Gurugram University Gurugram

Curriculum for UG Degree Course

in

Mechanical Engineering

Gurugram University Gurugram

GENERAL COURSE STRUCTURE and CREDIT DISTRIBUTION

STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAM

S.No.	Category	Breakup of Credits (Total 158)
1	Humanities and Social Sciences including Management courses	11
2	Basic Science courses	20
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc	34
4	Professional core courses	61
5	Professional Elective courses relevant to chosen specialization/branch	12
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	16
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Economics for Engineers]	Non-credit
9	**Total**	**166**

SEMESTER WISE SUMMARY OF THE PROGRAM

S.No.	Semester	No. of Contact Hours	Marks	Credits
1.	I	24	900	19.5
2.	II	27	800	22.5
3.	III	32	900	21
4.	IV	34	1000	22
5.	V	28	1000	22
6.	VI	33	1000	24
7.	VII	25	900	21
8.	VIII	5	500	14
	Total	**208**	**7000**	**166**

COURSE CODE AND DEFINITIONS

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional core courses
OEC	Open Elective courses
LC	Laboratory course

CO2. Undertake problem identification, formulation and solution.
CO3. Design engineering solutions to complex problems utilising a systems approach.
CO4. Conduct an engineering project.
CO5. Communicate with engineers and the community at large in written an oral forms.
CO6. Demonstrate the knowledge, skills and attitudes of a professional engineer.

Semester 7

S. No.	Category	Code	Course Title	Hours per week			Credits	Marks for Sessional	Marks for End Term Examination	Total
				L	T	P				
1	PCC		Non-Conventional Energy Resources	3	1	0	3	30	70	100
2	PCC		Refrigeration And Air Conditioning	3	0	0	3	30	70	100
3	OEC		Open Elective-III	3	0	0	3	30	70	100
4	OEC		Open Elective-IV	3	0	0	3	30	70	100
5	PEC		Professional Elective-IV	3	1	0	3	30	70	100
6	LC		Refrigeration And Air Conditioning_Lab	0	0	2	1	50	50	100
7	PROJ-II		Project-II	0	0	2	2	100	100	200
		Total					**18**			**800**

NOTE:
1. Choose any one from Professional Elective Course-IV
2. Choose any one from each of the Open Elective Course-III and IV

Professional Elective IV

Sr. No.	Code	Subject	Credit
1		Composite Materials	3
2		Gas Dynamics and Turbo machine	3
3		Non-Destructive Evaluation and Testing	3
4		Computational Fluid Dynamics	3

Course code					
Course title	**Non conventional Energy Resource**				
Category	**Professional Core Course**				
Semester and Credits	L	T	P	**Credits**	Semester
	3	0	0	3	VII
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objectives:

The main purpose of fuel is to store energy, which should be in a stable form and can be easily transported to the place of use. The user employs this fuel to generate heat or perform mechanical work, such as powering an engine. It may also be used to generate electricity, which is then used for heating, lighting, or other purposes.

UNIT-I

Principles Of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

Solar Energy Collection:Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

UNIT-III

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC. Thermoelectric generators, seebeck, peltier and joul Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faradays laws, thermodynamic aspects, selection of fuels and operating conditions.

UNIT-IV

Bio-Mass:Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects..

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Course Outcomes:

At the end of the course, the student shall be able to:

CO1 : Understanding of fuel is to store energy

CO2 : Employs fuel to generate heat or perform mechanical work, such as powering an engine.

CO3: Explain the classification of concentrating collectors based on their design and focusing mechanisms

CO4: Evaluate the advantages and limitations of flat plate collectors and concentrating collectors in different applications

CO5: Analyze the generation of power using MHD generators and the operation of MHD accelerators and engines.

CO6: Identify suitable fuels and operating conditions for different types of fuel cells

Reference Book:

1) Renewable energy resources/ Tiwari and Ghosal/Narosa.

2) Non-Conventional Energy / Ashok V Desai /Wiley Eastern.

3) Non-Conventional Energy Systems / K Mittal/Wheeler

Text books:

1) Raja etal, “Introduction to Non-Conventional Energy Resources” Scitech Publications.

2) John Twideu and Tony Weir, “Renewal Energy Resources” BSP Publications, 2006.

3) M.V.R. Koteswara Rao, “Energy Resources: Conventional and Non-Conventional” BSP Publications,2006.

4) D.S. Chauhan,”Non-conventional Energy Resources” New Age International.

5) C.S. Solanki, “Renewal Energy Technologies: A Practical Guide for Beginners” PHI Learning.

6) Peter Auer, "Advances in Energy System and Technology". Vol. 1 and II Edited by Academic Press. 7) Godfrey Boyle,“ Renewable Energy Power For A Sustainable Future”, Oxford University Press.

Course code					
Course title	**Refrigeration and Air Conditioning**				
Category	**Professional Core Course**				
Semester and Credits	L	T	P	**Credits**	Semester
	3	0	0	3	VII
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objectives:

1. To familiarize with the terminology associated with refrigeration systems and air conditioning
2. To understand basic refrigeration processes
3. To understand the basics of psychrometry and practice of applied psychrometrics .
4. To acquire the skills required to model, analyse and design different refrigeration as well as air conditioning processes and components

UNIT-I

Introduction: Definition of refrigeration and air conditioning; Necessity; Methods of refrigeration; Unit of refrigeration; Coefficient of performance (COP), Fundamentals of air-conditioning system; Refrigerants-Definition, Classification, Nomenclature, Desirable properties, Comparative study, secondary refrigerants, Introduction to eco-friendly Refrigerants; Introduction to Cryogenics.

Air Refrigeration System: Carnot refrigeration cycle. Temperature. Limitations; Brayton refrigeration or the Bell Coleman air refrigeration cycle; Necessity of cooling the aero plane; Air craft refrigeration systems, Simple cooling and Simple evaporative types, Boot strap and Boot strap evaporative types, Regenerative type and Reduced Ambient type system, Comparison of different systems, problems.

UNIT-II

Vapour Compression (VC) Refrigeration Systems: (A) Simple Vapour Compression (VC) Refrigeration systems-Limitations of Reversed Carnot cycle with vapour as the refrigerant; Analysis of VC cycle considering degrees of sub cooling and superheating; VC cycle on p-v, t-s and p-h diagrams; Effects of operating conditions on COP; Comparison of VC cycle with Air Refrigeration cycle. Multistage Ref. Systems- Necessity of compound compression, Compound VC cycle , Intercooling with liquid sub –cooling and / or water inter cooler: Multistage compression with flash inter-cooling and / or water inter-cooling; systems with individual or multiple expansion valves; Individual compression system with individual or multiple expansion valves; Individual compression systems with individual or multiple expansion valves but with and without intercoolers. Other Refrigeration Systems: (A) Vapour Absorption Refrigeration Systems – Basic Systems, Actual COP of the System, Performance, Relative merits and demerits; Properties of aqua ammonia; Electrolux Refrigeration; Problems. Steam Jet Refrigerating System- Introduction, Analysis,

Relative merits and demerits, Performance Applications, Problems.

Unit-III

Psychrometry of Air and Air Conditioning Processes: Properties of moist Air-Gibbs Dalton law, Specific humidity, Dew point temperature, Degree of saturation, Relative humidity, Enthalpy, Humid specific heat, Wet bulb temp., Thermodynamics wet bulb temp., Psychrometric chart; Psychrometry of air-conditioning processes, Mixing Process, Basic processes in conditioning of air; Psychrometric processes in air washer, Problems. Air- Conditioning Load Calculations: Outside and inside design conditions; Sources of heating load; Sources of cooling load; Heat transfer through structure, Solar radiation, Electrical applications, Infiltration and ventilation, Heat generation inside conditioned space; Apparatus selection; Comfort chart, Problems.

Unit-IV

Air Conditioning Systems with Controls and Accessories: Classifications, Layout of plants; Equipment selection; Air distribution system; Duct systems Design; Filters; Refrigerant piping; Design of summer air-conditioning and Winter air conditioning systems; Temperature sensors, Pressure sensors, Humidity sensors, Actuators, Safety controls; Accessories; Problems. Refrigeration and Air Conditioning Equipments: Type of compressors and their performance curves; Types of Condensers, Heat transfer in condensers; Types of expansion devices; types of evaporators, Cooling and Dehumidifying coils, Problems.

Course Outcomes (COs): At the end of the course, the student shall be able to:

CO 1- Understand the air refrigeration, vapour compression refrigeration, vapour absorption, steam jet refrigeration systems and different type of refrigerants.

CO 2- Expedite the working of single stage, multistage and cascade refrigeration.

CO 3- Knowledge of psychrometry and different psychrometric processes. Understand and evaluate cooling and heating load and design of HVAC system.

CO 4- Develop and design RAC systems and evaluate different expansion and control devices.

CO5- Familiarize with various accessories used in RAC systems

CO6- Design and select components for both summer and winter air-conditioning systems

Text Books :

1. Refrigeration and Air conditioning –R.C. Jordan and G.B. Priester, Prentice Hall of India. .
2. Refrigeration and Air conditioning –C.P. Arora, TMH, New Delhi.

Reference Books:

1. A course in Refrigeration and Air Conditioning – Arora and Domkundwar, Dhanpat Rai and Sons.
2. Refrigeration and Air conditioning –W.F. Stocker and J.W. Jones, TMH, New Delhi.
3. Refrigeration and Air conditioning- Manohar Prasad Wiley Estern limited, New Delhi

Course code					
Course title	**Composite Materials**				
Category	**Professional Elective-IV**				
Semester and Credits	L	T	P	**Credits**	Semester
	3	0	0	3	VII
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course objectives:

1. To understand the mechanical behaviour of composite materials
2. To get an overview of the methods of manufacturing composite materials and their fabrication methods and testing.

UNIT-I

Definition and applications of composite materials, Fibers- glass, carbon, ceramic and aramid fibers; Matrices- polymer, graphite, ceramic and metal matrices; characteristics of fibers and matrices. Lamina-assumptions, macroscopic viewpoint, generalized Hooke;s law, reduction of homogeneous orthotropic lamina, isotropic limit case, orthotropic stiffness matrix, commercial material properties, rule of mixtures, transformation matrix, transformed stiffness. Manufacturing of composite materials, bag moulding, compression moulding, pultrusion, filament welding, other manufacturing processes .

UNIT-II

Basic assumptions of laminated anisotropic plates, symmetric laminates, angle ply laminates, cross ply laminates, laminate structural moduli, evaluation of lamina properties, determination of lamina stresses, maximum stress and strain criteria, von Mises Yield criterion for isotropic materials, generalized Hill‟s criterion for anisotropic materials, TsaiHill‟s criterion for composites, prediction of laminate failure, thermal analysis of composite laminates Analysis of laminated plates- equilibrium equations of motion, energy formulation, static bending analysis, buckling analysis, free vibrations, natural frequencies

UNIT-III

Fabrication methods: Processing of Composite Materials: Overall considerations, Autoclave curing, Other Manufacturing Processes like filament welding, compression molding, resintransplant method, pltrusion, pre-peg layer, Fiber-only performs, Combined Fiber-Matrix performs, Manufacturing Techniques: Tooling and Specialty materials, Release agents, Peel plies, release films and fabrics, Bleeder and breather plies, bagging films

UNIT-IV

Testing of Composites: Mechanical testing of composites, tensile testing, Compressive testing, Intra-laminar shear testing, Inter-laminar shear testing, Fracture testing etc.

Course Outcomes:

Upon completion of this course, the students will have

CO1: An overview of the mechanical behaviour and application of composite materials and their fabrication methods and testing

CO2: Learn the concept of the transformation matrix and its application in predicting the properties of a transformed composite laminate

CO3: Comprehend the concept of a lamina in composite materials, including assumptions made for lamina behavior.

CO4: Identify and analyze symmetric laminates, which have identical stacking sequences on the top and bottom of the laminate

CO5: Determine lamina stresses using the laminate strain-displacement equations and lamination theory

CO6: Understand the concept of laminate structural moduli, including the calculation of in-plane stiffness, bending stiffness, and coupling stiffness

Text Books:

1. Gibson R.F. Principles of Composite Material Mechanics, second edition, McGraw Hill, 1994.
2. Hyer M.W., Stress Analysis of Fiber- Reinforced Composite Materials, McGraw Hill, 1998
3. Materials characterization, Vol. 10, ASM hand book
4. Mechanical Metallurgy by G. Dieter Mc-Graw Hill
5. Thermal Analysis of Materials by R.F. Speyer, Marcel Decker
6. Engineering Materials: Polymers, Ceramics and Composites A.K Bhargava Prentice Hall India

Course code					
Course title	**Gas Dynamics and Jet Propulsion**				
Category	**Professional Elective IV**				
Semester and Credits	L	T	P	**Credits**	Semester
	3	0	0	3	VII
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objective:

1. To understand the features of compressible isentropic flows and irreversibilities like shocks.
2. To provide a basic knowledge of jet and rocket propulsion technologies.

UNIT-I

Compressible flow, definition, Mach waves and Mach cone, stagnation states, Mass, momentum and energy equations of one-dimensional flow, Isentropic flow through variable area ducts, nozzle s and diffusers, subsonic and supersonic flow I variable area ducts, choked flow, AreaMach number relations for isentropic flow .

UNIT-II

Non-isentropic flow in constant area ducts, Rayleigh and Fanno flows, Normal shock relations, oblique shock relations, isentropic and shock tables.

UNIT-III

Theory of jet propulsion, thrust equation, thrust power and propulsive efficiency, Operating principle and cycle analysis of ramjet, turbojet, turbofan and turboprop engines.

UNIT-IV

Types of rocket engines, propellants and feeding systems, ignition and combustion, theory of rocket propulsion, performance study, staging, terminal and characteristic velocity, space flights

Course Outcomes:

Upon completion of this course, the students will be able to apply gas dynamics principles to jet and space propulsion systems

Text Books:

1. Ahmed F. El-Sayed, Aircraft Prpoulsion and Gas Turbine Engines, CRC Press, 2008.
2. H.S. Mukunda, “Understanding Aerospace Chemical Propulsion”, Interline Publishing, 2004.
3. Hill P. and Peterson C., Mechanics and Thermodynamics of Propulsion, Addison Wesley, 1992.
4. Zucrow N. J., Aircraft and Missile Propulsion, Vol.Iand II, John Wiley, 1975.
5. Sutton G.P., Rocket Propulsion Elements, John Wiley, New York, 1986

Course code					
Course title	**Computational Fluid Dynamics**				
Category	**Professional Elective IV**				
Semester and Credits	L	T	P	**Credits**	Semester
	3	0	0	3	VII
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objectives: This course introduces the basic knowledge of governing equations for fluid flow and different turbulence models. The course also introduces the concept of numerical methods used to solve the partial differential equation. Further, solve the fluid flow problem using CFD tool

Unit 1

Introduction: Motivation and role of computational fluid dynamics, concept of modeling and simulation. Benefits and limitations of CFD software tools.

Unit II

Governing equations of fluid dynamics: Continuity equation, momentum equation, energy equation, various simplifications, dimensionless equations and parameters, convective and conservation forms, incompressible hermos flows, source panel method and vortex panel method.

Unit III

Nature of equations: Classification of PDE, general Thermos of parabolic, elliptic and hyperbolic equations, boundary and initial conditions. **Finite difference method:** Discretization, various methods of finite differencing, stability, method of
solutions. **Finite Volume methods:** Integral Approach, discretization and Higher order scheme.

Unit IV

Turbulence modelling: Turbulence, effect of turbulence on N-S equations, different turbulent modelling scheme, Error and uncertainty. **Incompressible Viscous Flows:** Stream function-vorticity formulation, solution for pressure, applications to internal flows and boundary layer flows

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Course Outcomes (CLOs):

The students will be able to:

1. derive and analyse the various types of fluid flow governing equations.
2. analyse the internal fluid flow phenomena of thermal and fluid system.
3. simulate engineering problems using commercial CFD tools

Text books:

1. Ghosdastidar, P. S., Computer Simulation of Flow and Heat Transfer, McGraw Hill (1998)
2. Roache, P. J., Computational Fluid Dynamics, Hermosa (1998).
3. Wendt, J. F., Computational Fluid Dynamics An Introduction, Springer-Verlag (2008).

Reference Books:

1. Muralidhar, K. and Sundararajan, T., Computational Fluid Flow and Heat Transfer, Narosa (2008) 2nd ed.
2. Jaluria, Y. and Torrance, K. E., Computational Heat Transfer, Taylor and Francis (2003).
3. Patankar, S. V., Numerical Heat Transfer and Fluid Flow, Taylor and Francis (2007).

Course code					
Course title	**Non Destructive Evaluation and Testing**				
Category	**Professional Elective IV**				
Semester and Credits	L	T	P	**Credits**	Semester
	3	0	0	3	VII
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

Course Objectives

1. Provide an overview of various non-destructive testing methods and their applications.
2. Understand the principles and processes of different non-destructive testing methods.
3. Identify the advantages, limitations, and specific techniques associated with each method.
4. Learn about the equipment and instruments used for non-destructive testing.
5. Understand the safety precautions and considerations for each testing method.

Unit 1

Introduction and Visual Methods- Optical aids, In-situ metallography, Optical holographic methods, Dynamic inspection; Penetrant Flaw Detection- Principles: Process: Penetrant systems: Liquid penetrant materials: Emulsifiers: cleaners, developers: sensitivity: Advantages: Limitations: Applications;

Unit II

Radiographic Methods- Limitations: Principles of radiography: sources of radiation, Ionising radiation - X-rays sources, gama-rays sources Recording of radiation: Radiographic sensitivity: Fluoroscopic methods: special techniques: Radiation safety; Ultrasonic Testing of Materials- Advantages, disadvantages, Applications, Generation of. Ultrasonic waves, general characteristics of ultrasonic waves: methods and instruments for ultrasonic materials testing: special techniques;

Unit III

Magnetic Methods- Advantages, Limitations, Methods of generating fields: magnetic particles and suspending liquids Magnetography, field sensitive probes: applications. Measurement of metal properties; Electrical Methods- Eddy current methods: potential-drop methods, applications.

Unit IV

Electromagnetic Testing- Magnetism: Magnetic domains: Magnetization curves: Magnetic Hysteresis: Hysteresis loop tests: comparator - bridge tests Absolute single-coil system: applications.

Unit V

Other Methods- Acoustic Emission methods, Acoustic methods: Leak detection: Thermal inspection.

Course Outcomes:

By the end of the course, students should be able to:
CO1. Identify and select appropriate non-destructive testing methods for specific applications.
CO2. Perform non-destructive testing using visual methods, penetrant flaw detection, radiographic methods, ultrasonic testing, magnetic methods, electrical methods, and other relevant techniques.
CO3. Analyze and interpret test results accurately and effectively.
CO4. Understand and apply safety practices and precautions associated with non-destructive testing methods.
CO5. Demonstrate knowledge of the principles, advantages, limitations, and specific techniques of different non-destructive testing methods.
CO6. Operate and utilize the necessary equipment and instruments for non-destructive testing.

Text/Reference Books:

1. P. Halmshaw ;Non-Destructive Testing
2. Metals Handbook Vol. II, Non-destructive inspection and quality control

Course code					
Course title	**Refrigeration and Air Conditioning Lab**				
Category	**Laboratory Course**				
Semester and Credits	L	T	P	**Credits**	Semester
	0	0	2	2	VII
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objectives:

1. Understand the vapour compression refrigeration system and vapour absorption system.
2. Application of different compressors used in refrigeration system.
3. Understand functioning of various control devices
4. Evaluate the COP of various refrigeration system such as vapour compression refrigeration system and vapour absorption system.
5. Knowledge of how the loading condition changes the COP of the system

List of Experiments : (Refrigeration and Air Conditioning Lab)

1) To study the vapour compression Refrigeration System and determine its C.O.P. and draw P-H and T-S diagrams.
2) To Study the Mechanical heat pump and find its C.O.P.
3) To study the Air and Water heat pump and find its C.O.P.
4) To study the cut- sectional models of Reciprocating and Rotary Refrigerant compressor.
5) To study the various controls used in Refrigerating and Air Conditioning systems.
6) To study the Ice- plant, its working cycle and determine its C.O.P and capacity.
7) To study the humidification, heating, cooling and dehumidification processes and plot them on Psychrometric charts.
8) To determine the By-pass factor of Heating and Cooling coils and plot them on Psychrometric charts on different inlet conditions.
9) To determine sensible heat factor of Air on re-circulated air-conditioning set up.
10) To study the chilling plant and its working cycle.

Course Outcomes (COs): At the end of the course, the student shall be able to:

CO 1- Understand the vapour compression refrigeration system and vapour absorption system.
CO 2- Application of different compressors used in refrigeration system.
CO 3- Understand functioning of various control devices
CO 4- Evaluate the COP of various refrigeration system such as vapour compression refrigeration system and vapour absorption system.
CO 5- Knowledge of how the loading condition changes the COP of the system

Course Code					
Category	**PT**				
Course title	**Practical Training-II**				
Scheme	**L**	**T**	**P**	**Credits**	**Semester: VII**
	0	**0**	**2**	**2**	
Class Work	100 Marks				
Exam					
Total	100 Marks				
Duration of Exam					

The students are required to undergo practical training of duration not less than 1.5 months in a reputed organization or concerned institute. The students who wish to undergo practical training, the industry chosen for undergoing the training should be at least a private limited company. The students shall submit and present the midterm progress report at the institute. the presentation will be attended by a committee. alternately the teacher may visit the industry to get the feedback of the student.

The final Viva voice of the practical training will be conducted by an external examiner and one external examiner appointed by the institute. External examiner will be from the panel of examiners submitted by the concerned institute approved by the board of studies in engineering and technology. Assessment of industrial training will be based on seminar, viva-voice, report and certificate of practical training or institutional project work obtained by the student from the industry or institute.

The internal marks distribution for the students who have undergone industrial training consist of 100 marks internally.

Course code					
Course title	Project-II				
Category	**PROJ-II**				
Semester and Credits	L	T	P	**Credits**	Semester
	0	0	3	2	VII
Classwork	100 Marks				
Exam	100 Marks				
Total	200 Marks				
Duration of Exam	03 Hours				

COURSE OBJECTIVE

1. To prepare the student to gain major design and or research experience as applicable to the profession
2. Apply knowledge and skills acquired through earlier coursework in the chosen project.
3. Make conversant with the codes, standards, application software and equipment
4. Carry out the projects within multiple design constraints
5. Incorporate multidisciplinary components
6. Acquire the skills of comprehensive report writing

Students will be assigned projects (Applications/Research based) individually or in a group of not more than 3 students depending on the efforts required for completion of the project.

The project will have 4 stages: (*Marks for internal evaluation are given in brackets)

1. Synopsis submission (5 marks),
2. 1st mid-term progress evaluation (Literature Survey in case of research project) (5 marks)
3. 2nd mid-term progress evaluation (Paper Publishing/acceptance in a reputed Journal or Conference acceptance/ Presenting) (5 marks)
4. Final submission evaluation

The external examiner will evaluate the project on the basis of idea/quality of project, implementation of the project, project report and/or publication and viva.

Course outcomes

On successful completion of the course students will be able to:

CO1. Demonstrate a sound technical knowledge of their selected project topic.
CO2. Undertake problem identification, formulation and solution.
CO3. Design engineering solutions to complex problems utilising a systems approach.
CO4. Conduct an engineering project.
CO5. Communicate with engineers and the community at large in written an oral forms.
CO6. Demonstrate the knowledge, skills and attitudes of a professional engineer.

Gurugram University Scheme of Studies and Examination

Bachelor of Technology Semester 8

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks for Sessional	Marks for End Term Examination	Total
				L	T	P				
1	Elective		MOOC1	3	0	0	3	30	70	100
2	Elective		MOOC2	3	0	0	3	30	70	100
3	PROJECT		Industrial Project/ Project III	0	0	16	8	150	150	300
Total							**16**			**500**

MAJOR PROJECT/INDUSTRIAL TRAINING

Course Code					**Semester: VIII**
Category	**Project**				
Course title	**Major Project /Industrial Training**				
Scheme	**L**	**T**	**P**	**Credits**	
	0	**0**	**16**	**8**	
Class Work	150 Marks				
Exam	150 Marks				
Total	300 Marks				
Duration of Exam	3Hrs				

The students are required to undergo industrial training or institutional project work of duration not less than 4 months in a reputed organization or concerned institute. The students who wish to undergo industrial training, the industry chosen for undergoing the training should be at least a private limited company. The students shall submit and present the midterm progress report at the institute. the presentation will be attended by a committee. alternately the teacher may visit the industry to get the feedback of the student.

The final Viva voice of the industrial training on institutional project work will be conducted by an external examiner and one external examiner appointed by the institute. External examiner will be from the panel of examiners submitted by the concerned institute approved by the board of studies in engineering and technology. Assessment of industrial training or institutional project work will be based on seminar, yiva-voice, report and certificate of industrial training or institutional project work obtained by the student from the industry or institute.

The internal marks distribution for the students who have undergone industrial training consist of 150 marks internally and 150 marks buy an external examiner.

Elective

Course Code					**Semester: VIII**
Category	**Elective**				
Course title	**MOOC-1/Swayam/Nptel**				
Scheme	**L**	**T**	**P**	**Credits**	
	3	**0**	**0**	**3**	
Class Work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3Hrs				

A student has to complete NPTEL Courses of 12 Weeks respectively through MOOCs. For registration to MOOCs Courses, the students shall follow NPTEL Site http://nptel.ac.in/ as per the NPTEL policy and norms. The students can register for these courses through NPTEL directly as per the course offering in Odd/Even Semesters at NPTEL. These NPTEL courses (recommended by the University) may be cleared during the B. Tech degree program (not necessary one course in each semester). After successful completion of these MOOCS courses the students, shall, provide their successful completion NPTEL status/certificates to the University (COE) through their college of study only.

Elective

Course Code					**Semester: VIII**
Category	**Project**				
Course title	**MOOC-2/swayam/NPTEL**				
Scheme	**L**	**T**	**P**	**Credits**	
	3	**0**	**0**	**3**	
Class Work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	3Hrs				

A student has to complete NPTEL Courses of 12 Weeks respectively through MOOCs. For registration to MOOCs Courses, the students shall follow NPTEL Site http://nptel.ac.in/ as per the NPTEL policy and norms. The students can register for these courses through NPTEL directly as per the course offering in Odd/Even Semesters at NPTEL. These NPTEL courses (recommended by the University) may be cleared during the B. Tech degree program (not necessary one course in each semester). After successful completion of these MOOCS courses the students, shall, provide their successful completion NPTEL status/certificates to the University (COE) through their college of study only.