Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat) B.Tech. 3rd YEAR

ELECTRICAL ENGINEERING (SEMESTER – V)

Choice Based Credit System Scheme Of Studies & Examinations w.e.f. 2020-21

Sl. No.	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credits	Duration of Exam
			L	T	P		Theory	Practical			
1	EE301C	Power Electronics	3	1	0	25	75	0	100	4	3
2	EE381C	Power Electronics Laboratory	0	0	2	25	0	75	100	1	3
3	EE303C	Control Systems	3	1	0	25	75	0	100	4	3
4	EE383C	Control Systems Laboratory	0	0	2	25	0	75	100	1	3
5	EE305C	Electromagnetic Fields	3	1	0	25	75	0	100	4	3
6	PE1	Program Elective - 1	3	0	0	25	75	0	100	3	3
7	PE2	Program Elective - 2	3	0	0	25	75	0	100	3	3
	EE351C	Professional Training (Level-2)	0	0	2	100	0	0	100	1	3
8	MGT201C	Engineering Economics	3	0	0	25	75	0	100	3	3
Total			**18**	**03**	**06**	**300**	**450**	**150**	**900**	**24**	**27**

L= Lecture, T = Tutorial, P = Practical,& MC = Mandatory Course (Audit)

1. The students will be allowed to use non-programmable scientific calculator in the examination. However, Sharing/exchange of calculator is prohibited in the examination.
2. Electronics gadgets including Cellular phones are not allowed in the examination.

PROGRAM ELECTIVE-1 (PE1)

EE321C	Advanced Network Analysis
EE323C	Electrical Machine Design
EE325C	Industrial Electrical Systems
EE327C	Computer Architecture

PROGRAM ELECTIVE-2 (PE2)

EE331C	Electrical Engineering Materials
EE333C	Power Plant engineering
EE335C	Energy Management
EE337C	Process Control and Instrumentation

Subject: POWER ELECTRONICS
Subject Code: EE301C

L	T	P	Credits	Class-work Marks	: 25
3	1	0	4	Exam Marks	: 75
				Total Marks	:100
				Duration of Examination	:3 Hrs

Course Outcomes:
At the end of this course students will demonstrate the ability to
Understand the differences between signal level and power level devices.
Analyse controlled rectifier circuits.
Analyse the operation of DC-DC choppers.
Analyse the operation of voltage source inverters.

Unit -I

Power switching devices
Topic No. 1 Diode, Thyristor,
Topic No. 2 MOSFET,
Topic No. 3 IGBT: I-V Characteristics; Firing circuit for thyristor;
Topic No. 4 Voltage and current commutation of a thyristor;
Topic No. 5 Gate drive circuits for MOSFET and IGBT.
Topic No. 6 Protection of Devices.
Diode rectifiers with passive filtering
Topic No. 7 Half-wave diode rectifier with RL and RC loads;
Topic No. 8 1-phase full-wave diode rectifier with L, C and LC filter;
Topic No. 9 3-Phase diode rectifier with L, C and LC filter;
Topic No. 10 Continuous and discontinuous conduction,
Topic No. 11 Input current wave shape, effect of source inductance; commutation overlap.

Unit -II

Thyristor rectifiers
Topic No. 12 Single-phase half-wave and full-wave rectifiers,
Topic No. 13 Single-phase full-bridge thyristor rectifier with R-load and highly inductive load;
Topic No. 14 Three-phase full-bridge thyristor rectifier with R-load and highly inductive load;
Topic No. 15 Input current wave shape and power factor.

Unit -III

DC-DC buck converter
Topic No. 16 Elementary chopper with an active switch and diode,
Topic No. 17 Concepts of duty ratio and average voltage,
Topic No. 18 Power circuit of a buck converter,
Topic No. 19 Analysis and waveforms at steady state,
Topic No. 20 Duty ratio control of output voltage.

DC-DC boost converter
Topic No. 21 Power circuit of a boost converter,
Topic No. 22 Analysis and waveforms at steady state,
Topic No. 23 Relation between duty ratio and average output voltage.Single phase and three phase AC controller-
Topic No. 24 Operation, performance and applications

Unit -IV

Single-phase voltage source inverter
Topic No. 25 Power circuit of single-phase voltage source inverter,
Topic No. 26 Switch states and instantaneous output voltage,
Topic No. 27 Square wave operation of the inverter,
Topic No. 28 Concept of average voltage over a switching cycle,

Topic No. 29 Bipolar sinusoidal modulation and unipolar sinusoidal modulation,
Topic No. 30 Modulation index and output voltage

Three-phase voltage source inverter

Topic No. 31 Power circuit of a three-phase voltage source inverter,
Topic No. 32 Switch states, instantaneous output voltages,
Topic No. 33 Average output voltages over a sub-cycle,
Topic No. 34 Three-phase sinusoidal modulation

Text/References:

1. M. H. Rashid, "Power electronics: circuits, devices, and applications", Pearson Education India, 2009.
2. N. Mohan and T. M. Undeland, "Power Electronics: Converters, Applications and Design", John Wiley & Sons, 2007.
3. L. Umanand, "Power Electronics: Essentials and Applications", Wiley India, 2009.

NOTE:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:
   Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

Department	**Electrical Engineering**						
Program Name	**Bachelor of Technology in Electrical Engineering**						
Program Level	**UG**						
Course Code	**EE381C**						
Category	**Programme Core**						
Course Title	**POWER ELECTRONICS LABORATORY**						
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Duration of Examination**		
	3	**0**	**0**	**3**	**3 hours**		
Evaluation System	**Sessional**					**End Term Examination**	**Grand Total**
	As per Ordinance				**Total**		
					25	**75**	**100**

Course Outcomes:

At the end of this course students will demonstrate the ability to Understand the operating characteristics of power electronics devices. Analyse the performance of controlled rectifier circuits.Analyes the operation of DC-DC choppers. Analyses the operation of voltage source inverters.

LIST OF EXPERIMENTS:

1. To plot the characteristics of diode, thyristor, triac, transistor and MOSFET.
2. Firing angle control of R and R-C firing circuits, UJT firing circuits.
3. Develop the complementary voltage commutation using ring counter.
4. To obtain the performance parameters of three phase diode bridge rectifier with filter.
5. To plot the performance parameters of full wave converter.
6. To control the A.C. voltage with phase control technique.
7. To obtain the performance parameters of buck, boost chopper.
8. To conduct the load test on single phase inverter.
9. To obtain the performance parameters of H- bridge inverter.
10. To simulate the three-phase inverter and study its performance.

Reference Book:

Power Electronics Laboratory: Theory, Practice and Organization, Alpha Science International Limited, 2007

Note:-

1 Total ten experiments are to be performed in the semester.

At least eight experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus

Department	**Electrical Engineering**						
Program Name	**Bachelor of Technology in Electrical Engineering**						
Program Level	**UG**						
Course Code	**EE303C**						
Category	**Programme Core**						
Course Title	**CONTROL SYSTEMS**						
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Duration of Examination**		
	3	**0**	**0**	**3**	**3 hours**		
Evaluation System	**Sessional**					**End Term Examination**	**Grand Total**
	As per Ordinance				**Total**		
					25	**75**	**100**
Prerequisites (if any)							

Detailed Contents

S. No.	Contents
Unit - I	**INTRODUCTORY CONCEPTS:** **A) INTRODUCTION TO CONTROL PROBLEM**: TOPIC NO 1 Industrial Control examples. System / Plant model, TOPIC NO 2 types of models, TOPIC NO 3 Illustrative examples of plants & their inputs and outputs, TOPIC NO 4 Controller, TOPIC NO 5 Servomechanism, TOPIC NO 6 Regulating system, TOPIC NO 7 Linear time invariant (LTI) system, TOPIC NO 8 Time-varying system, TOPIC NO 9 Causal system, TOPIC NO 10 Open loop & closed loop control system & their illustrative examples, TOPIC NO 11 Continuous time and sampled data control systems. TOPIC NO 12 Effects of feedback on sensitivity (to parameter variations), TOPIC NO 13 Stability, TOPIC NO 14 External disturbance (noise), TOPIC NO 15 Overall gain, etc. TOPIC NO 16 Introductory remarks about non-linear control systems. **B) MATHEMATICAL MODELLING:** TOPIC NO 17 Concept of transfer function, TOPIC NO 18 Relationship between transfer function and impulse response, TOPIC NO 19 Order of a system, TOPIC NO 20 Block diagram algebra, TOPIC NO 21 Signal flow graphs: Mason's gain formula & its application, TOPIC NO 22 Characteristic equation, TOPIC NO 23 Derivation of transfer functions of electrical and electromechanical systems. TOPIC NO 24 Transfer functions of cascaded and non-loading cascaded elements
Unit – II	**STATE VARIABLE ANALYSIS:** TOPIC NO 25 Concepts of state, TOPIC NO 26 State variable, TOPIC NO 27 State model, TOPIC NO 28 State models for linear continuous time functions, TOPIC NO 29 Diagonalization of transfer function, TOPIC NO 30 State transition matrix,

	TOPIC NO 31 Solution of state equations, TOPIC NO 32 Concept of controllability & observability. **TIME DOMAIN ANALYSIS:** TOPIC NO 33 Typical test signals, TOPIC NO 34 Time response of first order systems to various standard inputs, TOPIC NO 35 Time response of 2nd order system to step input, TOPIC NO 36 Relationship between location of roots of characteristics equation and stability, TOPIC NO 37 Time domain specifications of a general and an under- damped 2nd order TOPIC NO 38 System, steady state error and error constants, TOPIC NO 39 Dominant closed loop poles, TOPIC NO 40 Concept of stability, TOPIC NO 41 Pole-zero configuration and stability, TOPIC NO 42 Necessary and sufficient conditions for stability, TOPIC NO 43 Hurwitz stability criterion, TOPIC NO 44 Routh stability criterion and relative stability
Unit – III	**ROOT LOCUS TECHNIQUE:** TOPIC NO 45 Root locus concept, TOPIC NO 46 Development of root loci for various systems, TOPIC NO 47 Stability considerations. **FREQUENCY DOMAIN ANALYSIS:** TOPIC NO 48 Relationship between frequency response and time-response for 2nd order system, TOPIC NO 49 Polar, TOPIC NO 50 Nyquist, TOPIC NO 51 Bode plots, TOPIC NO 52 Stability, TOPIC NO 53 Gain-margin and Phase Margin, TOPIC NO 54 Relative stability, TOPIC NO 55 Frequency response specifications
Unit - IV	**COMPENSATION:** TOPIC NO 56 Necessity of compensation, TOPIC NO 57 Compensation networks, TOPIC NO 58 Application of lag and lead compensation, TOPIC NO 59 Basic modes of feedback control, TOPIC NO 60 Proportional (P), integral (I), derivative(D), PI and PID controllers, TOPIC NO 61 Tuning of analog PID controllers through Ziegler-Nichols tuning methods (Process reaction curve and Ultimate Gain & Period methods) **CONTROL COMPONENTS & THEIR MODELS:** TOPIC NO 62 Synchros, TOPIC NO 63 Dc and ac servomotors, TOPIC NO 64 Stepper motors, TOPIC NO 65 Magnetic amplifier, TOPIC NO 66 Potentiometers, TOPIC NO 67 LVDT and techo generators.

TEXTBOOK:

Control System Engineering by I.J. Nagrath & M. Gopal, New Age Publishers.

REFERENCE BOOKS:

1. Automatic Control Systems by B.C. Kuo, PHI Publishers.
2. Modern Control Engg by K. Ogata, PHI Publishers.
3. Control Systems - Principles & Design by Madan Gopal, Tata Mc GrawHill. Publishers.
4. Modern Control Engineering by R.C. Dorf & Bishop, Addison-WesleyPublishers.
5. Control Systems by R.C.Sukhla, Dhanpat Rai Publishers.
6 Control Systems by Ashfaq Hussain & Haroon Ashfaq, Dhanpat Rai Publishers.

NOTE:

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2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students: Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

Department	**Electrical Engineering**						
Program Name	**Bachelor of Technology in Electrical Engineering**						
Program Level	**UG**						
Course Code	**EE383C**						
Category	**Programme Core**						
Course Title	**CONTROL SYSTEMS LABORATORY**						
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Duration of Examination**		
	3	**0**	**0**	**3**	**3 hours**		
Evaluation System	**Sessional**					**End Term Examination**	**Grand Total**
	As per Ordinance				**Total**		
					25	**75**	**100**
Prerequisites (if any)							

COURSE OUTCOMES:

At the end of this Laboratory course, the students will be able to have hands on experience of:

1. Using & verifying characteristics of various Control System components.
2. Analyzing the performance of servo motors driven control systems ;
3. Using Lead, lag, lead-lag compensators.
4. designing PID controllers for given Control System.
5. using MATLAB for control system design.

LIST OF EXPERIMENTS

1. To study A.C. servo motor and to plot its torque-speed characteristics.
2. To study D.C. servo motor and to plot its torque speed characteristics.
3. To study the magnetic amplifier and to plot its load current v/s control current characteristics for: (a) series connected mode (b) parallel connected mode.
4. To plot the load current v/ s control current characteristics for self exited mode of the magnetic amplifier.
5. To study the synchro & to: (a) Use the synchro pair (synchro transmitter & control transformer) as an error detector. (b) Plot stator voltage v/ s rotor angle for synchro transmitter i.e. to use the synchro transmitter as position transducer.
6. To use the synchro pair (synchro transmitter & synchro motor) as a torque transmitter.
7. (a) To demonstrate simple motor-driven closed-loop position control system. (b) To study and demonstrate simple closed-loop speed control system.
8. To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots.
9. To study a stepper motor & to execute microprocessor or computer-based control of the same by changing number of steps, direction of rotation & speed.
10. To implement a PID controller for level control of a pilot plant.
11. To implement a PID controller for temperature control of a pilot plant.
12. To study the MATLAB package for simulation of control system design.

NOTE:

The students are required to perform 10 experiments, with at least 8 experiments from the above list and further two experiments either from the above list or from any other experiments designed on the basis of the corresponding theory course.

Department	**Electrical Engineering**						
Program Name	**Bachelor of Technology in Electrical Engineering**						
Program Level	**UG**						
Course Code	**EE305C**						
Category	**Programme Core**						
Course Title	**ELECTROMAGNETIC FIELDS**						
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Duration of Examination**		
	3	**0**	**0**	**3**	**3 hours**		
Evaluation System	**Sessional**					**End Term Examination**	**Grand Total**
	As per Ordinance				**Total**		
					25	**75**	**100**
Prerequisites (if any)							

Detailed Contents

S. No.	Contents
Unit - I	**Review of Vector Calculus** TOPIC NO 1 Vector algebra-addition, TOPIC NO 2 Subtraction, TOPIC NO 3 Components of vectors, TOPIC NO 4 Scalar and vector multiplications, TOPIC NO 5 Triple products, TOPIC NO 6 Three orthogonal coordinate systems (rectangular, cylindrical and spherical). TOPIC NO 7 Vector calculus differentiation, TOPIC NO 8 Partial differentiation, TOPIC NO 9 Integration, TOPIC NO 10 Vector operator del, TOPIC NO 11 Gradient, TOPIC NO 12 Divergence and curl; integral theorems of vectors, TOPIC NO 13 Conversion of a vector from one coordinate system to another. **Static Electric Field** TOPIC NO 14 Coulomb's law, TOPIC NO 15 Electric field intensity, TOPIC NO 16 Electrical field due to point charges, TOPIC NO 17 Line, Surface and Volume charge distributions, TOPIC NO 18 Gauss law and its applications, TOPIC NO 19 Absolute Electric potential, TOPIC NO 20 Potential difference, TOPIC NO 21 Calculation of potential differences for different configurations, TOPIC NO 22 Electric dipole, TOPIC NO 23 Electrostatic Energy and Energy density
Unit – II	**Conductors, Dielectrics and Capacitance** TOPIC NO 24 Current and current density, TOPIC NO 25 Ohms Law in Point form, TOPIC NO 26 Continuity of current, TOPIC NO 26 Boundary conditions of perfect dielectric materials. TOPIC NO 27 Permittivity of dielectric materials, Capacitance, TOPIC NO 28 Capacitance of a two wire line, TOPIC NO 29 Poisson's equation, TOPIC NO 30 Laplace's equation, TOPIC NO 31 Solution of Laplace and Poisson's equation, TOPIC NO 32 Application of Laplace's and Poisson's equations

	Static Magnetic Fields TOPIC NO 33 Biot-Savart Law, TOPIC NO 34 Ampere Law, TOPIC NO 35 Magnetic flux and magnetic flux density, TOPIC NO 36 Scalar and Vector Magnetic potentials. TOPIC NO 37 Steady magnetic fields produced by current carrying conductors.
Unit – III	**Magnetic Forces, Materials and Inductance** TOPIC NO 38 Force on a moving charge, TOPIC NO 39 Force on a differential current element, TOPIC NO 40 Force between differential current elements, TOPIC NO 41 Nature of magnetic materials, TOPIC NO 42 Magnetization and permeability, TOPIC NO 43 Magnetic boundary conditions, TOPIC NO 44 Magnetic circuits, TOPIC NO 45 Inductances and mutual inductances. **Time Varying Fields and Maxwell's Equations** TOPIC NO 46 Faraday's law for Electromagnetic induction, TOPIC NO 47 Displacement current, TOPIC NO 48 Point form of Maxwell's equation, TOPIC NO 49 Integral form of Maxwell's equations TOPIC NO 50 Motional Electromotive forces,. TOPIC NO 51 Boundary Conditions.
Unit - IV	**Electromagnetic Waves** TOPIC NO 52 Derivation of Wave Equation, TOPIC NO 53 Uniform Plane Waves, TOPIC NO 54 Maxwell's equation in Phasor form, TOPIC NO 55 Wave equation in Phasor form, TOPIC NO 56 Plane waves in free space and in a homogenous material. TOPIC NO 57 Wave equation for a conducting medium, TOPIC NO 58 Plane waves in lossy dielectrics, TOPIC NO 59 Propagation in good conductors, TOPIC NO 60 Skin effect, TOPIC NO 61 Poynting theorem.

Text / References:

1. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014.
2. A. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi, 2009.
3. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
4. G. W. Carter, "The electromagnetic field in its engineering aspects", Longmans, 1954.
5. W. J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.
6. W. J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.

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Department	**Electrical Engineering**						
Program Name	**Bachelor of Technology in Electrical Engineering**						
Program Level	**UG**						
Course Code	**EE325C**						
Category	**Programme Elective I**						
Course Title	**INDUSTRIAL ELECTRICAL SYSTEMS**						
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Duration of Examination**		
	3	**0**	**0**	**3**	**3 hours**		
Evaluation System	**Sessional**					**End Term Examination**	**Grand Total**
	As per Ordinance				**Total**		
					25	**75**	**100**
Prerequisites (if any)							

Detailed Contents

S. No.	Contents
Unit - I	**Electrical System Components** TOPIC NO 1 LT system wiring components, TOPIC NO 2 Selection of cables, TOPIC NO 3 Wires, TOPIC NO 4 Switches, TOPIC NO 5 Distribution box, TOPIC NO 6 Metering system, TOPIC NO 7 Tariff structure, TOPIC NO 8 Protection components- Fuse, MCB, MCCB, ELCB, TOPIC NO 9 Inverse current characteristics, TOPIC NO 10 Symbols, TOPIC NO 11 Single line diagram (SLD) of a wiring system, TOPIC NO 12 Contactor, Isolator, Relays, MPCB, TOPIC NO 13 Electric shock and Electrical safety practices
Unit – II	**Residential and Commercial Electrical Systems** TOPIC NO 14 Types of residential and commercial wiring systems, TOPIC NO 15 General rules and guidelines for installation, TOPIC NO 16 Load calculation and sizing of wire, TOPIC NO 17 Rating of main switch, TOPIC NO 18 Distribution board and protection devices, TOPIC NO 19 Earthing system calculations, TOPIC NO 20 Requirements of commercial installation, TOPIC NO 21 Deciding lighting scheme and number of lamps, TOPIC NO 22 Earthing of commercial installation, TOPIC NO 23 Selection and sizing of components
Unit – III	**Industrial Electrical Systems** TOPIC NO 24 HT connection,Industrial substation, TOPIC NO 25 Transformer selection, Industrial loads,motors, TOPIC NO 26 Starting of motors,SLD, TOPIC NO 27 Cable and Switchgear selection,Lightning Protection, TOPIC NO 28 Power factor correction – KVAR calculations,type of compensation, TOPIC NO 29 Introduction to PCC, MCC panels,Specifications of LT Breakers, TOPIC NO 30 MCB and other LT panel components,UPS System,Battery banks, TOPIC NO 31 Sizing the DG,UPS and Battery Banks,Selection of UPS and Battery Banks.

Unit - IV	**Illumination Systems** TOPIC NO 32 Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, TOPIC NO 33 Specific consumption, glare, space to height ratio, TOPIC NO 34 Waste light factor, depreciation factor, TOPIC NO 35 Various illumination schemes, TOPIC NO 36 Incandescent lamps and modern luminaries like CFL, LED and their operation, TOPIC NO 37 Energy saving in illumination systems, TOPIC NO 38 Design of a lighting scheme for a residential and commercial premises, TOPIC NO 39 Flood lighting.

Referenc es:

1. S. L. Uppal and G. C. Garg, "Electrical Wiring, Estimating & Costing", Khanna publishers, 2008.
2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International,2007.
3. S. Singh and R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co., 1997.
4. Web site for IS Standards.
5. H. Joshi, "Residential Commercial and Industrial Systems", McGraw Hill Education, 2008.

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Department	**Electrical Engineering**					
Program Name	**Bachelor of Technology in Electrical Engineering**					
Program Level	**UG**					
Course Code	**EE333C**					
Category	**Programme Elective II**					
Course Title	**POWER PLANT ENGINEERING**					
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Duration of Examination**	
	3	**0**	**0**	**3**	**3 hours**	
Evaluation System	**Sessional**				**End Term Examination**	**Grand Total**
	As per Ordinance			**Total**		
				25	**75**	**100**
Prerequisites (if any)						

Detailed Contents

S. No.	Contents
Unit – I	**Introduction:** TOPIC NO 1 Conventional & Non-Conventional Sources of Energy and their availability in India, TOPIC NO 2 Different Types of Power Plants, TOPIC NO 3 Choice of Type of Power Generation, TOPIC NO 4 Power Plants in India. **Hydro Power Plants:** TOPIC NO 5 Hydrology – Hydrographs, TOPIC NO 6 Flow Duration Curve, TOPIC NO 7 Mass Curve; Principle of working, TOPIC NO 8 Classification, TOPIC NO 9 Site selection; TOPIC NO 10 Different components & their functions; TOPIC NO 11 Types of Dams; TOPIC NO 12 Types, Characteristics & Selection of Hydro-Turbines; TOPIC NO 13 Specific Speed of Hydro-Turbines; TOPIC NO 14 Power Output Equation; TOPIC NO 15 General arrangement and Operation of Hydroelectric Power Plant, TOPIC NO 16 Mini & Micro Hydro Power Plants, TOPIC NO 17 Pumped Storage Power Plants; TOPIC NO 18 Advantages of Hydroelectric Power Plants; TOPIC NO 19 Hydro Power in India & future trends.
Unit – II	**Nuclear Power Plants:** TOPIC NO 20 Principle of Nuclear Energy, TOPIC NO 21 Nuclear Power Plant Components & their Functions; TOPIC NO 22 Nuclear Fuels, TOPIC NO 23 Radioactivity, TOPIC NO 24 Nuclear Reaction & Classification; TOPIC NO 25 Nuclear Reactors – Types & Classification, TOPIC NO 26 Main Parts; TOPIC NO 27 Problems in Reactor Operation; TOPIC NO 28 Radiation Hazards; TOPIC NO 29Safety Measures; TOPIC NO 30 Nuclear Waste & its Disposal; TOPIC NO 31 Nuclear Power in India

Unit – III	**Gas Power Plants:** TOPIC NO 32 Operating Principle; TOPIC NO 33 Classification – Open Cycle, Closed Cycle, Combined Cycle; TOPIC NO 34 Fuels for Gas Turbine Power Plants; TOPIC NO 35 Different Components and their functions; TOPIC NO 36 Gas Turbine Characteristics, TOPIC NO 37 Cycle Efficiency, TOPIC NO 38 Operational Aspects, TOPIC NO 39 Advantages and Limitations. **Diesel Power Plants:** TOPIC NO 40 Working principle, TOPIC NO 41 Types of Diesel Engines, TOPIC NO 42 Different parts / systems and their functions, TOPIC NO 43 Performance of Diesel Engine, TOPIC NO 44 Plant Operation and Efficiency, TOPIC NO 45 Advantages and Disadvantages.
Unit – IV	**Thermal Power Plants:** TOPIC NO 46 Operating Principle, TOPIC NO 47 Site selection, TOPIC NO 48 Coal to Electricity, TOPIC NO 49 General Layout of Thermal Power Plant, TOPIC NO 50 Brief description of different parts/systems and their functions, TOPIC NO 51 Advantages and Limitations. **Co-Generation:** TOPIC NO 52 Concept; TOPIC NO 53 Schemes; TOPIC NO 54 Brief Description; **Non-Conventional Energy Sources:** TOPIC NO 56 Types, TOPIC NO 57 Brief Description, TOPIC NO 58 Advantages & Limitations.

TEXT BOOKS:

1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.
2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.
3. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering, 2nd ed.,McGraw .Hill,1998

REFERENCE BOOKS:

1. A Course in Electric Power System, Soni, Gupta, Bhatnagar, DhanpatRai&Sons
2. Power System Engineering, Nagrath& Kothari, Tata Mc-Graw Hill, New Delhi
3. Power Plant Engg: G.D. Rai
4. Electric Power: S.L. Uppal (Khanna Publishing)

NOTE:

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Subject: PROFESSIONAL TRAINING (LEVEL-2)
Subject Code: EE 351C

L	T	P	Credits		
0	0	2	1	Class Work	: 100
				Total	: 100
				Duration of Exam	: 3 Hrs

At the end of 4th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional Organization/Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format.

The report will be evaluated in the 5th Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.

COURSE OUTCOMES:

1. After the course is completed the student will have additional knowledge about professional attributes.
2. The students will develop a more professional outlook.
3. The students will know how to deal with time bound tasks in a more effective way.
4. The students will have more efficient attribute of multi-tasking.

Department	**Electrical Engineering**						
Program Name	**Bachelor of Technology in Electrical Engineering**						
Program Level	**UG**						
Course Code	**MGT201C**						
Category	**Programme Core**						
Course Title	**Engineering Economics**						
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Duration of Examination**		
	3	**0**	**0**	**3**	**3 hours**		
Evaluation System	**Sessional**					**End Term Examination**	**Grand Total**
	As per Ordinance				**Total**		
					25	**75**	**100**
Prerequisites (if any)							

Detailed Contents

S. No.	**Contents**
Unit – I	**Concept of Economics** TOPIC NO 1 Concept, TOPIC NO 2 Various definitions, TOPIC NO 3 Nature of Economic problem, TOPIC NO 4 Micro and macro economics- their features and scope, TOPIC NO 5 Production possibility curve, TOPIC NO 6 Relationship between Science, TOPIC NO 7 Engineering Technology and Economics. TOPIC NO 8 Utility: Concept and measurement of utility, TOPIC NO 9 Law of Diminishing Marginal Utility, TOPIC NO 10 Law of equi-marginal utility – its importance and practical applications.
Unit – II	Demand**:** TOPIC NO 11 Concept, TOPIC NO 12 Individual and Market demand schedule, TOPIC NO 13 Law of demand, TOPIC NO 14 Shape of demand curve. Elasticity of demand: TOPIC NO 15 Concept, TOPIC NO 16 Measurement of elasticity of demand, TOPIC NO 17 Factors affecting elasticity of demand, TOPIC NO 18 Practical application of elasticity of demand. TOPIC NO 19 Various concepts of cost-Fixed cost, variable cost, average cost, marginal cost, money cost, real cost, opportunity cost
Unit – III	TOPIC NO 20 Meaning of production and factors of production; TOPIC NO 21 Law of variable proportions, TOPIC NO 22 Law of Return to Scale, TOPIC NO 23 Internet and External economics and diseconomies of scale. TOPIC NO 24 Meaning of Market, TOPIC NO 25 Type of Marker– perfect Competition, TOPIC NO 26 Monopoly, TOPIC NO 27 Oligopoly, TOPIC NO 28 Monopolistic competition (Main features of these markers).

Unit – IV	TOPIC NO 29 Supply and Law of Supply, TOPIC NO 30 Role of Demand & Supply in Price Determination and effect of changes in demand and supply on price. TOPIC NO 31 Nature and characteristics of Indian economy, TOPIC NO 32 Privatization – meaning, merits and demerits. TOPIC NO 33 Globalisation – meaning, merits and demerits

TEXT BOOKS:

1. Publication, New Delhi
2. Jain T.R, Grover M.L, Ohri V.K Khanna O.P,"Economics for engineers" V.K .Publication ,New Delhi
3. Dr. R.K. Agarwal & Rashmi Agarwal, " Principles and Applications of Economic", Pragati Prakashan.

REFERNCE BOOKS:

4. Jhingan 1. Jhingan M.L"Micro Ecomomic Theory" S.
1. Chand Publication ,New Delhi
2. Chopra P.N "Principle of Economics" Kalyani Publishers, Delhi
5. Mishra S.K "Modern Micro Economics" Pragati Publication Ahuja H.L"Micro Ecomomic Theory" S. Chand Publication, New Delhi
3. Dewett K.K "Modern Ecomomic Theory" S. Chand Mumbai. 44
4. Dwivedi D.N "Micro Economics " Pearson Education, New Delhi.

Note:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

For student admitted in B. Tech. 1st Year (C-Scheme) in 2019 and all trailing students.

Examinations and evaluation of students shall be conducted as per guidelines AICTE Examinations Reforms covering the entire syllabus. The students shall be made aware about the reforms.

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