

S Y L L A B U S

BACHELOR OF TECHNOLOGY

FOUR YEAR INTERGRATED COURSE

B. Tech. First Year Examination, 2011

(Common for all branches)



JODHPUR NATIONAL UNIVERSITY
JODHPUR

Academic Regulations

Bachelor of Technology (Semester Scheme) Four Year Integrated Course

1. Abbreviations:-

CS –Computer Science & Engineering Branch

EE –Electrical Engineering Branch

EC –Electronics & Communication Branch

IT –Information Technology Branch

ME –Mechanical Engineering Branch

2. All examination for B.Tech. shall be governed by ordinance. Change in statutes/ordinance/rules/regulation/syllabi & books may from time to time be made by amendment and/or by redrafting and a candidate shall accept and comply with and abide by any change that applies to semester/year he has not completed at the time of the change.

3. Duration of Course

The course study for B.Tech. will extend over a period of 4 years (8 semesters) as an integrated course. A student shall follow the prescribed course as given in the teaching & examination scheme of the course to which he is admitted.

4 Eligibility for Admission

4.1 (a) A candidate for admission to the four year degree program for B.Tech must have passed (10+2) Senior Secondary/ (Physics, Chemistry & Mathematics) from Board of Secondary Education, Rajasthan or other examinations recognized as equivalent or higher thereto and selected through RPET/AIEEE or otherwise as per the procedure laid down by the University from time to time.

4.1 (b) 5% relaxation is provided to candidates belonging to SC/ST category.

4.2 Lateral entry to Diploma holder's B.Tech. Second Year

A candidate who has passed Diploma course in engineering conducted by a State Board of Technical Education with atleast 60% marks in aggregate or in Final year shall be eligible for admission directly to the II B.Tech of the Four year course in the appropriate branch of engineering provided that in the case of a student belonging to SC/ST, minimum percentage marks secured at the Diploma shall be at least 55%.

Admission of such student shall be made on the basis of merit at the Diploma level and/or merit to be adjudged through a competitive test/viva voce.

The candidate who has appeared at the Final Year examination of Diploma course but whose result are awaited will also be permitted provisionally.

All such cases would be considered for admission against the 10% of sanctioned strength and the availability of seats due to drop outs & failures in respective branch of engineering and as per prevalent rules (of RPET in this respect) of the University.

5. Eligibility for appearing in the examination

The course of study for First year (I & II Semester) would be common for all branches.

- 5.1 (i) For all regular candidates in the Faculties of Applied Science, Law, Pharmacy, Management and Engineering the minimum attendance requirement shall be that a candidate should have attended at least 75% of the lectures delivered and the tutorials held taken together as well as 75% for the practical and sessionals from the date of her/his admission.
- 5.1 (ii) A candidate who has attended a regular course of study in the Faculty of Engineering for the First Semester of First B.Tech. in accordance with the scheme of examination shall be eligible for appearing at the first semester examination of First B.Tech for the B.Tech. Degree which shall be common to all branches.
- 5.1 (iii) A candidate who has attended a regular course of study for the Second Semester of First B.Tech and has appeared in the First Semester examination shall be eligible for appearing at the Second Semester examination of First B.Tech. in accordance with the scheme of examination which shall be common to all branches.
- 5.2 (i) The course of study from the Second B.Tech. Examination shall be separate for all branches of study.
- 5.2 (ii) A candidate who after passing I & II Semester (combined) of Ist B.Tech. examination with regular course of study in a particular branch of Engineering shall be eligible for appearing at the Third Semester examination of Second B.Tech. in that branch of study.
- 5.2 (iii) A candidate who has attended a regular course of study for the Fourth Semester examination of Second B.Tech and has also appeared in the Third Semester examination of Second B.Tech shall be eligible for appearing at the Fourth Semester Examination of Second B.Tech in that branch of study.
- 5.2 (iv) A candidate who has passed III & IV Semester of Second B.Tech examination and has attended a regular course of study in a particular branch of Engineering for the Fifth Semester of Third B.Tech in accordance with the scheme of examination shall be eligible for appearing at the Fifth Semester examination of Third B.Tech in that branch of study.
- 5.2 (v) A candidate who has attended a regular course of study for the Sixth Semester of Third B.Tech. and also has appeared in the Fifth Semester examination of Third B.Tech. in accordance with the scheme of examination shall be eligible for appearing at the Sixth Semester examination of Third B.Tech in that branch of study.
- 5.2 (vi) A candidate who has passed V and VI Semester of Third B.Tech examination and has attended a regular courses of study in particular branch of Engineering for the Seventh Semester of Final B.Tech in accordance with the scheme of examination shall be eligible of appearing at the Seventh Semester examination of Final B.Tech in that branch of study.
- 5.2 (vii) A candidate who has attended a regular course of study for the Eighth Semester of Final B.Tech and has also appeared in the Seventh Semester examination of Final B.Tech in accordance with the scheme of examination shall be eligible for appearing at the Eighth Semester examination of Final B.Tech in that branch of study.

5.3 Condonation of shortage of attendance :

The shortage of attendance up to the limits specified below may be condoned on valid reasons :

- (i) A candidate can have a relaxation of 10% attendance on medical and special ground to the satisfaction of Dean and additional 5% can be granted by Vice-Chancellor.
- (ii) The N.C.C./N.S.S. cadets sent out to parades and camps and such students who are deputed by the University to take part in games, athletics or cultural activities and to attend campus interviews may for the purpose of attendance be treated as present for the days of these absence in connection with the aforesaid activities and that period shall be added to their subject wise attendance.

6. Scheme of Study

6.1 The Medium of instruction and examination shall be English.

6.2 Candidates for the B.Tech Course shall be instructed and examined as per the Teaching and Examination scheme and course content of respective semester.

6.3 (i) The course of study for First year (I & II Semester) would be common for all branches.

6.3 (ii) The course of study from the Second B.Tech, III B.Tech & Final B.Tech (from III to VIII Semester) shall be separate for each branch of study.

7. Examination There shall be two sessional exam in theory and one university examination each in theory & Practical in each semester. These examinations will be designated as follows.

(i) During first year; B.Tech. I semester Examination, B.Tech. II Semester Examination.

(ii) During second year: B.Tech. III Semester Examination, B.Tech. IV Semester Examination.

(iii) During third year: B.Tech. V Semester Examination, B.Tech. VII Semester Examination.

(vi) During fourth year: B.Tech. VII semester Examination, B.Tech. VIII Semester Examination.

(v) Examination shall be conducted by means of written papers and/or practical and/or viva voce exams, including sessionals work done in the laboratories, workshops and training in engineering works or factories.

8. Standard of Passing

8.1 (i) the candidate has to pass individually in all courses of each semester from I to VIII Semester. The results of I, III, V and VII Semester shall be declared without awarding the division. The division will be awarded on the basis of combined performance of I & II Semesters, III & IV Semesters, V & VI Semesters and VII & VIII Semesters respectively.

8.1 (ii) For pass in a course the student has to secure minimum 35% marks in theory papers including sessionals/ term papers however to pass in theory paper he/she must secure 35% marks in university theory paper (i.e. 28 marks out of 80) and candidate has to obtain 50% marks in practical and sessional (i.e. as a minimum 10 marks out of 20 and 15 marks out of 30 and in total 25 marks out of 50). He/she must obtain aggregate of 45% marks in the grand total in that semester.

8.2 No candidate will be awarded degree of Bachelor of Engineering unless he/she has passed all the eight semester.

8.3 If a student fails only in theory papers, he/she will be treated as an Ex-student until-unless he/she wants to be a regular student.

8.4 If he/she fails in any Practical examination then-

- a) if he/she is declared as Year Back category, he/she will be a regular student.
- b) if he/she is declared ATKT due to fail in practical then he/she has to attend laboratory classes regularly to improve internal marks. He/she will be given single chance.

NOTE: a candidate, who is unable to appear at the semester examination in some theory papers, Practical and sessionals due to any reason what so ever, shall be considered as having failed in those paper (s), Practical (s) and Sessional (s).

9. Marks, Criteria for passing and other conditions.

9.1 Candidate will be considered as passed the semester only when the candidate passes in all the subjects with ATKT. Candidate will be given maximum eight years to complete his/her B.Tech after this period his enrolment stand cancelled. If candidate fail to appear in examination, then also his attempt will be counted.

9.2 (i) No candidate shall be permitted to pursue a regular course of study of III B.Tech (V and VI Semesters) unless he/she has passed all the courses of First B.Tech.

(ii) No candidate shall be permitted to pursue a regular course of study of Fourth B.Tech (VII and VIII Semesters) unless he/she has passed all the courses of Second B.Tech.

9.3 ATKT

If a candidate fails in not more than 50% of Theory courses and/or not more than 50% of practical courses during a year (Both semesters of a year taken together), he will be allowed to keep term (ATKT) in next year subject to the provisions of ordinance.

At the end of academic year	Total subject heads at the end of academic year.	50% of total subjects (To nearest full digit) for ATKT
B. Tech. I Year Theory	7 + 7	7
Practical	6 + 6	6

Candidate allowed ATKT shall appear in failed subject (s) along with regular candidates whenever examination of that semester is held or in special examination if any held by the University. For the purpose of this clause, each written paper and each Practical and sessional of a semester shall be counted as a separate course.

10 Professional Training and Project

Every candidate is required to undergo practical training in a engineering works, organization of hardware & software technology, factory, workshop & design office approved by the Dean of the faculty for a period of 45 working days after 3rd year. In addition to this, every candidate will be required to undertake 4 - 5 Industrial Visits spanning over a period of about 10 days after Second Year but before completing the course of III B.Tech.

11 Award of Degree, Division and Rank

11.1 Degree will be awarded to the candidates who have passed in all the subjects of the all eight semesters.

11.2 (i) First B.Tech to Third B.Tech. a candidate declared pass in a examination will be awarded division as follows:

First Class	If a candidate secure a minimum of 60 percent.
Second Class	If a candidate secure a minimum of 50 percent.
Pass Class	If a candidate secure a minimum of 45 percent.

11.2 (ii) For award of division for B.Tech Degree as a whole marks shall be totaled up as follows :

First B.Tech	40%
Second B.Tech	60%
Third B.Tech	100%
Final B.Tech	100%

11.2 (iii) A candidate shall be awarded a degree with Honours if she/he secures a minimum of 75 percent of aggregate marks provided he/she clears all the courses in first attempt. A candidate shall be awarded a degree with First Class if she/he secures a minimum of 60 percent of aggregate marks. A candidate shall be awarded a degree with Second Class if she/he secures a minimum of 50 percent of aggregate marks. The rest of the successful candidates will be awarded pass class.

11.2 (iv) For determining merit position of the candidates at the Final Year level the marks obtained by them in the Second, Third and Final Year as described above shall only be considered.

12. REVALUATION: Revaluation can be done on the request of candidate with requisite fee as per Rules laid down by university.

13. CONDONATION OF DEFICIENCY IN MARKS

With a view to moderate hard line cases in the examination the following rules shall be observes:

13.1 Deficiency up to 5 marks be condoned to the best advantage of the candidate for passing the examination, provided the candidate fails in maximum of two Theory, or one Theory and one practical or two practicals. This facility shall be available only to those candidates who appear at the semester examination in full (i.e. in all Theory, Practicals and sessional in first attempt.)

13.2 While declaring result of the candidate no marks shall be added to or subtracted from the aggregate for the deficiency condoned as above. However, he/she will pass the subjects cleared through clause 13.1 after condoning the deficiency the candidate's result shall be declared in the division, which the aggregate entitled him/her.

13.2.1 One grace mark will be given to the candidate who is failing/missing distinction/ missing first division by one mark, by the Vice-Chancellor in the B.Tech. examination. This benefit will not, however, be available to a candidate getting advantage under clause 13.1

14. Ex-student:

14.1 (i) If a candidate fails in more than 50% of theory courses and/or more than 50% of practicals and sessionals in a year, he/she shall be declared as failed in that year.

14.1 (ii) A candidates failed in a year shall have to take admission as regular student in that year. However a candidate who has passed in all practicals and sessionals but has failed in Theory courses only may appear in that years' examination as Ex student in all Theory papers, his practical and sessional marks of that year shall be carried over. However, such an Ex-student can apply for regular course of study in the year in which he/she has failed. Being a regular student he/she shall appear in all the examinations of Theory, Practical and Sessionals.

14.2 (i) Where a candidate fails in Practicals and Sessionals and is given the benefit of ATKT as per clause 8 and 9, he/she may choose to attend laboratory/sessional classes and submit a revised laboratory reord/sessional. Such a candidate shall have to pay a fee of Rs. 500/- for doing each practical and sessional course during the semester. Otherwise his previous sessional marks shall be carried forward.

15. Change of Branch

A candidate may be permitted to change his/her branch of study after passing B.Tech I Year strictly on the basis of merit secured in B.Tech I Year examination (First and Second Semester examination taken together) depending upon the vacancies available in the sanctioned strength in particular branch of study.

16. Requirement of additional degree :

- a) An engineering graduate of the Jodhpur National University, Jodhpur who wishes to qualify for an additional degree of Engineering of the University will be considered by a committee consisting of the Dean and the Head of Department concerned.
- b) He/she will be admitted in Third B.Tech class of the branch as regular student. The Theory papers and practicals and sessional which he/she has to appear as additional courses at the previous examinations in that branch will be decided by the above committee. .
- c) He/she will be awarded division as per regulation 11.
- d) Mention will be made in the certificate that he/she has qualified for the additional degree.

17. A special Examination for VIII Semester will be held along with VII Semester examinations for students who fail in VIII Semester regular Examination.

18. The diploma passed candidates admitted to the Second B.Tech., (all branches) shall be required to undergo a regular course of study in Special Mathematics during the academic Session and shall have to appear and pass in this paper (Sessional) along with other theory papers of the Main Examination. For this subject, combined marks obtained in III & IV Semester shall be counted for pass as a pre-requisite of Clause 9.2 (ii) and will not be considered for award of division.

JODHPUR UNIVERSITY, JODHPUR
Plan and Scheme of Examination for B.Tech. 1 Year (Semester I & II)
COMMON FOR ALL BRANCHES

I Semester- Theory Courses

Sub Code	Subject	No. of Teaching Hours Per Week			Exam. Hours	Marks Allocation				Total
		L	T	P		Theory Univ. Exam.	Term test	Sessional	Practical Univ. Exam.	
101	English- I	3	1	-	2	80	20			100
102	Engineering Mathematics-I	4	1	-	3	80	20			100
103	Physics-I	2	1	-	3	80	20			100
104	Environmental Engg	3	-	-	3	80	20			100
105	Fundamental of Electrical Engineering	3	-	-	3	80	20			100
106	Fundamentals of Manufacturing Processes	2	-	-	3	80	20			100
107	Fundamentals of Computer Applications	2	-	-	3	80	20			100
Total		19	3	-		560	140			700

Practical- Courses

Sub Code	Subject	No. of Teaching Hours Per Week			Exam. Hours	Marks Allocation				Total
		L	T	P		Theory Univ. Exam.	Term test	Sessional	Practical Univ. Exam.	
111	Physics Lab –I	-	-	2	3			30	20	50
112	Environmental Engg. Lab	-	-	2	3			30	20	50
113	Computer Applications Lab	-	-	2	3			30	20	50
114	Electrical .Engineering. Lab.	-	-	2	3			30	20	50
115	Mechanical. Workshop	-	-	2	3			30	20	50
116	Practical Geometry	-	-	3	3			30	20	50
Total		19	3	13				180	120	350
Contact Hours per week				35					Grand Total	1000

II Semester- Theory Courses

Sub Code	Subject	No. of Teaching Hours Per Week			Exam. Hours	Marks Allocation				Total
		L	T	P		Theory Univ. Exam.	Term test	Sessional	Practical Univ. Exam.	
201	English Communication Techniques	3	-	-	3	80	20			100
202	Engineering Mathematics-II	4	1	-	3	80	20			100
203	Physics-II	2	1	-	3	80	20			100
204	Engineering Chemistry	3	-	-	3	80	20			100
205	Fundamental of Electronics Engineering	3	-	-	3	80	20			100
206	Fundamental of Mechanical Engg.	2	-	-	3	80	20			100
207	Fundamental of Computer Programme.	3	-	-	3	80	20			100
Total		20	02	-		560	140			700

Practical- Courses

Sub Code	Subject	No. of Teaching Hours Per Week			Exam. Hours	Marks Allocation				Total
		L	T	P		Theory Univ. Exam.	Term test	Sessional	Practical Univ. Exam.	
211	English Language Lab.	-	-	2	3			30	20	50
212	Physics Lab –II	-	-	2	3			30	20	50
213	Engineering Chemistry Lab.	-	-	2	3			30	20	50
214	Fundamentals of Computer Programming	-	-	2	3			30	20	50
215	Mechanical Engineering. Lab.	-	-	2	3			30	20	50
216	Machine Drawing	-	-	3	3			30	20	50
Total		20	2	13				180	120	350
Contact Hours per week				35					Grand Total	1000

Teaching Hrs.

Exam. Hrs. – 3 Hrs

L-3 T-1 P-0

Marks Theory Exam – 80 Term Test – 20 Total 100

CONTENTS OF SYLLABUS

Units:	Topics	
I	Text Book for detailed study Tongue R.K. and Shiv. K. Kumar- An English Miscellany (Oxford University Publication)	Lectures Req-6
	<ul style="list-style-type: none"> • Two Lessons from prose and two lessons from Poetry • Question Answer from the text book • Comprehension Passages- Seen and unseen. 	
II:	Grammar	Lectures Req-9
	<ul style="list-style-type: none"> • Nouns, Pronouns • Tenses, Sequence of tenses • Subject verb Agreement • Modal verbs 	
III	Grammar	Lectures Req-9
	<ul style="list-style-type: none"> • Adjectives • Articles and determiners • The Infinitive, Participle & Gerund • The passive 	
IV		Lectures Req- 9
	<ul style="list-style-type: none"> • Application writing • C.V. writing • Letter writing formal & informal 	
V		Lectures Req-9
	<ul style="list-style-type: none"> • Essay writing • Paragraph writing • Review writing 	
		Total Lectures Req- 42

Books for Reference

- High School English Grammar & Composition
P.C. Wren & Martin, S.Chand & Co., New Delhi
- Murphy's English Grammar, 3rd Edition
Raymond Murphy, Cambridge University Press
- An Intermediate English Practice Book
S. Pit Corder, Orient Long Man
- A Remedial English Grammar for foreign Students
F.T. Wood, Macmillan Publishers
- A University Grammar of English
Quirk & Green Baum, Orient Longman
- A Practical English Grammar
Thomson & Martinet, Oxford University Press
- Written Communication in English
Sarah Freeman, Orient Longman

Teaching Hrs.
Hrs.
L-4 T-1 P-0
100

Exam Hrs. – 3

Marks Theory Exam.-80 Term test-20 Total

CONTENTS OF SYLLABUS

Units	Topics	
I	Differential Calculus :	Asymptotes (Cartesian Coordinates Only),Curvature ,Concavity, Convexity and Point of inflexion (Cartesian Coordinates Only),Curve Tracing (Cartesian and Standard Polar Curves-Cardioids, Lemniscates of Bernoulli Limacine, Equiangular Spiral) Lectures Req : 10
II	Differential Calculus :	Partial Differentiation, Euler's Theorem on Homogeneous Functions, Approximate Calculations, Maxima & Minima of Two and More Independent Variables, Lagrange's Method of Multipliers Lectures Req : 10
III	Integral Calculus :	Applications in Finding the Length of Simple Curves, Surface and Volumes of Solids of Revolution, Double Integral, Areas & Volumes by Double Integration, Change of Order of Integration, Beta Function and Gamma Function (Simple Properties) Lectures Req : 10
IV	Differential Equations :	Differential Equations of First Order and First Degree - Variable Separable, Homogeneous Forms, Reducible to Homogeneous Form, Linear Form, Exact Form, Reducible to Exact Form, Linear Differential Equations of Higher Order with Constant Coefficients Only Lectures Req : 12
V	Differential Equations :	Second Order Ordinary Differential Equations with Variables Coefficients, Homogeneous and Exact Forms, Change of Dependent Variable, Change of independent Variable. Normal Forms, Method of Variation of Parameter Lectures Req : 12
		Total Lectures Req : 54

Reference Books:

- Jain. R.K. and Iyengar, S.R.K., Advanced Engineering Mathematics, Narosa Publishing House, New Delhi.
- Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi.
- Bali, N.P., A Text Book on Engineering Mathematics, Luxmi Publications, New Delhi.
- Kreyszing, E., Advanced Engineering Mathematics, John Wiley.
- Mehta D.M, Sharma Engineering Mathematics I, Vardan Publisher.
- Ray Wylie, C., Advanced Engineering Mathematics. 6th ed., McGraw Hill.

Teaching Hrs.
L-2 T-1 P-0Exam Hrs.- 3 Hrs
Marks Theory Exam.-80 Term test-20 Total 100

CONTENTS OF SYLLABUS

Unit	Topics	Details of coverage	
1	Magnetic Materials and Electrostatics		Lectures required: 06
	<ul style="list-style-type: none"> Classification of magnetic material Types of magnetism Magnetic domains Ferrites Charge distribution Integral/Differential approach to Gauss's Law Poisson and Laplace equation Boundary conditions and Uniqueness theorem Solution of Laplace's equation in rectangular coordinates. 	<ul style="list-style-type: none"> Brief Explanation Dia, Para, Ferro etc. Explanation Brief description and their applications. Explanation Derivation No derivation Explanation and brief derivation Derivation, No numerical 	
2	Physical Optics		Lectures required: 06
	<ul style="list-style-type: none"> Interference, Interference from parallel thin films, Newton rings, Michelson interferometer 	<ul style="list-style-type: none"> Definition & brief introduction, Condition of Interference Explanation and derivation Determination of wavelength, refractive index, formation by two curved surfaces and Newton's ring with white light. Types of fringes, determination of wavelength of monochromatic light, difference in wavelength between two neighbouring spectral lines and its uses. 	
3	Diffraction		Lectures required: 06
	<ul style="list-style-type: none"> Diffraction, Fraunhofer diffraction Plane Transmission Grating, Resolving power 	<ul style="list-style-type: none"> Definition, difference between Fresnel's and Fraunhofer Class Single Slit (Intensity distribution by calculus method), N slits (derivation for intensity distribution) Theory, width of Principal Maxima, absent spectra, maximum number of orders available, dispersive power, formation of multiple spectra. Brief introduction, Rayleigh's criterion and resolving power of grating. 	
4	Theory of Relativity		Lectures required: 08
	<ul style="list-style-type: none"> Concept of ether; Michelson Morley experiment; Einstein's postulates, Lorentz transformation equations, Length contraction and Time dilation Addition of velocity, Variation of mass with velocity, Mass-energy relation, Energy momentum relation. 	<ul style="list-style-type: none"> Introduction Explanation with derivation Statement Derivation of equations. Explanation with derivation Derivation. Derivation. Derivation. Derivation 	
5	Electromagnetics		Lectures required: 06
	<ul style="list-style-type: none"> Ampere's Circuital law Displacement Current Maxwell's Equations (Differential) Electromagnetic Wave Propagation in Free Space Poynting Theorem 	<ul style="list-style-type: none"> Derivation Brief description Derivation Derivation Derivation 	

Total No. of Periods: 32**Reference Books:**

1. A. Ghatak, "Optics"
2. N. Subrahmanyam and Brij Lal, "Optics"
3. R.L. Singhal "Solid State Physics"
4. D.S.Mathur "Mechanics"
5. R K Gaur and S L Gupta "Engg. Physics"
6. J.C. Upadhaya, "Mechanics"
7. K.K. Tiwari, "Electromagnetic & Electronics"
8. B.B. Laud, "Electro magnetic"

104 ENVIRONMENTAL ENGINEERING

Teaching Hrs.

Exam. Hrs. – 3 Hrs

L-3 T-0 P-0

Marks Theory Exam – 80 Term Test – 20 Total 100

CONTENTS OF SYLLABUS

Units: Topics

I	Water: Sources of water, Impurities in water, Hardness of water, Units of hardness, Inter relationship between various units, Degree of hardness, Determination of hardness by Clark's test and Complexometric (EDTA) method, Numerical problems based on hardness and EDTA method. Boiler troubles their causes, disadvantages and prevention: Carry over (Priming and Foaming), Boiler Corrosion, Scale and Sludge formation, Caustic embrittlement.	Lectures Req: 8
II	Water treatment: Requisites of drinking water, Treatment of water, Disinfection, Break point chlorination, Softening of water by Lime - Soda, Zeolite and Ion-exchange process, Mixed bed demineralization, Numerical problems based on Lime - Soda and Zeolite softening method.	Lectures Req: 9
III	Environmental pollution and control: Air Pollution, Harmful effects of air pollution, Control of air pollution, Noise pollution, Adverse effects and control of noise pollution, Global warming, Acid rain, Ozone depletion, Objectives and definitions of Environmental acts and regulations for pollution control (brief description only), Necessity and methodology of Environmental Impact Assessment (EIA).	Lectures Req: 8
IV	Corrosion and its prevention: Definition and its significance, Mechanism of corrosion (Dry and Electrochemical Corrosion), Factors affecting rate of corrosion, Protection against corrosion, Protective metal coating. Solid waste management: Introduction to solid waste management, classification, collection and disposal of solid waste.	Lectures Req: 9
V	Phase rule: Statement: Definition and meaning of the terms involved, Application to One component system (Water system and Sulphur system), Study of two component system (Pb-Ag system). Renewable energy sources: Elementary ideas of renewable sources of energy, Potential of renewable sources of energy in India.	Lectures Req: 8

Total Lectures Req. 42

Reference Books:

1. Chemical Process Industries By R. Norris Shreve & Joseph A. Brink, Tata McGraw Hill Publishing Co. New Delhi
2. Shreve's Chemical Process Industries By George T. Austin. McGraw Hill Book Co.
3. Industries Chemistry By B.K Sharma, Krishna Prakashan Mandir, Meerut.
4. Engineering Chemistry By P.C. Jain and Monica Jain. Dhanpat Rai Publishing Company (P) Ltd. New Delhi.
5. Engineering Chemistry By S.K. Jain and K.D. Gupta, Jaipur Publishing House, Jaipur
6. Environmental Chemistry By Anil Kumar De, New Age International (P) Limited. New Delhi.
7. Environmental Chemistry and Pollution Control (Latest ed.), By S.S. Dara.
8. A Basic in Environmental studies, By S.Deswal and A.Deswal.

Teaching Hrs.
L-3, T-0, P-0

Exam. Hrs. : 3 Hrs.
Exam Marks: 100 {Internal (20) & University (80)}

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage	Lectures required: 10
I	Elementary Concepts		
	<ul style="list-style-type: none"> • Electrical Circuit • Various circuits and parameters • Energy sources • Basic laws • AC waveforms 	<ul style="list-style-type: none"> : Various types of elements, Basic electrical quantities : Introduction to linear & nonlinear circuits, RLC parameters, Lumped & distributed networks. self inductance & mutual inductance : Voltage & current sources, series & parallel connections of sources, Source conversion techniques. : Ohm's law, KCL, KVL, Nodal and Mesh analysis : Introduction to waveforms such as square, triangular, saw-tooth, concept of R.M.S. & average values, elementary method of obtaining average value & R.M.S, value Various connections & theorem's : Y to Δ & Δ to Y connections, superposition theorem, Thevenin Theorem. 	
II	Single Phase & Three Phase A.C. Circuits		Lectures required: 8
	<ul style="list-style-type: none"> • Single Phase AC Circuit • Circuit details • Three Phase AC Circuit 	<ul style="list-style-type: none"> : Generation of single phase a.c. voltage, E.M.F. equation, average, R.M.S. & effective values. : R.L.C. series, parallel & series parallel circuits, complex representation of impedances, phasor diagram, power & power factor : Generation of three phase a.c. voltage, line & phase quantities, three phase balanced circuits, phasor diagrams, measurement of power in three phase balanced circuits. 	
III	D.C. Machines		Lectures required: 5
	<ul style="list-style-type: none"> • D.C. Generator • D.C. Motor 	<ul style="list-style-type: none"> : Concept of E.M.F. generation, excitation system, series, shunt & compound generators, Characteristics. : Series, Shunt & compound types, Characteristics and their Uses 	
IV	A.C. Machines		Lectures required: 9
	<ul style="list-style-type: none"> • Transformer • Three Phase inductions motor • Synchronous Machine 	<ul style="list-style-type: none"> : Principle of transformer, ideal transformer, basic construction, equivalent circuit & its phasor diagrams (No Load and On Load) : Concept of rotating magnetic field, three phase induction motor, principle of operation, equivalent circuit as a rotating transformer & phasor diagram. : Synchronous machine: Principle of operation of generator & motor, comparison with induction machine. 	
V	Electrical Measuring Instruments		Lectures required: 8
	<ul style="list-style-type: none"> • Measuring Instruments 	<ul style="list-style-type: none"> : Introduction, types of measuring instruments, Deflection, controlling & damping torque, Galvanometer, moving coil instruments, shunts & multipliers, moving iron ammeter & voltmeter. Dynamometer wattmeter, Energy meter. 	

Reference Books:

- i) S.K. Sahdev : Electrical & Electronics Engineering
- ii) B.L. Theroya : Fundament of Electrical Engineering
- iii) K.R. Niaza : Electrical & Electronics Engineering
- iv) J.B. Gupta : Electrical & Electronics Engineering

Teaching Hrs.
L-2 T-0 P-0

Exam Hrs. – 3 Hrs.
Marks Theory Exam.-80 Term Test – 20 Total 100

CONTENTS OF SYLLABUS		
Unit	Topics	Details of Coverage
I	Engineering Materials	Classification of Engineering Materials: Plain Carbon Steel, Types of cast irons, composition, properties & applications. Properties & application of aluminum, copper, types of brasses, their composition & applications. Definition of mechanical properties like elasticity, toughness, resilience tensile strength, ductility, malleability, brittleness & hardness
II	Fabrication Processes	Introduction to wood working, types of wood, advantages of timber, qualities of good timber, seasoning of wood, defect in timber, wooden joints, ply wood, ply board. Gas welding, Arc welding tools & equipment, Introduction to soldering and brazing, Introduction to bench working operations.
III	Manufacturing Processes	Forgeability and forging temperatures, Forging operations, forging hand tools and their applications, hand forging operations: like upsetting, drawing, punching & drifting etc. Definitions and functions of pattern, pattern making, types of pattern, molding tools, molding boxes, molding sands, compositions and sand preparation.
IV	Metal Machining Processes	Machine tools: Classifications Specifications Working and operations of Centre lathe, Shaper and Drilling Machines
V	Power Transmission in Machine Tools	Power Transmission: Classification And Applications of Various Drives Belt, Chain, Gear (Excluding Epicyclic Gear Train) And Their Velocity Ratios. Introduction to Clutches, Couplings, Pulleys and their applications.

Total Lectures Required: 29

Reference Books:

1. Elements of Workshop Technology Vol-I &II by S K Hazara Choudhury, S K Bose A K Hazra Choudhury Nirjhar Roy ; Media Promoters & Publishers Pvt. Ltd.
2. A Course in Workshop Technology Vol I & II by B S Raghuvanshi ; Dhanpat Rai & co.
3. Manufacturing Technology by P N Rao; Tata McGraw-Hill Publishing Co. Ltd.
4. Theory of Machines by S S Ratan; Tata McGraw Hill Publishing Co. Ltd.
5. Automation, Production Systems, and Computer-Integrated Manufacturing Prentice Hall, Mikell P. Groover, ISBN-13: 9780130889782.

OBJECTIVE: Familiarity with the Computer, Software, Networks & their uses.

CONTENTS OF SYLLABUS

Units	Topics	Details of Coverage	
I	Getting Acquainted with Computer. <ul style="list-style-type: none"> Types & Generation of Computers. Computer Architecture & Building Blocks. Memory & I/O devices. Specification of Personal Computer. 	Explanation of evolution of Computers. Explanation with Block Diagram Basic Concepts & Examples Various Configurations of Branded & Assembled PC's.	Lectures Req: 10
II	Data Processing and Office Use <ul style="list-style-type: none"> MS-WORD MS-POWERPOINT MS-EXCEL MS-ACCESS 	Explanation of Application of MS-OFFICE for use in Project Report formation.	Lectures Req: 03
III	Data Modeling & Information Technology <ul style="list-style-type: none"> Flow Charts Control Flow Diagram, Data Flow Diagram, Entity Relationship Diagram Data & Information, Quality of Information, Information system Character & Graphical User Interface Important Data types: Text, Graphics & Animation, Audio, Video. 	Introduction & its Symbols Explanation with Examples Basic Idea. Basic explanation & Difference. Basic idea about the daily use.	Lectures Req: 06
IV	Networks <ul style="list-style-type: none"> LAN, MAN, WAN. Intranet. Internet: WWW, Web Browser, Search Engine, Email, Cryptography, Digital Signature, Smart Card Technology, Upload & Download. 	Basic Components & Differences Introduction & Uses. Brief Introduction of each, based on day to day uses.	Lectures Req: 08
V	Threats & Security for Computer <ul style="list-style-type: none"> Virus & Antivirus. Ethics (Do's & Don'ts). Trouble Shooting. S/W Licenses & Open Source Technology. 	Introduction and its types. Security, Concepts, Cyber Laws Solution to PC related Common Problems Brief Introduction.	Lectures Req: 05

Total Lectures Req: 32

Teaching Hrs.
L-0 T-0 P-2

Exam Hrs.- 3 Hrs
Marks Sessional -30 Practical-20 Total 50

S. No. List of Experiments

OPTICS

- I. To determine the wave length of Sodium light by Newton's rings.
- II. To determine the specific rotation of Glucose (Sugar) solution using a Polarimeter.
- III. To determine the wave length of Sodium light by Michelson's Interferometer.
- IV. To determine the dispersive power of material of prism for violet and yellow colors of mercury light with the help of a spectrometer.
- V. To verify the expression for the resolving power of a telescope

ELECTRONICS / ELECTRICAL

- VI. To convert a galvanometer into an Ammeter of range 1.5 Amps and calibrate it.
- VII. To study the variation of semiconductor resistance with temperature and hence determine the band gap of semiconductor in the form of reverse biased P-N junction diode.
- VIII. To determine the high resistance by the method of leakage, using a Ballistic Galvanometer.
- IX. To determine dielectric constant of a liquid using moving coil Ballistic Galvanometer with standard parallel plate condenser.

112 ENVIRONMENTAL ENGINEERING LAB

Teaching Hrs.

Exam. Hrs. – 3 Hrs

L-0 T-0 P-2

Marks Sessional – 30 Practical – 20 Total - 50

(Any Eight experiments are to be performed.)

S. No. List of Experiments:

- I. Determination of hardness of water by different methods.
- II. Determination of strength of NaOH and Na₂CO₃ in a given alkali mixture.
- III. Determination of available chlorine in water.
- IV. Measurement of residual chlorine in water.
- V. Measurement of dissolved oxygen in water.
- VI. Measurement of nitrate in water.
- VII. Measurement of fluoride in water.
- VIII. Measurement of chlorides in water.
- IX. Determination of barium as barium sulphate gravimetrically.
- X. Measurement of pH of a given sample by pH meter and measurement of strength of acid and base pH metrically.
- XI. Measurement of conductivity of a given sample by conductivity meter and measurement of strength of acid and base by conductometric method.
- XII. Measurement of total solids, settleable solids and dissolved solids in sewage.
- XIII. Determination of sodium and potassium by flame photometer in a given sample.

Reference Books:

1. A Text Book on Experiment and Calculation in Engineering Chemistry By S.S. Dara.
2. Laboratory Manual on Engineering Chemistry By S.K. Bhasin and Sudha Rani.
3. Vogel Text book of Quantitative Chemical Analysis By G.H. Jeffery, J. Bassett, J. Mendham & R.C. Denney.
4. Instrumental Methods of Chemical Analysis By B.K. Sharma.
5. Practical Engineering Chemistry By Sanjay Sharma.
6. Environmental Engineering Laboratory Manual By Vivek Pandey and Sama Jain.

113 COMPUTER APPLICATIONS LAB

Teaching Hrs.
L-0 T-0 P-2

Exam Hrs. – 3 Hrs.
Marks Sessional - 30 Practical – 20 Total 50

OBJECTIVE: To make the user system friendly & to get hands on computer experience.

S. No	List Of Experiments	
	Assignment 1st	
I	<ul style="list-style-type: none">MS-WORDMS-POWERPOINT	(3 Labs)
	Assignment 2nd	
II	<ul style="list-style-type: none">MS -ACCESSMS -EXCELL Spread Sheet, Graphs, Database Management, Formulations	(3 Labs)
	Assignment 3rd	
III	<ul style="list-style-type: none">INTERNET APPLICATIONS: Email, Search Engine, Download & Upload, Community Groups	(3 Labs)
	Assignment 4th	
IV	<ul style="list-style-type: none">PDF Formats, JPG Formats, Photo Editor, Picture Formats	(2 Labs)
	Assignment 5th	
V	<ul style="list-style-type: none">THREATS & SECURITIES Virus, Ethics, DOS, Formatting ,Trouble Shooting	(5 Labs)
		Total Labs Req: 16

Teaching Hrs.
L-0, T-0, P-02

Exam Hrs. : 3 Hrs.
Exam Marks: 50 (Internal (30) & University

CONTENTS OF SYLLABUS

S. No.	List of Experiments	Details of Coverage 17	Labs required:
1.	Graphical Symbols and Electrical components	Study of graphical symbols used to indicate Electrical components in single line diagrams. Functional study of various Electrical components viz. fuse, MCB, Relays, switches etc.	
2.	Earthing- study and types.	Study of the necessity of earthing, Advantages and types of earthing- plate earthing and pipe earthing.	
3.	Electrical Ceiling Fan	Study of parts of ceiling fan, Its working, connection and testing.	
4.	Types of House Wiring	Study of different types of house wiring, materials required casing, capping etc. Making the connection of house wiring including energy meter , MCB, ceiling fan, lamp and three pin socket. Staircase wiring- controlling a lamp from two different positions.	
5.	Electrical Iron	Study of electric iron, its parts and testing.	
6.	Fluorescent Tube Light	Study, working and circuit connection.	
7.	Introduction of various active and passive components.	Identification, testing and application of resistors, inductors, capacitors, PN-diode, Zener diode, LED, LCD, UJT, BJT, FET, SCR, Photo diode and Photo Transistor.	
8.	Electronic instruments.	Functional study of CRO, analog and digital multimeters and Function generator.	
9.	Electronic Hardware	Study of soldering-desoldering, bread board, printed circuit boards(PCBs) and to learn mounting of components on PCB.	
10.	Rectifier circuits	Study of single phase half-wave rectifier and full-wave rectifiers. Make the connections on bread board and observe the effect of filters on CRO.	

115 MECHANICAL WORKSHOP

Teaching Hrs.
L-0 T-0 P-2

Exam Hrs. – 3 Hrs.
Marks Sessional-30 Practical – 20 Total 50

S. No. List of Experiments

I Carpentry Shop

- To prepare a dovetail joint.

II Foundry Shop

- To prepare Mould of given pattern and casting in aluminum.

III Welding Shop

- Demonstration & practice in gas welding on mild steel flat.
- Demonstration & practice in arc welding on mild steel flat.
- To prepare a Lap-joint by arc welding.

IV Machine Shop

- To prepare a job on lathe machine involving various operations like facing, step turning, chamfering & knurling etc.
- To prepare a job on shaper involving angular cutting.

V Fitting Shop

- Demonstration for use of bench working tools.
- To prepare a job involving various fitting operations, like filling, sawing, drilling & tapping etc.

VI Sheet Metal Shop

- Demonstration & practice in Brazing on thin sheet.
- To prepare a funnel from a sheet metal & soldering the joint

116 PRACTICAL GEOMETRY

Teaching Hrs.
L-0 T-0 P-3

Exam Hrs. – 3 Hrs.
Marks Sessional-30 Practical – 20 Total 50

Unit	Details of Coverage	
I	<ul style="list-style-type: none">• Lines and Dimensioning.• Scales: Representative factor; Plain scales; Diagonal scales; Comparative scale; Scale of chords.	(2 Labs)
II	<ul style="list-style-type: none">• Conic Sections: Construction of ellipse, parabola and hyperbola by different methods; Normal and Tangents.• Special Curves: Roulettes; Cycloid; Epicycloid; Hypo-cycloid; Involute; Archimedian; Logarithmic spirals.	(4 Labs)
III	<ul style="list-style-type: none">• Projections: Types of projections; Orthographic projection; First angle and third angle projection.• Projections of points and lines: True inclinations; True length of straight lines; Traces of straight lines; Auxiliary planes.• Projections of planes and solids: Projections of planes; Projections of polyhedra and solids of revolution.	(4 Labs)
IV	<ul style="list-style-type: none">• Section of Solids: Section of right solids by normal and inclined planes.• Development of Surfaces: Parallel line and radial line method for right solids.	(2 Labs)
V	<ul style="list-style-type: none">• Isometric Projections: Isometric Scale; Isometric axes; Isometric projections of planes and solids.	(3 Labs)

Total Labs Required : 15

Reference Books:

1. Engineering Drawing by N.D.Bhatt, V.M.Panchal; Charotar Publishing House.
2. Engineering Graphics by P. S. Gill; K. Kataria & Sons
3. A text book of Engineering Drawing by R. K. Dhawan; S. Chand & Company Ltd.
4. Engineering Drawing & Auto Cad by T. Jeyapoovan; Vikas Publishing House

201 ENGLISH COMMUNICATION TECHNIQUES

Teaching Hrs.

L-3 T-1 P-0

Exam. Hrs. – 3 Hrs

Marks Theory Exam – 80 Term Test – 20 Total 100

CONTENTS OF SYLLABUS

Units	Topics	
I	Grammar <ul style="list-style-type: none">• Adverbs• Prepositions• Verbs with preposition• Conjunctions & Connectors	Lectures Req- 9
II	Grammar <ul style="list-style-type: none">• Reported speech• Conditionals• Relative clauses	Lectures Req- 9
III	<ul style="list-style-type: none">• Word formation and vocabulary building• One word substitutes• Synonyms & Antonyms	Lectures Req- 9
IV	<ul style="list-style-type: none">• Idioms and phrases• Words commonly confused (mispronounced and mis-spelt)• Affixes.	Lectures Req- 9
V	<ul style="list-style-type: none">• Report writing• Précis writing	Lectures Req- 6

Total Lectures Required- 42

Books for Reference

- High School English Grammar & Composition
P.C. Wren & Martin, S.Chand & Co., New Delhi
- Murphy's English Grammar, 3rd Edition
Raymond Murphy, Cambridge University Press
- An Intermediate English Practice Book
S. Pit Corder, Orient Long Man
- A Remedial English Grammar for foreign Students
F.T. Wood, Macmillan Publishers
- A University Grammar of English
Quirk & Green Baum, Orient Long Man
- A Practical English Grammar
Thomson & Martinet, Oxford University Press
- Written Communication in English
Sarah Freeman, Orient Longman

202 ENGINEERING MATHEMATICS-II

Teaching Hrs.
Hrs.
L-4 T-1 P-0
100

Exam Hrs. – 3

Marks Theory Exam.-80 Term test-20 Total

CONTENTS OF SYLLABUS

Units	Topics	
I	Coordinate Geometry of Three Dimensions	Equation of a sphere, Intersection of a sphere and a plane, tangent plane normal Lines, Right circular cone, Right circular cylinder Lectures Req : 10
II	Matrices :	Linear dependence of vectors Rank of a matrix, inverse of a matrix by elementary transformations, Solution of simultaneous linear equations, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof), Diagonalization of matrix Lectures Req : 10
III	Vector Calculus :	Scalar and vector field, differentiation & integration of vector functions, Gradient, Divergence, Curl and Differential Operator, Line, Surface and volume integrals, Green's Theorem in a plane, Gauss' and Stoke's Theorem without proof) and their Applications Lectures Req : 12
VI	Dynamics:	Angular Motion, Radial and transverse Velocity and Accelerations, Rectilinear Motion Motion in Resisting Medium. Lectures Req : 10
V	Differential Equations :	Series Solutions of Second Order Linear Differential Equations with Variable Coefficients (Complementary Function only), Partial Differential Equations of First Order, Lagrange's Form, Standard Forms, Charpit's Method Lectures Req : 12
		Total Lectures Req : 54

- Jain. R.K. and Iyengar, S.R.K., Advanced Engineering Mathematics, Narosa Publishing House, New Delhi.
- Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi.
- Bali, N.P., A Text Book on Engineering Mathematics, Luxmi Publications, New Delhi.
- Kreyszing, E., Advanced Engineering Mathematics, John Wiley.
- Mehta D.M, Sharma Engineering Mathematics I, Vardan Publisher.
- Ray Wylie, C., Advanced Engineering Mathematics. 6th ed., McGraw Hill.

CONTENTS OF SYLLABUS

Unit	Topics	Details of coverage	Lectures required:
1	LASER		06
	<ul style="list-style-type: none"> Principle and production, Einstein's coefficients, Requisites of a Laser system, Condition for Laser action, Principle, construction and working of He-Ne, & Semiconductor Laser 	<ul style="list-style-type: none"> Stimulated and spontaneous emission and induced absorption. Expression for energy density and ratio of Spontaneous to stimulated emission. Active medium and pumping system and resonant cavity. Explanation. Explanation with suitable diagrams & Principle and working of any type of P-N junction semiconductor. Applications of Laser 	
2	Holography and Modern Physics		05
	<ul style="list-style-type: none"> Holography Photo-electric effect Unability of wave theory of light to explain Photo-electric effect Einstein's Photo-electric Compton effect and quantum nature of light 	<ul style="list-style-type: none"> Basic principles and its applications, Construction and Reconstruction (No derivation) Introduction and experimental results Explanation. Explanation. Brief introduction and derivation of Compton shift. 	
3	Polarization		06
	<ul style="list-style-type: none"> Polarization, Double refraction, Quarter and Half wave plates, Optical activity. 	<ul style="list-style-type: none"> Representation of various lights, Polarization by reflection, Brewster's and Malus laws, Huygen's theory, Polaroid's, Production and analysis of plane elliptical and circularly polarized light. Fresnel's theory of optical rotation, Specific rotation, Biquartz and Laurent half-shade polarimeters. 	
4	Fibre Optics and Nuclear detectors		06
	<ul style="list-style-type: none"> Optical Fibres Angle of acceptance Numerical aperture Applications of Optical fibre. Nuclear detectors Ionization chamber, Proportional Counter, G M Counter, Scintillation Counter 	<ul style="list-style-type: none"> Introduction and basic theory. Expression Expression with diagram, No numericals. Brief idea Introduction Construction, working and properties 	
5	Quantum Physics		06
	<ul style="list-style-type: none"> Wave function Schrödinger's Equation Eigen values and eigen functions Application of Schrödinger's Equation Density of energy states, Fermi energy level 	<ul style="list-style-type: none"> Complex wave function, Physical significance and normalization (explanation). Setting up of 1D and 3D time dependent and independent equations. Explanation. Derivation of equation for particle trapped in one dimensional potential well of infinite height. Explanation. 	

Total No. of Periods : 29

Reference Books:

1. A. Ghatak, "Optics"
2. N. Subrahmanyam and Brij Lal, "Optics"
3. Jenkins and White, "Fundamentals of Optics"
4. R.L. Singhal "Solid State Physics"
5. D.S.Mathur "Mechanics"
6. K. Thyagarajan and A.K.Ghatak "LASERS"
7. R K Gaur and S L Gupta "Engg. Physics"
7. S.N Ghoshal "Atomic and Nuclear Physics Vol.1 & 2"

Teaching Hrs.

Exam. Hrs. – 3 Hrs

L-3 T-0 P-0

Marks Theory Exam – 80 Term Test – 20 Total 100

CONTENTS OF SYLLABUS

Units: Topics

I	Chemical Fuel (Part I): Origin and classification of fuels Solid fuels: Coal, Its origin and classification, Proximate and Ultimate analysis of coal, Significance of the constituents, Gross and Net calorific values, Determination of calorific value by Bomb Calorimeter (Related numerical problems), Soft and Metallurgical coke, Carbonization process, Manufacture of coke-Beehive Coke ovens and Byproduct Coke ovens, Combustion and requirement of oxygen/air in combustion process. Liquid Fuels: Merits and demerits, Petroleum and Refining of petroleum, Synthetic petrol, Refining and Reforming of gasoline, Cracking, Knocking, Octane number, Cetane number and their significance, Antiknocking agents.	Lectures Req: 9
II	Chemical Fuel (Part II): Gaseous Fuels: Advantages, Manufacture, Composition and calorific value of coal gas and oil gas, CNG, LPG, Determination of calorific value by Juckner's calorimeter and related numerical problems, Flue gas analysis by Orsat's apparatus. Nuclear Fuels: Nuclear binding energy, Nuclear fission and Nuclear fusion, Elementary idea about reactor concepts, Nuclear power reactor and Breeder reactor.	Lectures Req: 9
III	Polymers: Basic concepts and Terminology such as Functionality, Degree of polymerization, Different definitions of weight viz. Mw, Mn, Mv (Numerical problems based on them), Thermoplastic, Thermosets Linear, Branched and Cross- linked polymers, Tacticity of polymers, Homo and Copolymers (classification based on repeat unit), Addition, Condensation and Ionic polymerization, Constituents of plastics and their uses, Preparation, Properties and uses of Polyethylene, PVC, Teflon, Bakelite, Terylene and Nylon, Natural rubber, Vulcanization, Synthetic rubber Viz. Buna-S, Buna-N, Butyl, Neoprene, Thiokol, Polyurethane and Silicones rubber.	Lectures Req: 8
IV	Lubricants: Classification, Types of lubrication (Thick film or Hydrodynamic lubrication, Thin film or Boundary lubrication and Extreme pressure lubrication), Properties and uses, Viscosity and Viscosity index, Flash point and Fire point, Cloud and Pour point, Steam emulsification number. New Engineering Materials: Brief idea of following: Super conductor, Organic electronic materials, Fullerenes and Optical fibers.	Lectures Req: 8
V	Cement: Manufacture of Portland cement, Vertical shaft kiln technology, Chemistry of setting and hardening Refractories: Definition, Properties, Classification, Requisites of good refractory, Properties of silica and fire clay refractory. Glass: Preparation, Varieties and uses.	Lectures Req: 8

Total Lectures Req. 42**Reference Books:**

1. Chemical Process Industries By R. Norris Shreve & Joseph A. Brink, Tata McGraw Hill Publishing Co. New Delhi
2. Shreve's Chemical Process Industries By George T. Austin. McGraw Hill Book Co.
3. Polymer Science and Technology By Joel R. Fried. Prentice Hall Publications.
4. Industries Chemistry By B.K Sharma, Krishna Prakashan Mandir, Meerut.
5. Engineering Chemistry By P.C. Jain and Monica Jain. Dhanpat Rai Publishing Company (P) Ltd. New Delhi.
6. Engineering Chemistry By S.K. Jain and K.D. Gupta, Jaipur Publishing House, Jaipur
7. Chemistry in Engineering and Technology (Vol I & II) (Latest ed.), By J.C. Kuriacase and J. Rajaram.

Teaching Hrs.
L-3 T-0 P-0Exam Hrs. – 3 Hrs.
Marks Theory Exam -80 Test – 20 Total 100**CONTENTS OF SYLLABUS****Details of Coverage**

Unit	Topics	Lectures Required :
I	<ul style="list-style-type: none"> • Resistors: • Capacitors: 	<p>Concepts of fixed & variable resistors, metal film resistors. Construction, power rating. Tolerance. colour code. Standard values. Wire wound resistors. Fixed & variable. Construction. Power rating & tolerance. different types.</p> <p>Construction of mica and ceramic capacitors (disc & tubular). Colour code. Electrolytic (Teflon) capacitors. Typical range of values and voltage ratings of different types of capacitors.</p>
II	<p>Semi Conductor Devices:</p> <ul style="list-style-type: none"> • Diode: • Rectifiers & Power supply: 	<p>Lectures Required : 08</p> <p>PN junction diodes, typical doping concentration. Formation of barrier potential. Forward and reverse biasing. V-I characteristics. Dynamic & static resistance. Principle of working and V-I characteristics of Zener diode. Principle of Photo diode. Solar cell & LED</p> <p>Block diagram description of a dc power supply. Rectifying action of diodes. Circuit diagram & working of half-wave & full wave (including bridge) rectifier. Final equations of V_{rms}. V_{de} ripple factor & peak inverse voltage in each case. Principle of working of series inductor and shunt capacitor filters. Need of voltage regulator. Working of simple zener voltage regulator.</p>
III	<p>Semi Conductor Devices:</p> <ul style="list-style-type: none"> • Bipolar junction transistors: • Thyraster: 	<p>Lectures Required: 08</p> <p>NPN & PNP transistors. Structure. Typical doping. Working of NPN transistor, concepts of common base, common emitter & common collector configurations. Current gain, input & output characteristics of all configuration concepts of Input & output resistances. Comparison of three configurations with reference to voltage & current gain. Input & output resistances. Operation. Construction & characteristics of 4 Layer Devices... (UJT,SCR, DIAC,TRAIAC & their application as voltage & current controller.</p>
IV	<p>Digital Electronics:</p> <ul style="list-style-type: none"> • Binary Systems: • Boolean Algebra: • Logic Gates: 	<p>Lectures Required : 06</p> <p>Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion. Octal and Hexadecimal Numbers. Complements. Binary Codes, Binary Logic Integrated Circuits</p> <p>Basic Definitions Axiomatic Definition of Boolean Algebra Basic Theorems and Properties of Boolean Algebra Boolean Function Digital Logic Gates Truth table and symbol of AND, OR,NOT,NAND,NOR and EXOR gates. Half and Full Address.</p>
V	<p>Communication System</p> <ul style="list-style-type: none"> • Type of Signals: • Communication Systems: • Modulation: • Amplitude Modulation: • Frequency and Phase Modulation: • Bandwidth Requirements: • Television: • Elementary concept of : 	<p>Lecture Required: 08</p> <p>Analog and Digital Signals.</p> <p>Information, Transmitter, Channel, Noise & Receiver. General Concept of modulation, Need for modulation. Definition. Modulation Index. Frequency spectrum of the AM wave. Representation of AM wave. Power content in AM wave. Concept of Angle modulation Definition of FM & PM. Frequency deviation. Mathematical representation of FM.</p> <p>Sinewave and Fourier series review. Frequency spectra of non-sinusoidal waves. Like AM, FM and their bandwidth requirements</p> <p>Introduction to television. Block diagram. Television systems and standards. Block Diagram, Approach only with explanation of each block of Superheterodyne Receiver. Optical Fiber Communication System, Satellite Communications and Mobile Communications.</p>

Total Lectures Required : 36

206 FUNDAMENTALS OF MECHANICAL ENGINEERING

Teaching Hrs.
L-2 T-0 P-0

Exam Hrs. – 3 Hrs.
Marks Theory-80 Term Test – 20 Total 100

Unit	Topics	CONTENTS OF SYLLABUS Details of Coverage
I	<ul style="list-style-type: none">• Basic Concepts• Working Fluids	<p>Thermodynamic systems; Properties; Work and heat; Zeroth Law of thermodynamics.</p> <p>Ideal Gas Laws; Calculation of properties of ideal gases for various thermodynamic cyclic and non-cyclic processes.</p>
II	<ul style="list-style-type: none">• First Law of Thermodynamics• Second Law of Thermodynamics	<p>First Law of thermodynamics; Non-flow and flow energy equations; Numerical problems based on ideal gases.</p> <p>Statements of Second Law of Thermodynamics; Reversible process; Entropy; Carnot cycle (Descriptive Only).</p>
III	<ul style="list-style-type: none">• Internal Combustion Engines	<p>Otto and Diesel cycle; Air standard efficiency. (Descriptive Only).</p> <p>Classification; Two and four stroke engines; Construction and working of petrol and diesel engines; Comparison of petrol and diesel engines; Comparison of 4 - stroke and 2 - stroke engines; Principle and working of simple carburetor.</p>
IV	<ul style="list-style-type: none">• Properties of Steam• Steam Power Plants	<p>Generation of steam; Quality and properties of steam; Use of steam table; Mollier chart and T-s diagram for steam properties and various.</p> <p>Classification of steam generators; Construction and working of Babcock and Wilcox boiler and Cochran boiler.</p>
V	Refrigeration and Air-conditioning Gas Compressors	<p>Elementary concepts of refrigeration and air-conditioning; Vapour compression cycle; Working, principle and schematic diagrams of refrigerators, window air conditioners and ice plants.</p> <p>Classification; Working of reciprocating compressor, rotary compressor, centrifugal compressor and axial flow compressor; Comparison; Applications.</p>

Reference Books:

1. Engineering Thermodynamics by P.K. Nag; Tata McGraw-Hill Publishing Co. Ltd.
2. Thermal Engineering Vol-I and Vol-II by M.L. Mathur and F.S. Mehta; Jain Brothers
3. Applied Thermodynamics by Onkar Singh; New Age International Publishers.
4. Thermal Science and Engineering by D.S. Kumar; S.K. Katariya & Sons.

Teaching Hrs.
L-3 T-0 P-0

Exam Hrs. – 3 Hrs.
Marks Theory Exam.-80 Term Test – 20 Total 100

OBJECTIVE: To learn theoretical aspects of programming language.

CONTENTS OF SYLLABUS		
Units	Topics	Contents
I	Number systems	<ul style="list-style-type: none"> • Binary, Octal, Decimal & Hexadecimal representation of nos. • Integers & Floating point numbers • Representation of characters, ASCII & EBCDIC codes. • Binary arithmetic : Addition, Subtraction, Compliments
II	Classification of Computer Languages	<ul style="list-style-type: none"> • Introduction & Examples of Machine, Assembly and High Level Languages • Introduction & Types of Operating System • Assembler, Compiler and Interpreter
III	Programming in 'C'-- I	<ul style="list-style-type: none"> • Need of Programming Languages, Defining Problems • Flowcharts and Algorithm Development • Data Types, Constants, Variables, Operators and Expressions • Input and Output Statements, Conditional and Control Statements, Arrays
IV	Programming in 'C'-- II	<ul style="list-style-type: none"> • Structures and Unions • Pointers •
V	Programming in 'C'-- III	<ul style="list-style-type: none"> • File Handling • Macro
		Total Lectures Req: 30

Teaching Hrs.

Exam. Hrs. – 3 Hrs

L-0 T-0 P-2

Marks Sessional – 20 Practical – 30 Total 50

CONTENTS

- Phonetic symbols & Transcription
- Communication & Aspects of Communication
- Presentations (seminar)
- Extempore Speaking
- Group discussions
- Interview Preparations
- Viva- Voce

Teaching Hrs.
L-0 T-0 P-2

Exam Hrs.- 3 Hrs
Marks Sessional -30 Practical-20 Total 50

S. No. List of Experiments

OPTICS

- I. To determine the wave length of monochromatic light with the help of Fresnel's Biprism.
- II. To determine the wavelength of prominent lines of mercury by plane diffraction grating with the Help of a spectrometer.
- III. To determine the height of water tank with the help of a sextant.
- IV. To determine the transmission coefficient of transparent glass plate by Lummer-Brodhum photometer.

ELECTRONICS / ELECTRICAL

- V. To convert a galvanometer into a Voltmeter of range 1.5 Volts and calibrate it.
- VI. To determine the specific resistance of the material of a wire by Carey-Foster's bridge.
- VII. To study the variation of thermo emf of Iron-Copper thermo couple with temperature.
- VIII. To study the charge & discharge of a condenser and hence determine time constant.
- IX. To study the variation of magnetic field along the axis of a current carrying coil & to estimate the radius of the coil.

Teaching Hrs.

Exam. Hrs. – 3 Hrs

L-0 T-0 P-2

Marks Sessional – 30 Practical – 20 Total - 50

(Any Eight experiments are to be performed.)**S. No. List of Experiments**

- I. Determination of strength of CuSO_4 iodometrically
- II. Determination of strength of $\text{K}_2\text{Cr}_2\text{O}_7$ iodometrically.
- III. Determination of strength of ferrous ammonium sulphate with the help of $\text{K}_2\text{Cr}_2\text{O}_7$.
- IV. Estimation of copper in brass.
- V. Estimation of iron in plain carbon steel
- VI. Determination of viscosity of lubricating oil by redwood viscometer.
- VII. Determination of flash and fire point of lubricating oil by pensky-marten apparatus.
- VIII. Determination of cloud and pour point of lubricating oil.
- IX. To study kinetics of acetone iodine reaction.
- X. To study hydrolysis of ester.
- XI. Determination of calorific value of a solid fuel by bomb calorimeter.
- XII. Determination of proximate analysis of coal.
- XIII. Determination of percentage of CO , CO_2 and O_2 in given sample by orsat's gas apparatus.

Reference Books:

1. A text book on experiment and calculation in engineering chemistry By S.S. Dara.
2. Laboratory manual on engineering chemistry By S.K. Bhasin and Sudha Rani.
3. Vogel Text book of Quantitative Chemical Analysis By G.H. Jeffery, J. Bassett, J. Mendham & R.C. Denney
4. Instrumental methods of Chemical Analysis By B.K. Sharma.
5. Practical Engineering Chemistry By Sanjay Sharma.
6. Environmental Engineering laboratory manual By Vivek Pandey and Sama Jain.

Teaching Hrs.
L-0 T-0 P-2

Exam Hrs. – 3 Hrs.
Marks Sessional - 30 Practical – 20 Total 50

OBJECTIVE: Inculcating the programming habits in practical.

S. No	List Of Experiments	
I	Assignment 1st <ul style="list-style-type: none"> • Simple input output program integer, real, character and string (Formatted & Unformatted) 	(3 Labs)
II	Assignment 2nd <ul style="list-style-type: none"> • Condition statement programs (if, if-else-if, switch-case) 	(2 Labs)
III	Assignment 3rd <ul style="list-style-type: none"> • Looping program (for, while, do-while) 	(2 Labs)
IV	Assignment 4th <ul style="list-style-type: none"> • Program based on array (one, two, three dimensions) 	(2 Labs)
V	Assignment 5th <ul style="list-style-type: none"> • Program using Structure and Union 	(2 Labs)
VI	Assignment 6th <ul style="list-style-type: none"> • Program using Functions(with or without recursion) 	(2 Labs)
VII	Assignment 7th <ul style="list-style-type: none"> • Program using Pointers(with Functions) 	(3 Labs)
VIII	Assignment 8th <ul style="list-style-type: none"> • Program using File Handling. 	(2 Labs)
		Total Labs Req: 18

215 MECHANICAL ENGINEERING LAB

Teaching Hrs.
L-0 T-0 P-2

Exam Hrs. – 3 Hrs.
Marks Sessional-30 Practical – 20 Total 50

S. No.	List of Experiments
I	Study of 2-stroke Petrol Engine.
II	Study of 2-stroke Diesel Engine.
III	Study of 4-stroke Petrol Engine.
IV	Study of 4-stroke Diesel Engine.
V	Study of various types of Low Pressure Steam Generators.
VI	Study a Window type Air Conditioner
VII	Study a vapour absorption type Refrigerator.
VIII	Study of Reciprocating Compressor.
IX	To establish the relation between saturation temperature and pressure for steam and to compare the results with standard values.
X	To study various mechanical drives (Belt, Chain and Gear).
XI	To study various Shaft Couplings.

Teaching Hrs.
L-0 T-0 P-3

Exam Hrs. – 3 Hrs.
Marks Sessional-30 Practical – 20 Total 50

CONTENTS OF SYLLABUS
Details of Coverage

S. No.

- I
 - Introduction to machine drawing.
 - Orthographic projections: First and third angle methods; Free hand sketching.
 - Dimensioning: Locations and placing.
- II
 - Orthographic Projections (Sheet).
 - Sectional Views (Sheet).
- III
 - Riveted joints; Screw fasteners; Different types of threads, thread profiles, nuts and bolts; Locking devices; Set screws; Foundation bolts (Sheet).
- IV
 - Bearing: foot step bearing (Sheet).
- V
 - Introduction to Auto CAD.

List of free hand sketches

- Different type of lines.
- Conventional representation of materials.
- Riveted joints; Lap joints; Butt joints; Chain riveting; Zig-zag riveting.
- Conventional representation of threads (without section and with section).
- Coupling: Flange and pin type flexible coupling.
- Welded joints.
- Pulleys.

Total Labs Required: 14

Reference Books:

1. Machine Drawing by N.D.Bhatt; Charotar Publishing House.
2. Machine Drawing by P. S. Gill; K. Kataria & Sons
3. A text book of Machine Drawing by Lakshminarayanan Mathur; S. Chand & Company Ltd.
4. Machine drawing by K.R. Gopal Krishna; Subhas Publications.