. Data Link Layer - Error detection and correction, Data link control and Protocols, Stop and wait, Go-back-n, Selective repeat. Network Layer - Inter-networks, Addressing, unicast and multicast routing, Presentation Layer.

Programming in C: Data types, Declarations, Expressions, statements and symbolic constants, input-Output functions. Operators and expressions: Arithmetic, unary, logical, bit-wise, assignment and conditional operators. Control statements: While, do-while, for statements, nested loops, if else, switch, break, Continue, comma operators. Storage types: Automatic, external, register and static variables. Functions: Defining and accessing, passing arguments, Recursion.

Database Management Systems: DBMS architecture, Data models, data independence, E-R model, normalization, Relational Model: concepts, constraints, languages. Data storage, indexing, query processing, design and programming SQL.

Operating Systems: Process management, Process States, Process Control Block, Process and Threads, CPU Scheduling, Scheduling algorithm, Process Synchronization and Deadlock, Memory management, Virtual memory concepts paging and segmentation File organization, Blocking and buffering, file descriptor, File and Directory structures, I/O Devices.

Computer Architecture: Boolean algebra and computer arithmetic, flip-flops, design of combinational and sequential circuits, instruction formats, addressing modes, interfacing peripheral devices, types of memory and their organization, interrupts and exceptions. Von Neumann Computer, System Bus. Instruction Cycle, Data Representation, Machine instruction and Assembly Language.

APPENDIX - II
CODES OF THE STATE / UNION TERRITORY

State	Code	State	Code
Andaman and Nicobar Islands	01	Manipur	19
Andhra Pradesh	02	Meghalaya	20
Arunachal Pradesh	03	Mizoram	21
Assam	04	Nagaland	22
Bihar	05	Orissa	23
Chandigarh	06	Punjab	24
Chattisgarh	07	Rajasthan	25
Delhi	08	Sikkim	26
Goa	09	Tamil Nadu	27
Gujarat	10	Tripura	28
Haryana	11	Uttar Pradesh	29
Himachal Pradesh	12	Uttarakhand	30
Jammu and Kashmir	13	West Bengal	31
Jharkhand	14	Dadra and Nagar Haveli (UT)	32
Karnataka	15	Daman and Diu (UT)	33
Kerala	16	Lakshadweep (UT)	34
Madhya Pradesh	17	Puducherry (UT)	35
Maharashtra	18		

APPENDIX – III
Test City Codes

The Entrance Examination will be held in the following Test Cities.

CITY	CODE
BANGALORE	10
BHOPAL	11
CHENNAI	12
CHANDIGARH	13
COIMBATORE	14
HYDERABAD	15
JAIPUR	16
KOCHI	17
KOLKATA	18
LUCKNOW	19
MADURAI	20
NAGPUR	21
NEW DELHI	22
PATNA	23
PUNE	24
VELLORE	25
VIJAYAWADA	26

APPENDIX – IV
The Question Paper

The question papers will have the following subjects code.

Code	Subjects
C I	Civil Engineering
C S	Computer Science and Engineering, Information Technology & Software Technology
C E	Chemical Engineering
C H	Chemistry
E E	Electrical and Electronics Engineering
E I	Instrumentation Engineering
E C	Electronics and Communication Engineering
L S	Life Sciences
M E	Mechanical Engineering
N T	Nanotechnology
P M	Pharmacy
P H	Physics
M A	Mathematics
MC	Master of Computer Applications

APPENDIX – V

PROFORMA FOR SPONSORED CANDIDATES

(To be filled in by the employer sponsoring the candidate)

Name of Employee seeking admission at VIT :..

Employee's date of birth as per company record :..

Designation :..

Date of joining the organization :..

Nature of the job : R&D / Design / Production / Marketing / Administrative/

Others(Specify..)

Reasons for sponsorship :..

Certified that Mr. /Ms. ....

employed as .... in this organization is sponsored

for admission to M.Tech. degree programme at VIT. He / she will be on deputation from this organization during

the study period from July 2014 to May 2016. On completion of the programme, he / she will continue to be

employed by our organization.

Place :

Date :

Signature of Competent Authority with seal

Name :

Designation :

ANNEXURE I

AFFIDAVIT BY THE STUDENT

(This matter has to be typed on a non-judicial stamp paper of ₹ 20)

I, Mr./Mrs./Ms. _____ (full name of student with admission/registration/enrolment number) s/o d/o Mr./Mrs./Ms. _____, having been admitted to _____ (name of the institution), have received a copy of the UGC Regulations on Curbing the Menace of Ragging in Higher Educational Institutions, 2009, (hereinafter called the "Regulations") carefully read and fully understood the provisions contained in the said Regulations.

2) I have, in particular, perused clause 3 of the Regulations and am aware as to what constitutes ragging.

3) I have also, in particular, perused clause 7 and clause 9.1 of the Regulations and am fully aware of the penal and administrative action that is liable to be taken against me in case I am found guilty of or abetting ragging, actively or passively, or being part of a conspiracy to promote ragging.

4) I hereby solemnly aver and undertake that

   a) I will not indulge in any behaviour or act that may be constituted as ragging under clause 3 of the Regulations.
   b) I will not participate in or abet or propagate through any act of commission or omission that may be constituted as ragging under clause 3 of the Regulations.

5) I hereby affirm that, if found guilty of ragging, I am liable for punishment according to clause 9.1 of the Regulations, without prejudice to any other criminal action that may be taken against me under any penal law or any law for the time being in force.

6) I hereby declare that I have not been expelled or debarred from admission in any institution in the country on account of being found guilty of, abetting or being part of a conspiracy to promote, ragging; and further affirm that, in case the declaration is found to be untrue, I am aware that my admission is liable to be cancelled.

Declared this   day of   month of   year.

_____
Signature of deponent
Name:

VERIFICATION

Verified that the contents of this affidavit are true to the best of my knowledge and no part of the affidavit is false and nothing has been concealed or misstated therein.

Verified at _____ (place) on this the _____ (day), of _____ (month), _____ (year).

_____
Signature of deponent

Solemnly affirmed and signed in my presence on this the _____ (day) of _____ (month), _____ (year) after reading the contents of this affidavit.

OATH COMMISSIONER / ADVOCATE AND NOTORY PUBLIC

ANNEXURE II

AFFIDAVIT BY PARENT/GUARDIAN
(This matter has to be typed on a non-judicial stamp paper of ₹ 20)

I,   Mr./Mrs./Ms. _____(full name of parent/guardian) father/mother/guardian of, _____ (full name of student with admission/registration/enrolment number) , having been admitted to _____(name of the institution), have received a copy of the UGC Regulations on Curbing the Menace of Ragging in Higher Educational Institutions, 2009, (hereinafter called the "Regulations"), carefully read and fully understood the provisions contained in the said Regulations.

2)   I have, in particular, perused clause 3 of the Regulations and am aware as to what constitutes ragging.

3)   I have also, in particular, perused clause 7 and clause 9.1 of the Regulations and am fully aware of the penal and administrative action that is liable to be taken against my ward in case he/she is found guilty of or abetting ragging, actively or passively, or being part of a conspiracy to promote ragging.

4)   I hereby solemnly aver and undertake that

a) My ward will not indulge in any behaviour or act that may be constituted as ragging under clause 3 of the Regulations.
b) My ward will not participate in or abet or propagate through any act of commission or omission that may be constituted as ragging under clause 3 of the Regulations.

5)   I hereby affirm that, if found guilty of ragging, my ward is liable for punishment according to clause 9.1 of the Regulations, without prejudice to any other criminal action that may be taken against my ward underany penal law or any law for the time being in force.

6)   I hereby declare that my ward has not been expelled or debarred from admission in any institution in the country on account of being found guilty of, abetting or being part of a conspiracy to promote, ragging; and further affirm that, in case the declaration is found to be untrue, the admission of my ward is liable to be cancelled.

Declared this ___day of _____month of _____year.

_____
Signature of deponent
Name :
Address   :
 Telephone/Mobile No.:

VERIFICATION

Verified that the contents of this affidavit are true to the best of my knowledge and no part of the affidavit is false and nothing has been concealed or misstated therein.

Verified at _____(place) on this the _____(day), of _____(month), _____(year) .

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
Signature of deponent

Solemnly affirmed and signed in my presence on this the _____(day), of _____(month), _____(year) after reading the contents of this affidavit.

OATH COMMISSIONER / ADVOCATE AND NOTARY PUBLIC

ANNEXURE III

CERTIFICATE TO PROVE NATIVITY
(For candidates hailing from Jammu and Kashmir and the North Eastern states of
Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura)

Certified that Mr. / Ms. _____an

applicant for admission to B.Tech. Degree programme in the year _____, son / daughter of Shri. /

Smt_____ residing

at_____

in _____ District of _____ State, is a native of

_____State.

Signature of Tahsildar or Revenue Authority
Name   :
Designation :
Place   :
Date   :
Office Seal   :   **Office Seal**

THE FORM OF CASTE CERTIFICATE FOR SC / ST

Certified that Mr. / Ms. _____an applicant

for admission to B.Tech. Degree programme in the year _____, son / daughter of Shri. / Smt

_____ residing at_____

_____in _____District

of _____belongs to the _____Caste / Tribe,

which is recognized as a Scheduled Caste / Scheduled Tribe under the Constitution (Scheduled Castes) Order 1950 / The Constitution

(Scheduled Tribes) Order, 1950, as amended by the Scheduled Castes and Scheduled Tribes Orders amendment Act, 1976.

Signature of Competent Authority

Name   :
Designation :
Place   :
Date   :

Office Seal
Authorities empowered to issue Scheduled Caste / Scheduled Tribe Certificate

- District Magistrate / Additional District Magistrate/ Collector / Deputy Collector / Deputy Commissioner / 1st Class Stipendiary magistrate / City Magistrate / Sub-Divisional Magistrate / Taluk Magistrate / Executive magistrate / Extra Assistant Commissioner.
- Chief Presidency Magistrate / Additional Chief Presidency Magistrate / Presidency Magistrate
- Revenue Officer not below the rank of Tahsildar
- Sub-Divisional Officer of the area where the candidate and / or his family normally resides