SEMESTERWISE COURSES OFFERED FOR THE DEGREE OF B.Tech. (Agril. Engg.)

FIRST YEAR

Semester - I

S.No.	Course Name	Course No.	Credit	L	P	T
1	**Engineering Mathematics-I**	**Maths (E)-101**	**3 (2 + 1)**	**2**	**0**	**1**

Course content :
Differential calculus: Taylor's and Maclaurin's expansions; indeterminate form; curvature, asymptotes, tracing of curves, function of two or more independent variables, partial differentiation, homogeneous functions and Euler's theorem, composite functions, total derivatives, derivative of an implicit function, change of variables, Jacobians, error evaluation, maxima and minima.
Integral calculus: Reduction formulae; rectification of standard curves, volumes and surfaces of revolution of curves; double and triple integrals, change of order of integration, Gamma and Beta functions, application of double and triple integrals to find area and volume.
Ordinary differential equations: Exact and Bernoulli's differential equations, equations reducible to exact form by integrating factors, equations of first order and higher degree, Clairaut's equation, Differential equations of higher orders, methods of finding complementary functions and particular integrals, method of variation of parameters, Cauchy's and Legendre's linear equations, simultaneous linear differential equations with constant coefficients, series solution techniques, Bessel's and Legendre's differential equations.
Vector calculus: Differentiation of vectors, scalar and vector point functions, vector differential operator Del, Gradient of a scalar point function, Divergence and Curl of a vector point function and their physical interpretations, identities involving Del, second order differential operator; line, surface and volume integrals, Stoke's, divergence and Green's theorems (without proofs).

Planning of lectures	
S.No.	Topics to be covered in Lecture / Tutorial	Proposed No. of Lectures / Tutorials

S.No.	Topics to be covered in Lecture / Tutorial	Proposed No. of Lectures / Tutorials
1	Taylor's & Maclaurin's expansion	2
2	Indeterminate forms	2
3	Partial differentiation, Homogeneous function, Euler's theorem, Composite function	3
4	Total derivative, Jacobian, Error evaluation, Maxima-Minima	2
5	Reduction formulae	2
6	Rectification, Volume & Surface of revolution	2
7	Double integration, Triple integration, Area & Volume using double and triple integration	3
8	Gamma function , Beta function	2
9	Differential equation: Exact, Bernoulli's differential equations, Use of integrating factor	2
10	Equation of first order and higher degree, Clairaut's equation	1
11	Differential equations of higher order, Methods of finding C.F. and P.I.	4
12	Method of Variation of parameters	1
13	Cauchy and Legendre differential equations	2
14	Simultaneous linear differential equation with constant coefficients	1
15	Series solution technique	2
16	Bessel's and Legendre's differential equations	2

17	Vector calculus: Scalar and vector point functions, Del, Gradient, Divergence, Curl and their physical interpretations	2
18	Identities involving Del, Second order differential operator	2
19	Line, Surface and Volume integrals	2
20	Gauss, Stoke, Green's theorems(Without proof)	2
21	Asymptotes	2
22	Tracing of curves	4
	Total	**47**

Reference Books
- Higher Engineering Mathematics, Vol-I,II , By: Dr. K. R. Kachot
- A Text book of Practical Mathematics Vol-I,II, By: I. B. Prasad
- Higher Engineering Mathematics, By: Dr. B. S. Grawal
- A Text Book of Engineering Mathematics, By: N. P. Bali and Ashok Saxena
- Schaum's Outline Series: Theory and Problems of Vector analysis, By: Murray R. Spigel
- Schaum's Outline Series: Theory and Problems of Advance Calculus, By: Murray R. Spigel
- Advance Engineering Mathematics , By: Erwin Kreyszing

S.No.	Course Name	Course No.	Credit	L	P	T
2	**Engineering Physics**	**Phy (E)-101**	**3 (2 + 1)**	**2**	**1**	**0**

Course content :

Dia, Para and ferromagnetism-classification. Langevin theory of dia and paramagnetism. Adiabatic demagnetization, Weiss molecular field theory and ferromagnetism. Curie-Weiss law. Wave particle quality, de-Broglie concept, uncertainty principle. Wave function, Time dependent and time independent Schrodinger wave equation, Qualitative explanation of Zeeman effect, Stark effect and Paschan Back effect, Raman spectroscopy. Statement of Bloch's function, Bands in solids, velocity of Bloch's electron and effective mass. Distinction between metals, insulators and semiconductors, Intrinsic and extrinsic semiconductors, law of mass action, Determination of energy gap in semiconductors, Donors and acceptor levels. Superconductivity, critical magnetic field, Meissner effect, Isotope effect, Type-I and II superconductors, Josephson's effect DC and AC, Squids, Introduction to high T_c superconductors. Spontaneous and stimulated emission, Einstein A and B coefficients, Population inversion, He-Ne and Ruby lasers, Ammonia and Ruby masers, Holography-Note. Optical fiber, Physical structure, basic theory. Mode type, input output characteristics of optical fiber and applications. . Illumination laws of illumination, luminous flux, luminous intensity, candle power, brightness.

Planning of lectures

S.No.	Topics to be covered in Lecture	Proposed No. of Lectures
1	Dia, Para and Ferromagnetism- Classification, Langevin theory of Dia. and Para magnetism	2
2	Adiabatic demagnetization, Weiss molecular field theory and Ferromagnetism	2
3	Curie- Weiss law, Wave particle duality, De-Broglie concept	2
4	Uncertainty principle. Wave function, Time dependent Schrodinger wave Equation	2
5	Time Independent Schrodinger wave Equation	2
6	Qualitative explanation of Zeeman effect, Stark effect	2
7	Paschan Back effect, Raman Spectroscopy	2

8	Statement of Bloch's function, Bands in solids, Velocity of Bloch's electron	2
9	Effective mass, Distinction between metals, Insulators and semiconductors	1
10	Intrinsic and extrinsic Semiconductors, Laws of mass action	1
11	Determination of energy gap in semiconductors, Donors and acceptors levels	1
12	Super conductivity, critical magnetic field, Meissner effect	1
13	Isotope effect, Type I and II super conductors	1
14	Josepsson's effect DC and AC, Squids	1
15	Introduction to High Tc superconductors	1
16	Spontaneous and Stimulated emission, Einstein A and B coefficients	1
17	Population inversion, He-Ne and Ruby lasers	1
18	Ammonia and Ruby masers, Holography Note.	1
19	Optical fibre, Physical structure, basic theory	1
20	Mode type, Input output characteristics of optical fibers and applications	1
21	Illumination Laws of Illumination, luminous flux, luminous intensity, Candle power, brightness	1
	Total	29

Practicals

S.No.	Topic	No. of Practicals
1	To find the frequency of A.C. supply using an electrical vibrator.	1
2	To find the low resistance using Carey Foster bridge without calibrating the bridge wire.	1
3	To determine dielectric constant of material using De Sauty's bridge	1
4	To determine the value of specific charge (e/m) for electrons by helical method.	1
5	To study the induced e.m.f. as a function of velocity of the magnet.	1
6	To obtain hysteresis curve (B-H curve) on a C.R.O. and to determine related magnetic quantities.	1
7	To study the variation of magnetic field with distance along the axis of a current carrying circular coil and to determine the radius of the coil.	1
8	To determine the energy band gap in a semiconductor using a PN Junction diode.	1
9	To determine the slit width from Fraunhofer diffraction pattern using laser beam.	1
10	Determination of ultrasonic wave velocity in a liquid medium.	1
11	To find the numerical aperture of optical fiber.	1
12	To set up the Fiber optic analog and digital link.	1
13	To study the phase relationships in L.R. circuit.	1
14	To study LCR circuit.	1
15	To study the variations of thermo e.m.f. of a copper-constantan thermocouple with temperature.	1
16	To find the wave length of light by prism.	1
	Total	**16**

Reference Books
- Engineering Physics , By: Uma Mukherji
- Solid State Physics , By: A.J. Dekker
- Physics for Engineers , By: S.P. Taneja

S.No.	Course Name	Course No.	Credit	L	P	T
3	**Engineering Chemistry**	**Chem (E)-101**	**3 (2 + 1)**	**2**	**1**	**0**

Course content :

Phase rule and its application to one and two component systems. Fuels classification, calorific value. Colloids classification, properties. Corrosion causes, types and method of prevention. Water temporary and permanent hardness, disadvantages of hard water, scale and sledge formation in boilers, boiler corrosion. Analytical methods like thermo-gravimetric, polarographic analysis, nuclear radiation detectors and analytical applications of radio active materials. Enzymes and their use in the manufacturing of ethanol and acetic acid by fermentation methods. Principles of food chemistry, introduction to lipids, proteins, carbohydrates, vitamins, food preservators, colouring and flavouring reagents of food. Lubricants properties, mechanism, classification and tests. Polymers. types of polymerization, properties, uses and methods for the determination of molecular weight of polymers, Introduction to IR spectroscopy.

Planning of lectures

S.No.	Topics to be covered in Lecture	Proposed No. of Lectures
1	Phase rule its application to one and two component systems	2
2	Fuels Classification, Calorific value	2
3	Colloids Classification, properties	2
4	Corrosion Causes, type and methods of prevention	2
5	Water Temporary and permanent hardness, disadvantages of hard water	2
6	Scale and sludge formation in boilers, boiler corrosion	2
7	Analytical methods like thermo gravimetric, polarographic analysis,	2
8	Nuclear radiation, detectors and analytical application of radio active materials	3
9	Enzymes and their use in manufacturing of ethanol and acetic acid by fermentation methods	3
10	Principles of food chemistry, introduction to lipids, proteins, carbohydrates, vitamins, Food preservators , colouring and flavouring reagents of food	7
11	Lubricants properties, mechanism, classification and tests	2
12	Polymers type of polymerization, properties, uses and methods for the determination of molecular weight of polymers	4
	Total	**33**

Practicals

S.No.	Topic	No. of Practicals
1	Determination of temporary and permanent hardness of water by EDTA method.	1
2	Estimation of chloride in water.	1
3	Estimation of dissolved oxygen in water.	1
4	Determination of BOD in water sample.	1
5	Determination of COD in water sample.	1
6	Estimation of available chlorine in bleaching powder.	1
7	Determination of viscosity of oil.	1
8	Estimation of activity of water sample.	1
9	Estimation of alkalinity of water sample.	1
10	Determination of carbonate and non-carbonate hardness by soda seagent.	1
11	Determination of coagulation of water and chloride ion content.	1
12	Determination of specific rotation of an optically active compound.	1
13	Determination of λ_{max} and verification of Beer Lambert Law.	1

14	Determination of calorific value of fuel.	1
15	Identification of functional groups (alcohol aldelyde, keline, carbonylic acid and amide) by IR.	1
16	Chromatographic analysis.	1
17	Determination of molar refraction of organic compounds.	1
	Total	**17**

Reference Books
- Engineering Chemistry , By: PC Jain and Monika Jain
- Analytical Chemistry Theory and Practical , By: R.M. Verma
- Physical Chemistry , By: Puri and Sharma
- Quantitative Inorganic Chemistry , By: V.I. Vogel
- Comprehensive Engineering Chemistry, By: Dhiraj Sud
- Principles of Food Chemistry , By: Johan M Deman

S.No.	Course Name	Course No.	Credit	L	P	T
4	**Workshop Practice**	**FMP - 101**	**1 (0 + 1)**	0	1	0

Course content :

The   subject is completely based on Practical.   The theoretical topic will be discussed in the Practical classes before assigning the Practical jobs of Carpentry shop, Smithy shop, Fitting shop, Welding and Sheet metal shop.

	Practicals	
S.No.	Topic	No. of Practicals
1	Study of shop lay-out fitting shop, carpentry shop, black smithy shop.	1
2	To prepare a single piece pattern by wood working operation	1
3	To prepare half lap joint by wood working operation	1
4	To prepare Dove-tail joint by wood working operation	1
5	To prepare Mortised joint by wood working operation	1
6	To prepare Tennon joint by wood working operation	1
7	To prepare square bar out of cylindrical bar by cold working process	1
8	To prepare hexagonal chisel by hot working process	1
9	To prepare chipping hammer by hot working process	1
10	To prepare khurpi by hot working process	1
11	To prepare I hook by hot working process	1
12	To prepare a lap joint of galvanized/ M.S. sheet by punching , drilling, and riveting operation	1
13	To prepare m.s. square plates by filing, cutting, with hacksaw, drilling, ramming, threading with tap and die and assembly processes	2
14	To prepare male and female (C & T) parts by different fitting operations	2
	Total	**16**

Reference Books
- Workshop Technology Vol. I & II , By: S.K. Hajra Chaudhary
- Workshop Technology , By: Chapman
- Workshop Technology , By: S.K. Gupta
- Manufacturing Technology, By: S. Dalela

Sr. No.	Course Name	Course No.	Credit	L	P	T
5	Applied Electronics and Instrumentation	RE - 102	3 (2 + 1)	2	1	0

Course content :

Semiconductors, PN junction, V-I characteristics of PN junction, diode as a circuit element, rectifier, clipper, clamper, voltage multiplier, capacitive filter, diode circuits for OR & AND (both positive and negative logic), bipolar junction transistor: operating point, classification(A,B & C) of amplifier, various biasing methods (fixed, self, potential divider), h-parameter model of a transistor, analysis of small signal CE amplifier, phase shift oscillator, analysis of differential amplifier using transistor, ideal OP-AMP characteristics, linear and non-linear applications of OP-AMP (adder, subtractor, integrator, active rectifier, comparator, differentiator, differential, instrumentation amplifier and oscillator), zener diode voltage regulator, transistor series regulator, current limiting, OP-AMP voltage regulators, Basic theorem of Boolean algebra, Combinational logic circuits(basic gates, SOP rule and K-map), binary ladder D/A converter, successive approximation A/D converter, generalized instrumentation, measurement of displacement, temperature, velocity, force and pressure using potentiometer, resistance thermometer, thermocouples, bounden tube, LVDT, strain gauge and tacho-generator.

	Planning of lectures	
S.No.	Topics to be covered in Lecture	Proposed No. of Lectures
1	Semiconductors, P-N junction, V-I characteristics of P-N junction	2
2	Diode as a circuit element, rectifier	2
3	Clipper, clamper	2
4	Voltage multiplier, Capacitive filter	2
5	Diode circuits for OR & AND gate	2
6	Bipolar junction Transistor; operating point	2
7	Classification of amplifier, various biasing methods	2
8	h-parameter model of a transistor, analysis of small signal	2
9	CE amplifier, phase shift oscillator	2
10	Analysis of different amplifier using transistor	2
11	Ideal OP-AMP characteristics	2
12	Linear and Non-linear application of AMP.	2
13	Linear and Non-linear application of AMP.	2
14	Zener diode Voltage Regulator, transistor series regulator	1
15	Current limiting, OP-AMP Voltage regulator	1
16	Basic theorem of Boolean algebra	1
17	Combinational logic circuits	1
18	Binary ladder D/A converter	1
19	Successive approximation A/D converter	1
20	Generalized instrumentation, measurement of displacement, temperature using potentiometer	2
21	Velocity, force and pressure measurement using potentiometer	1
22	Resistance thermometer, thermocouple	1
23	Bourden tube, LVDT	1
24	Strain gauge and tacho generator	1
	Total	36

	Practicals	
S.No.	Topic	No. of Practicals
1	To study V-I characteristics of PN junction diode	1
2	To study Half wave, full wave and Bridge Rectifier.	1

3	To study transistor characteristics in CE configurations.	1
4	To design study fixed and self bias transistor.	1
5	To design study potential divider bias transistor.	1
6	To study a Diode as clipper and clamper.	1
7	To study a OP-AMP IC 741 as inverting and non-inverting amplifier	1
8	To study a OP-AMP IC 741 as differentiator amplifier	1
9	To study a differential amplifier using two transistor	1
10	To study a OP-AMP IC 741 as differential amplifier	1
11	To study a zener regulator circuit	1
12	To study a OP-AMP IC 741 as a active rectifier	1
13	To study a OP-AMP IC 741 as a comparator	1
14	To familiarize with various types of transducers	1
	Total	**14**

Reference Books /
- Electronic Principles , By: Albert Paul Malvino, TMH..
- Electrical Engineering Fundamentals , By: Vincent Del Toro, PHI..
- A course in electrical and electronic measurements & instrumentation, By: A.K Sawhney, Dhanpat Rai.
- Electronic Devices & Circuit Theory , By: Boylestad, PHI.
- Electronic Devices & Circuits , By: Allen Mottershead, PHI.

S.No.	Course Name	Course No.	Credit	L	P	T
6	**Engineering Drawing**	**FMP - 103**	**2 (0 + 2)**	**0**	**2**	**0**

Course content :
Introduction of drawing scales; Principles of orthographic projections; References planes; Points and lines in space and traces of lines and planes; Auxiliary planes and true shapes of oblique plain surface; True length and inclination of lines; Projections of solids (Change of position method, alteration of ground lines); Section of solids and Interpenetration of solid-surfaces; Development of surfaces of geometrical solids; Isometric projection of geometrical solids.

Practicals		
S.No.	Topic	No. of Practicals
1	Familiarization with drawing instruments and their uses	1
2	Study of different type of scales and related terminology	3
3	Construction of different scales	2
4	Study of useful terminology of projections	1
5	Problems on projection of points lying in different quadrant with respect to two reference plains	2
6	Problems on projection of straight line lying in different quadrant with respect to two reference plains	3
7	Study of useful terminology of different types of planes and their traces	1
8	Problems on projection of planes lying in different quadrant with respect to two reference plains	2
9	Study of useful terminology of different types of solids	1
10	Problems on projection of solids lying in different quadrant with respect to two reference plains	3
11	Study of useful terminology of section of solids	1
12	Problems on section of solids lying in different quadrant with respect to	3

	two reference plains	
13	Problems on intersection of different solids with respect to two reference plane	3
14	Study of different methods of development and problem on development of surfaces of diff. solids	3
15	Study of useful terminology of isometric projection	1
16	Problems on isometric view . isometric projection of different solids with their diff. position with respect to two reference plane	3
	Total	**33**

Reference Books

- Elementary Engineering Drawing , By: N.D. Bhatt ,
- Engineering Drawing & Graphics , By: K. Venugopal
- Engineering Drawing , By: D.N. Ghose
- Geometrical Drawing , By: R. K. Dhawan,
- Engineering Drawing , By: P. S. Gill

S.No.	Course Name	Course No.	Credit	L	P	T
7	**Environmental Science**	**ES - 101**	**3 (3 + 0)**	**3**	**0**	**0**

Course content :
Definition, Scope and Importance. Ecosystem Types, structure and functions Bio-diversity Value, threats and conservation. Natural Resources Forest, mineral, soil and water –Their uses and abuses. Environmental pollution –Causes, effects and control measures of air, Water, soil, marine, thermal and noise pollution. Nuclear hazards. Bio-safety and risk assessment. Rural and urban waste management. Global Warming. Environmental act and related issues. Human population, health and social welfare.

Planning of lectures

S.No.	Topics to be covered in Lecture	Proposed No. of Lectures
1	Definition, Scope and Importance	2
2	Ecosystem Types, structure and functions	5
3	Bio-diversity Value, threats and conservation	6
4	Natural Resources Forest, mineral, soil and water –Their uses and abuses.	6
5	Environmental pollution –Causes, effects and control measures of air, Water, soil, marine, thermal and noise pollution	6
6	Nuclear hazards	3
7	Bio-safety and risk assessment	3
8	Rural and urban waste management	4
9	Global Warming	3
10	Environmental act and related issues	5
11	Human population, health and social welfare	5
	Total	**48**

Reference Books

- Environmental Science- A new Approach ,By: S.S. Purohit, Q. J. Shamani and A. K. Agarwal
- Environment, Biodiversity and Conservation , By: M. A. Khan and S. Farooq
- Conservation of Biodiversity and Natural Resources, By: M. P. Singh, Soma Dey and Bijay S. Singh.

S.No.	Course Name	Course No.	Credit	L	P	T
8	Electrical Circuits	PFE - 101	3 (2 + 1)	2	1	0

Course content :

Average and effective value of sinusoidal and linear periodic wave forms. Independent and dependent sources, loop current and loop equations (Mesh current method), node voltage and node equations(Nodal voltage method), Network theorems Thevenin's, Norton's, Superposition, Reciprocity and Maximum power transfer, Star- Delta conversion Solution of DC circuit by Network Theorems, Sinusoidal steady state response of circuits, Instantaneous and average power, power factor, reactive and apparent power, Concept and analysis of balanced polyphase circuits, Laplace transform method of finding step response of DC circuits, Series and parallel resonance, Classification of filters, constant-k, m-derived, terminating half network and composite filters.

Planning of lectures

S.No.	Topics to be covered in Lecture	Proposed No. of Lectures
1	Average and effective value of sinusoidal and linear periodic wave forms.	3
2	Independent and dependent sources, loop current and loop equations (Mesh current method).	3
3	Node voltage and node equations (Nodal voltage method).	3
4	Network theorems Thevenin' s, Norton' s, Superposition.	2
5	Reciprocity and Maximum power transfer.	2
6	Star- Delta conversion solution of DC circuit by Network theorems.	2
7	Sinusoidal steady state response of circuits.	3
8	Instantaneous and average power, power factor, reactive and apparent power.	3
9	Concept and analysis of balanced polyphase circuits.	3
10	Laplace transform method of finding step response of DC circuits.	3
11	Series and parallel resonance.	2
12	Classification of filters.	2
13	Constant-k, m-derived, terminating half network and composite filters.	3
	Total	**34**

Practicals

S.No.	Topic	No. of Practicals
1	To familiarize with the components and equipments used in Laboratory	**1**
2	To verify Krichhoff's current laws	**1**
3	To verify Krichhoff's voltage laws	**1**
4	To verify Thevenin theorems., and Norton's theorems.	**2**
5	To verify Superposition theorem and reciprocity theorem	**2**
6	To Study the sinusoidal response of RL series circuit	**1**

7	To study the sinusoidal response of RC series circuit	**1**
8	To study the step response of RL series circuit	**1**
9	To study the step response of RC series circuit	**1**
10	To study the response of constant K-filters.	**1**
11	To study the response of m-derived filters	**1**
12	To study power consumed in a three phase circuit	**1**
	Total	**14**

Reference Books
- Electrical Engineering Fundamentals , By: Vincent Del Toro, PHI
- A text book of Electrical Engineering , By: B.L Theraja & A.K Theraja, Chand publisher
- A course in Electrical Technology , By: J.B Gupta, Kataria Sons
- Electrical Technology , By: Edward Hughes

S.No.	Course Name	Course No.	Credit	L	P	T
9	**English**	**Eng (E) - 101**	**2 (1 + 1)**	**1**	**0**	**1**

Course content :
Grammar Tenses, Voice-Change, Direct/Indirect narration, Prepositions and Determiners, Word-formation with parts of Speech, Types of sentences, Elementary Knowledge of English Sound with Word-stress, intonation Pattern. Composition letter, Application, Summary and report writing.

Planning of lectures		
S.No.	Topics to be covered in Lecture	Proposed No. of Lectures
1	Grammar Tenses,	6
2	Voice-Change,	1
3	Direct/Indirect narration,	1
4	Prepositions and Determiners,	1
5	Word-formation with parts of Speech,	2
6	Types of sentences	2
7	Elementary Knowledge of English	1
8	Sound with Word-stress, intonation Pattern.	1
9	Composition - Letter, Application, Summary and report writing.	1
	Total	**16**

Details of Tutorials		
S.No.	Topic	No. of Tutorials
1	Grammar Tenses,	6
2	Voice-Change,	1
3	Direct/Indirect narration,	1
4	Prepositions and Determiners,	1
5	Word-formation with parts of Speech,	2
6	Types of sentences	2

7	Elementary Knowledge of English	1
8	Sound with Word-stress, intonation Pattern.	1
9	Composition - Letter, Application, Summary and report writing.	1
	Total	**16**

Reference Books

- Bridge intensive course , By: B. J. Carrol (Oxford Uni. Press)
- Modern English Grammar , By: N.Krishnaswamy (Maemilan)
- Spoken English for India , By: Bansal & Harrison
- Developing Programmes and Materials for Language Learning , By: Fraida Dubin & Elite Olshtain
- Communicative Approach to Language Teaching , By: David H. Wyatt