Gayatri Vidya Parishad College for Degree and PG Courses (A)

Department of Mechanical Engineering

Accredited by NBA and NAAC

SEMESTER III

(II Year I Semester)

Sl. No.	Code	Category	Course Title	Hours per week			Allotment of Marks		Total Marks	Credits
				L	T	P	Internal	External		
1	2295301	BSC	Engineering Mathematics-III	3	0	0	30	70	100	3
2	2295302	PCC	Strength of Materials	3	0	0	30	70	100	3
3	2295303	HSSC	Professional Ethics & Universal Human Values	3	0	0	30	70	100	3
4	2295304	PCC	Basic Thermodynamics	3	0	0	30	70	100	3
5	2295305	PCC	Manufacturing Processes	3	0	0	30	70	100	3
6	2295306P	PCC	Fuels and Mechanics Lab	0	0	3	50	50	100	1.5
7	2295302P	PCC	Strength of Materials Lab	0	0	3	50	50	100	1.5
8	2295307S	SOC	Internet Of Things	1	0	2	50	50	100	2
9	2295308	PCC	Mechanical Engineering Drawing	0	0	3	50	50	100	1.5
			Total	**16**	**0**	**11**	**350**	**550**	**900**	**21.5**

BSC : BASIC SCIENCE COURSE

PCC : PROFESSIONAL CORE COURSE

ESC : ENGINEERING SCIENCE COURSE

PEC : PROFESSIONAL ELECTIVE COURSE

OEC : OPEN ELECTIVE COURSE

MC : MANDATORY COURSE

HSSC : HUMANITIES AND SOCIAL SCIENCES COURSE

SOC : SKILL ORIENTED COURSE

SKILL ORIENTED COURSES

Skill Oriented Course-I : 2295307S Internet Of Things

GAYATRI VIDYA PARISHAD
COLLEGE FOR DEGREE AND PG COURSES (A)

(Permanently Affiliated to Andhra University)

ENGINEERING AND TECHNOLOGY PROGRAM

II/IV B. Tech. DEGREE I SEMESTER (R-22 REGULATIONS)

Vector Calculus, Partial Differential Equations, Fourier Transforms and Applications

(ENGINEERING MATHEMATICS – III)

(Common for Civil Engineering and Mechanical Engineering)

(Effective from the admitted batch of 2022-23)

Description	Subject Name	L	T	P	C	Ext. Exam Time
Course Code	**Vector Calculus, Partial Differential Equations, Fourier Transforms and Applications**	3	0	0	3	3 Hrs.
	Total Marks : 100	Ses. 30		Ext. 70		

L: Lectures; T: Tutorial; P: Practical; Ses: Sessionals; Ext: External; C: Credits

Course Objectives:

In general, the students are introduced with a knowledge on the topics:

- How to evaluate gradient, divergence and curl under the differentiation of scalar and vector point functions.
- How to evaluate Line, Surface and Volume integrals under the integration of point functions. Also, how to transformation theorems such as Green's theorem in the plane, Stoke's theorem, Gauss Divergence theorem and their applications.
- How to formulate and solve the Partial Differential Equations
- Partial differential equations, their applications and
- To learn, the concept of integral transforms, namely, Fourier transforms, Fourier Sine, Cosine and related inverse transforms, and their applications in solving several Physical and Engineering problems.

Course Outcomes:

CO 1: Ability to evaluate gradient, divergence and curl under the differentiation of scalar and vector point functions.

CO 2: Ability to evaluate Line, Surface and Volume integrals under the integration of point functions. Also, how to transformation theorems such as Green's theorem in the plane, Stoke's theorem, Gauss Divergence theorem and their applications.

CO 3: Ability to formulate and solve the Partial Differential Equations.

CO 4: Ability to evaluate the application of Partial Differential Equations using the method of separation of variables.

CO 5: Apply Fourier transforms to solve Partial Differential Equations.

SYLLABUS

UNIT-I
(VECTOR CALCULUS-1)

Differentiation of vectors, velocity and acceleration, scalar and vector point functions, vector operator ∇ applied to scalar point functions- gradient, ∇ applied to vector point functions- divergence and curl. Physical interpretation of divergence. Irrotational and Solenoidal vectors, the relations obtained after ∇ applied twice to point functions, ∇ applied to products of two functions.

(Chapter 8.1, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9)

SYLLABUS APPROVED BY BOARD

CHAIRMAN B.O.S.

(Dr. CH. SANTHI SUNDAR RAJ) Professor, Dept. of Eng. Maths A.U.C.E(A).

UNIT-II
(VECTOR CALCULUS-2)

Integration of vectors, line integral, circulation, work done, surface integral-flux, Green's theorem in the plane, Stoke's theorem, volume integral, Gauss Divergence theorem. (only theorem statements without proofs), orthogonal curvilinear coordinates, cylindrical and spherical coordinates

(Chapter 8.10, 8.11, 8.12, 8.13, 8.14, 8.15, 8.16, 8.17, 8.18, 8.19, 8.20)

UNIT-III
(INTRODUCTION OF PARTIAL DIFFERENTIAL EQUATIONS)

Introduction, Formation of partial differential equations, solutions of partial differential equations- linear equations of first order: Lagrange's Linear equation, non-linear equations of first order. Homogeneous linear equations with constant coefficients- rules for finding the complementary function, rules for finding the particular integral (working procedure), non-homogeneous linear equations.

(Chapter 17.1, 17.2, 17.3, 17.5, 17.6, 17.8, 17.9, 17.10, 17.11, 17.12)

UNIT-IV
(APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS)

Introduction, Method of separation of variables, One dimensional wave equation-vibrations of a stretched string, one dimensional Heat flow equation.

(Chapter 18.1, 18.2, 18.3, 18.4, 18.5)

UNIT-V
(Fourier Transforms)

Introduction, definition, Fourier integral theorem, Fourier Sine and Cosine integrals, Complex form of Fourier integral, Fourier transforms, Fourier Sine and Cosine transforms, Finite Fourier Sine and Cosine transforms, properties of Fourier transforms. Convolution theorem for Fourier transforms, Parseval's identity for Fourier transforms.

(Chapter 22.1, 22.2, 22.3, 22.4, 22.5, 22.6, 22.7)

TEXT BOOK:

Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S. Grewal, 43rd Edition, Khanna publishers.

REFERENCE BOOKS:

1. Graduate Engineering Mathematics by V B Kumar Vatti., I.K.International publishing house Pvt. Ltd.
2. Advanced Engineering Mathematics by Erwin Kreyszig.
3. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.
4. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
5. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.
6. Higher Engineering Mathematics by Dr. M.K.Venkataraman.

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(Dr. CH. SANTHI SUNDAR RAO
Professor, Dept. of Eng Maths
A.U.C.E (A))

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
2295302	**Strength of Materials**	L	T	P	Int.	Ext	3
		3	**0**	**0**	**30**	**70**	

Course Objectives:

1. To make students to understand the concept of stress and strain and enable them to calculate different types of stresses and strains under simple and complex loading.
2. To make students to calculate shearing force and bending moments of different types of beams.
3. To apply the knowledge of determining moment of inertias of different cross sections and identify the stresses and deflections induced in beams
4. To enable the students to understand stresses induced in the transmission shafts and helical coil springs against different types of loading conditions.
5. To develop knowledge in calculation of stresses and identifying the type of failure in cylinders and spherical shells.

Course Outcomes:

1. Determine stresses and strains induced in a mechanical component for various types of loads. Further, the student can also determine principal stresses and strains.
2. Calculate shear force and bending moments induced in beams for different types of loading conditions
3. Calculate moment of inertias of different cross sections and analyze the beams for determination of stresses and deflections using double integration, Macaulay's and moment area method.
4. Identify the mode of failure in transmission shafts and determine stresses induced in shaft and springs subjected to complex loading conditions
5. Apply the principles of stresses and strains in thin cylinders and shells and evaluate longitudinal and circumferential stresses.

Unit-I:

Simple Stresses: Stress, Strain, Stress- Strain curve, Lateral strain, Relationship between elastic constants, Bars of varying cross-section, Compound bars, Temperature stresses in bars. Complex Stresses: Stresses on an inclined plane under different uniaxial and biaxial stress conditions, Principal planes and principal stresses, Mohr's circle, Relation between elastic constants, Strain energy, Impact loading.

Unit-II:
Shear Force and Bending Moment Diagrams: Beam - Types of loads, Types of supports, S.F. and B.M. diagrams for Cantilever, Simply supported and Over hanging beams.

Unit-III:
Stresses in Beams: Theory of bending, Flexural formula, Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections, Shear stresses in beams, Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T, angle sections.

Unit-IV:
Deflections of Beams: Relation between curvature, slope and deflection, double integration method, Macaulay's method, Moment area method -application to simple cases including Cantilever, Simply supported and Over hanging beams.

Unit-V:
Thin Cylinders and Spherical Shells: Stresses and strains in thin cylinders, Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders and Thin spherical shell.

Text Books:

1. A Textbook of Strength of Materials, by R.K.Bansal, Laxmi Publications.
2. Solid Mechanics, E.P. Popov, Pearson Education India, 2nd Edition, 2015

Reference Books:

1. Strength of Materials, Timoshenko, CBS Publishers, 3rd Edition
2. Strength of Materials, Bhavikatti S.S, Vikas Publishing House PVT Ltd. Fourth Edition 2013
3. Mechanics of Materials, James M. Gere , Stephen P. Timoshenko , CBS Publishers
4. Analysis of structures, Vazirani and Ratwani.
5. Mechanics of Structures Vol-III, S.B.Junnarkar.

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES (A)

ENGINEERING AND TECHNOLOGY PROGRAM

MODEL QUESTION PAPER

[PAPER CODE]

II/IV B.Tech, I SEM END EXAMINATION

STRENGHT OF MATERIALS

Time: 3 hours Maximum Marks: 70

1				
	a.	State Hook's law.	2 marks	CO1
	b	What is the relationship between SF and BM?	2 marks	CO2
	c	List out any two assumptions in simple bending.	2 marks	CO3
	d	Enlist the methods for finding out slope and deflection at a section.	2 marks	CO4
	e	Define circumferential stress in Thin cylinders.	2 marks	CO5
2				
	a	What do you understand by Temperature stress and strain? State the applications of the same. A thin steel ring (tyre) is shrunk on a rigid wooden wheel 1.2 m in diameter. If the stress in the steel tyre is limited to 120 MPa, determine (a) minimum internal diameter of the tyre, and (b) least temperature to which the tyre must be heated above that of wheel. For the tyre material E= 200 GPa and $\alpha = 12 \times 10^{-6}$ per ^{0}c.	12 marks	CO1
		OR		
	b	A piece of material is subjected to two compressive stresses at right angles, their values being 40 N/mm^{2}and 60 N/mm^2. Find the position of the plane across which the resultant stress is most inclined to the normal and determine the value of the resultant stress. Draw the Mohr's circle diagram when a piece of material is subjected to shear stress only. Assume any suitable value of stress for the diagram.	12 marks	CO1
3				
	a	A simply supported beam of length 8 m rests on the supports 6 m apart, the right hand end is overhanging by 2m. The beam carries a uniformly distributed load of 1500 N/m over the entire length. Draw Shear force and bending moment diagrams and find the point of contra flexure, if any?	12 marks	CO2
		OR		
	b	A beam AB 10m long carries a uniformly distributed load of 2 kN/m over its entire length together with concentrated load of 5 kN at the left end A and 8 kN at right end B. The beam is to be supported at two props at the same level, 6 m apart so that the reaction is the same at each. Find the positions of the supports and S.F. and B.M. diameters. Mark the value of maximum B.M.	12 marks	CO2

4				
	a	Derive the equation M/I = f/y = E/R	12 marks	CO3
		OR		
	b	Derive the shear stress at any point in the cross section of a beam which is subjected to a shear force F.	12 marks	CO3
5				
	a	A simply supported beam of 4 m length is subjected to a concentrated point load of 16 kN at 1 m from left support and uniformly distributed load of 8 kN/m over a span of 2 m from right support. Using Macaulay's method, make calculations for slope at left support, deflection at centre of beam and maximum deflection. The flexural rigidity for the given beam EI =4000kNm^2	12 marks	CO4
		OR		
	b	A simply supported beam of 10 m span carries a concentrated load of 40 kN at a distance of 7.5 m from one end. Determine the deflection at the load point and the slopes at the load point and at the two ends Use moment area method. Take moment of inertia of area I= 2 x 10_9 mm_4 and young's modulus of elasticity as 200 GPa.	12 marks	CO4
6				
	a	A thin cylindrical shell of 90 mm internal diameter and 6 mm thick is closed at the ends and is subjected to an internal pressure of 7 MPa. A torque of 2 kN-m is also applied to the tube. Find the maximum and minimum principal stresses and maximum shear stress.	12 marks	CO5
		OR		
	b	A cylindrical shell 1m long, 180mm internal diameter, thickness of metal 8mm is filled with a fluid at atmospheric pressure. If an additional 20,000mm3 of the fluid is pumped in to the cylinder. Find the pressure exited by the fluid on the wall of the cylinder and also find the hoop stress is induced take E=2×105 N/mm2 and 1/m = 0.3	12 marks	CO5

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND P.G.COURSES (A)

ENGINEERING AND TECHNOLOGY PROGRAM

II/IV B. Tech. DEGREE EXAMINATION

II/IV B.Tech. :: CSE/ECE/CE/ME

MANDATORY COURSE

Professional Ethics and Universal Human Values

(Effective from 2020-2021 Admitted Batches)
(Common for all Branches)

Course Objectives:

The objective of the course is:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- This course will illuminate the students in the concepts of laws and its applicability to engineers
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection, Development of commitment and courage to act and also enable the students to imbibe and internalize the Values and Ethical Behavior in the personal and professional lives
- To enable the students to imbibe the Values and Ethical Behavior in the personal and Professional lives
- The students will learn the rights and responsibilities Individual, employee, team member and a global citizen

Course Outcomes:

By the end of the course Student will be able to:

CO-1: Self-explore by using different techniques to live in harmony at various levels

CO-2:Analyze themselves and understand their position with respect to the moral and ethical character needed for a successful and satisfactory work life

CO-3: Students are expected to become more aware of themselves and their surroundings (family, society, nature)

CO-4: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

CO-5: They would also become sensitive to their commitment towards what they have understood human values, human relationship and human society

SYLLABUS

UNIT-I: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education.

- Need, Basic Guidelines, Content and Process for Value Education.
- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation - as the process for self-exploration.
- Continuous Happiness and Prosperity - A look at basic Human Aspirations.
- Right understanding, Relationship and Physical Facility - the basic requirements for fulfillment of aspirations of every human being with their correct priority.
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario.
- Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-II: Understanding Harmony in the Human Being - Harmony in Myself

- Understanding human being as: a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility(sukh and suvidha)
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer),
- Understanding the characteristics and activities of 'I' and harmony in 'I', the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.
- Program to ensure Sanyam and Swasthya,

UNIT-III:Understanding Harmony in the Family and Society - Harmony in Human – Human Relationship

- Understanding Harmony in the family – the basic unit of human interaction
- Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas)* and Respect (*Samman)* as the foundational values of relationship
- Understanding the meaning of *Vishwas*; Difference between intention and competence
- Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva* as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj),* Universal Order (*Sarvabhaum Vyawastha)*- from family to world family!

UNIT-IV: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence.

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all – pervasive space
- Holistic perception of harmony at all levels of existence

UNIT-V: Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order,
- Competence in professional ethics:

  a.Ability to utilize the professional competence for augmenting universal human order

  b.Ability to identify the scope and characteristics of people friendly and eco-friendly production systems

  c.Ability to identify and develop appropriate technologies and management patterns for above . Production systems
- Case studies of typical holistic technologies, management models and production systems,
- Strategy for transition from the present state to Universal Human Order:

  a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers

  b. At the level of society: as mutually enriching institutions and organizations, Include practice sessions and case studies.

Text Books

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

3. R. Subramanian, "Professional Ethics", Oxford University Press.

4. S.B. Srivasthva, "Professional Ethics & Human Values", SciTech Publications (India) Pvt. Ltd. New Delhi.

5. D.R. Kiran, "Professional Ethics & Human Values", TATA Mc Graw Hill Education.

6. Saroj Kumar, "Business Law" and Avtar Singh, "Law of Contract"

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.

2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.

3. The Story of Stuff (Book), Mohandas Karamchand Gandhi "The Story of My Experiments with Truth", E. FSchumacher. "Small is Beautiful", Slow is Beautiful –Cecile Andrews, J C Kumarappa "Economy of Permanence", Pandit Sunderlal "Bharat Mein Angreji Raj" and Dharampal, "Rediscovering India

4. G K Kapoor, "Business Law" and Sen & Mitra, "Business & Commercial Laws" and Calvin Frank Allen, "Business law for Engineers"

5. Hilgard, E. R.; Atkinson, R. C. & Atkinson, R.L. (1975). *Introduction to Psychology*. 6th Edition. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.

6. Govindarajan, M; Natarajan, G. M. & Senthilkumar, V.S. (2013). *Professional Ethics & Human Values*. Prentice Hall: New Delhi

7. Gogate, S. B. (2011). Human Values & Professional Ethics. Vikas Publishing: New Delhi.

8. Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, "Engineering Ethics, Concepts Cases: 4e, Cengage learning, 2015.

9. Caroline Whitbec, " Ethics in Engineering Practice & Research: 2e, Cambridge University Press 2015.

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND P.G. COURSES (A)

ENGINEERING AND TECHNOLOGY PROGRAM

II/IV B. Tech. DEGREE EXAMINATION.

I SEMESTER END EXAMINATIONS

Professional Ethics &Universal Human Values

Electronics and Communication Engineering
&
Mechanical Engineering

(Effective from the admitted batch of 2020-2021)

Time: 3hours. **Maximum: 70 marks**

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Answer all the questions

5*2M=10M

1	a)	What is value education?	2M CO-1
	b)	What do you mean by right utilization of the body?	2M CO-2
	c)	How do we come to differentiate between human beings on the basis of body?	2M CO-3
	d)	What are the four orders of nature?	2M CO-4
	e)	What do you mean by Ethical Human Conduct?	2M CO-5
2	a)	Write a short note on the need for value education in today's scenario.	6M CO-1
	b)	Define self-exploration. What is the content of self – exploration?	6M CO-1
		or	
3	a)	What do you mean by Happiness and prosperity? Explain the current scenario of human beings.	6M CO-1
	b)	What do the abbreviations given as SVDD, SSDD and SSSS signify?	6M CO-1
4	a)	Distinguish between the needs of the Self and the needs of the Body.	6M CO-2
	b)	Do you think that human beings are sum-total of sentiments and physical aspects the 'self' and the 'body'? Explain your answer using examples.	6M CO-2
		or	

5.	a)	'Human being is co-existence of the Self and the Body' – elaborate on this statement.	6M CO-2
	b)	What are the programs for ensuring the health of the body? Explain.	6M CO-2
6	a)	What is justice? How does it lead to mutual happiness?	6M CO-3
	b)	What are the five dimensions of Human Endeavour? How are they helpful in achieving the Comprehensive human goal?	6M CO-3
		or	
7	a)	Right understanding in the individuals is the basis for harmony in the family, which is the building block for harmony in the society. Give your comments.	6M CO-3
	b)	What do you mean by differentiation in relationship? What are the issues on which differentiation in relationship in prevalent in the society?	6M CO-3
8	a)	Explain the harmony in nature.	6M CO-4
	b)	What do you mean by 'innateness'? What is the innateness in the four orders?	6M CO-4
		or	
9	a)	Explain the differences and similarities between animal order and human order.	6M CO-4
	b)	Define existence? Show that existence is in a form of co-existence.	6M CO-4
10	a)	What is ethical human conduct? Explain in terms of values, policies and character with appropriate examples	6M CO-5
	b)	What do you understand by holistic technology? Briefly explain.	6M CO-5
		or	
11	a)	What do you mean by competence in professional ethics? Elaborate with examples.	6M CO-5
	b)	Give a critical review of the current management models in profession	6M CO-5

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE&P.G.COURSES (A)
ENGINEERING & TECHNOLOGY PROGRAM
DEPARTMENT OF MECHANICAL ENGINEERING

Course code	Title of the course	Contact periods for delivering the course	Credits
2295304	BASIC THERMODYNAMICS	L T P 3 0 0	3

COURSE OBJECTIVES:

- To give a clear understanding of basic concepts of thermodynamics, first law of thermodynamics and its application for analysis of non-flow and steady flow engineering systems
- To describe various non-flow and steady-flow engineering systems with the application of first law and to understand the second law of thermodynamics and entropy.
- To carryout thermodynamic analysis of steam undergoing different thermodynamic processes and to understand steam power cycles and its performance parameters

COURSE OUTCOMES: At the end of the course, the student will be able to:

CO 1	Strengthen knowledge on basic concepts of thermodynamics and to analyze various non-flow and steady flow engineering systems with the application of first law of thermodynamics.
CO 2	Identify the possibilities to improve the performance of heat engine, refrigerator and heat pump in conformity with second law of thermodynamics and to gain insight knowledge on Carnot cycle, Carnot theorem and the concept of entropy
CO 3	Carryout the thermodynamic analysis of air-standard cycles i.e., Otto, Diesel, Dual and Brayton cycles and computation of performance parameters for those cycles.
CO 4	Determine steam properties with the help of steam tables and Mollier diagram and also able to analyze various non-flow and flow processes in which working substance as steam.
CO5	Analyze the performance of simple Rankine cycle and its modifications employed such as of superheating, reheating and regeneration

BASIC THERMODYNAMICS

SYLLABUS

UNIT- I:

Fundamental concepts of Thermodynamics: Introduction to Thermodynamics; Thermodynamic systems; Microscopic and Macroscopic approaches - Thermodynamic equilibrium; State; Property; Path; Process; Cycle; Reversible and irreversible processes; Work and Heat ; Non-flow work , Flow work ; Zeroth law of thermodynamics, Specific heat at constant pressure and constant volume and their relation.

First law of thermodynamics: First law of thermodynamics for closed system undergoing a cycle and a change of state - Application of First law of thermodynamics to various non-flow processes. Steady flow energy equation (SFEE) and its application to various steady flow systems; PMM-I; Limitations of first law of thermodynamics.

UNIT- II:

Second law of thermodynamics and Entropy: Thermal energy reservoirs - heat source and heat sink; Cyclic heat engine- Refrigerator and heat pump - Kelvin Plank and Clasius statements of second law of thermodynamics and their equivalence; PMM-II; Carnot cycle; Carnot's theorem; Concept of entropy; Temperature - entropy plot; Clausius inequality; Principle of increase of entropy; Calculation of entropy change for an ideal gas undergoing different thermodynamic processes.

UNIT- III:

Gas power cycles: Air standard cycle; Assumptions in air-standard cycles; Important terms used in air standard cycles - bore – stroke - dead centres - clearance volume-swept volume - clearance ratio- compression ratio- air standard efficiency relative efficiency-mean effective pressure ; Thermodynamic analysis of Otto cycle, Diesel cycle and Dual cycle; Comparison of Otto, Diesel and Dual cycles; Analysis of simple Gas turbine cycle – Brayton cycle.

UNIT- IV:

Properties of steam: Definition of pure substance, phase change of a pure substance, Phase Change Terminology and Definitions, Formation of Steam, Dryness fraction of steam ; types of steam - dry steam, wet steam and superheated steam ; Properties of steam – saturation temperature and pressure, volume, internal energy, enthalpy, entropy; Property diagrams - p-v , p-T, T-s, h-s (Mollier diagram) diagrams, critical point, triple point ; Steam Tables ; Determination of steam properties using steam tables and Mollier diagram ; Determination of work done, heat transfer, change in internal energy, change in enthalpy and change in entropy in non-flow isochoric, isobaric, isothermal and isentropic processes and in flow processes carried in steady flow devices.

UNIT- V:

Steam power cycles: Rankine cycle, steam rate, heat rate and thermal efficiency, actual vapor power cycle, comparison of Rankine – Carnot cycles, mean temperature of heat addition, methods for improving the efficiency of Rankine cycle – super heat Rankine cycle , reheat Rankine cycle an Regenerative cycle (simple problems only)

Text Books:

1. Engineering Thermodynamics, by P.K. Nag, Tata McGraw Hill Education Private Limited, 5th Revised Edition
2. Thermal Engineering by R.K. Rajput, Laxmi Publications, 10th Edition.

References:

1. Thermal Engineering, by Mahesh M. Rathore, Tata McGraw Hill Education Private Limited
2. Applied Thermodynamics-I by R. Yadav, Central Book House

GayatriVidya Parishad College for Degree and PG Courses (A)

II B.Tech I Sem Regular Examinations

BASIC THERMODYNAMICS

R 22

Course Code:

Time: 3 hours **Total Max. Marks: 70**

PART-A (2×5=10 Marks) ; PART-B (5×12=60 Marks)

First Question is compulsory

Answer ONE question from each unit of PART – B

All parts of the questions must be answered at one place only

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PART-A				
			CO	**M**
1	**a)**	Define the terms (i) thermodynamic process (ii) thermodynamic cycle	**1**	2M
	b)	What is COP and define COP of a refrigerator	**2**	2M
	c)	Name the processes involved in Brayton cycle	**3**	2M
	d)	Define dryness fraction of steam and what do you understand from the word dryness fraction ?	**4**	2M
	e)	What are the advantages of super heating of steam in a steam power plant	**5**	2M
PART - B				
UNIT-I				
2	**a)**	State First law of thermodynamics when a system undergoing a change of state and show that internal energy is a property of a system	**1**	[6M]
	b)	Air at 1.02 bar, 22°C, initially occupying a cylinder volume of 0.015 m^3, is compressed reversibly and adiabatically by a piston to a pressure of 6.8 bar. Calculate (i) the final temperature (ii) the final volume and (iii) the work done	**1**	[6M]
OR				
3	a)	What is steady flow process and derive steady flow energy equation	**1**	[6M]
	b)	At the inlet of a horizontal nozzle , the enthalpy and velocity of the fluid are 3000 kJ/kg and 50m/s respectively. There is negligible heat loss from the nozzle. At the outlet of the nozzle the enthalpy is 2450 J/kg . Find the velocity of the fluid at the exit of the nozzle	**1**	[6M]
UNIT -II				
4	**a)**	State Kelvin-Plank and Clausius statements of Second law of thermodynamics and show that they are equivalent to one another	**2**	[6M]
	b)	Two reversible heat engines *A* and *B* are arranged in series, *A* rejecting heat directly to *B*. Engine *A* receives 200 kJ at a temperature of 421°C from a hot source, while engine *B* is in communication with a cold sink at a temperature of 4.4°C. If the work output of *A* is twice that of *B*, find (i) The intermediate temperature between *A* and *B* (ii) The efficiency of each engine	**2**	[6M]
OR				
5	**a)**	What is entropy and show that entropy is a property of a system	**2**	[6M]
	b)	State and explain Carnot's theorem briefly	**2**	[6M]
UNIT -III				
6	**a)**	What is Otto cycle and derive the expression for its thermal efficiency	**3**	[6M]
	b)	An engine of 250 mm bore and 375 mm stroke works on Otto cycle. The clearance volume is 0.00263 m^3. The initial pressure and	**3**	[6M]

		temperature are 1 bar and 50°C. If the maximum pressure is limited to 25 bar, find the air-standard efficiency of Otto cycle		
		OR		
7	**a)**	An engine with 200mm cylinder diameter and 300mm stroke works on theoretical Diesel cycle. The initial pressure and temperature of air used are 1 bar and 300K. The cut-off ratio is 8% of the stroke. Determine (i) Pressures and temperatures at all salient points (ii) Theoretical air-standard efficiency	**3**	[12M]
		UNIT -IV		
8	**a)**	Define the terms (i) Sensible heat of water (ii) Latent heat of steam (ii) Degree of super heat	**4**	[6M]
	b)	Calculate the internal energy of 1kg of steam at a pressure of 10 bar when the condition of steam at a pressure of 10 bar when the condition of steam is (i) wet and dryness fraction of 0.85 , (ii) dry and saturated and (iii) superheated with degree of superheat being 50°C . The specific heat of super heated steam at constant pressure is 2.26 kJ/kgK.	**4**	[6M]
		OR		
9	**a)**	What is Mollier diagram and represent the following processes on Mollier diagram (i) isobaric heat addition and (ii) isentropic expansion process	**4**	[6M]
	b)	A vessel of volume $0.34m^3$ contains 4kg of steam at a pressure of 18 bar. If 1840 kJof heat is rejected from the vessel during a constant volume process, calculate (a) final internal energy (b) final dryness fraction (c) pressure (d) change in entropy (e) work done.	**4**	[6M]
		UNIT –V		
10	**a)**	What is simple Rankine cycle and mention the different ways to increase the efficiency of simple Rankine cycle.	**5**	[6M]
	b)	In a Rankine cycle, 10 kg of steam at inlet to turbine is saturated at a pressure of 35 bar and the exhaust pressure is 0.2 bar. Determine (i) The pump work (ii) The turbine work (iii) The Rankine efficiency.	**5**	[6M]
		OR		
11	a)	Explain reheat Rankine cycle with neat sketch	**5**	[6M]
	b)	A simple Rankine cycle works between pressures 28 bar and 0.06 bar, the initial condition of steam being dry saturated. Calculate the cycle efficiency and work ratio .	**5**	[6M]

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Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int	Ext	
2295305	MANUFACTURING PROCESSES	3	0	0	30	70	3

COURSE OBJECTIVES:

1. To provide an understanding and appreciation of the different manufacturing (Casting, Forming) and fabrication (Welding, Soldering and Brazing) methods to the students.
2. To expose the students to various applications of the manufacturing process in real life articles/ products.
3. To expose the students to advanced techniques for a day to day application in manufacturing industry.

COURSE OUTCOMES:

After completion of this course, the students will be able to

1. Understand the sand-casting process and the importance of various elements involved in it.
2. Design gating system and able to choose special casting processes in accordance with requirement and can identify various casting defects.
3. Select the type of bulk deformation technique for manufacturing the components in accordance with the requirement.
4. Select the type of sheet metal operation for manufacturing the components in accordance with the requirement.
5. Understand the use of joining techniques such as arc welding, gas welding, solid state welding, soldering and brazing in accordance with the requirement.

SYLLABUS:

UNIT – I

Introduction to production and production systems: Production and production system - types of production systems - Job, Batch and Mass production; Primary and Secondary Manufacturing Processes.

Casting: Introduction to casting **-** Casting Terminology; Pattern Types, Materials and Allowances; Moulding sand - composition, types, properties, preparation and Testing; Moulding tools and equipment; Sand moulding methods – manual moulding, machine moulding and CO_2 moulding, Core making , Core Prints, chaplets, chills.

UNIT – II

Elements of gating system- Sprue; Runner, gates and risers' types; Gating system design, Melting and pouring of the metal, types of furnaces (Cupola, Induction), Types of cast irons, fettling.

Special Casting Processes:

Expendable mould casting processes – Shell mould casting, investment casting.

Permanent mould casting processes- High and Low Pressure die casting, Centrifugal casting, Continuous casting; Casting defects, testing and inspection – destructive and non-destructive methods.

UNIT – III

Metal Working processes:

Introduction to Metal working processes: Classification of processes based on temperature and forces.

Rolling: Concept of Rolling - Types of Rolling mills, Roll size, Roll Pressure distribution, Rolling Defects.

Forging: Forging processes; Forging techniques; Forging presses; Forging pressure distribution and forging force; Automation of forging; Swaging; Forging defects.

Extrusion: Forward, Backward, Impact and Hydrostatic Extrusion, extrusion defects

Drawing: Wire, Bar and Tube Drawing with and without mandrel, drawing defects

UNIT – IV

Sheet Metal Forming: Classification of sheet metal forming processes - Shear forming – Blanking, Piercing, Trimming, Shaving, Notching, Nibbling, Lancing. Tensile forming - Stretch forming; Compressive forming – Coining, Sizing, ironing; Combined Tensile and Compressive forming - Drawing, Metal spinning, Bending, Forming, Embossing; Sheet metal die types- Progressive, Compound and combination dies; Punch types – Plain, pedestal punches and punch mounted in punch plates. Sheet metal forming defects.

UNIT – V

Welding: Welding metallurgy; Principles and processes of arc welding (SMAW, GTAW, GMAW, FCAW, PAW, SAW); Welding equipment – classification of welding power source and characteristics; Weld positioners and fixtures; Oxyacetylene welding; Flame cutting; Brazing and soldering; Principle of resistance welding; Types of resistance welds; Seam welding; Projection welding; Resistance butt welding; Solid state welding; Weld defects, inspection and testing.

Text Books:

1. Manufacturing Technology-Foundry, Forming and Welding by P.N. Rao, 5th Edition, Vol -1, Tata McGraw Hill Publishing Company.
2. Manufacturing Engineering & Technology by Kalpak Jian, 7th Edition Addition Wesley, Pearson.

REFERENCE BOOKS:

1. Materials and Processes in Manufacturing by De Margo, Black and Kohser, 11th edition, Wiley, Prentice Hall of India.
2. Manufacturing Science by Amitabha Ghosh and Ashok Kumar Mallik, 2nd Edition, East-West Press Pvt Ltd.
3. Principles of Metal Casting by Richard W. Heine, Carl R. Loper, Philip C. Rosenthal, 2nd Edition, Tata McGraw Hill India.
4. Welding Processes and Technology by R. S. Parmar, 3rd Edition, Khanna Publishers.

Gayatri Vidya Parishad College for Degree and PG Courses (A)
II B.Tech I Sem Regular Examinations

MANUFACTURING PROCESSES

Course Code: 2295305

Time: 3 hours **Total Max. Marks: 70**

PART-A (2×5=10 Marks) PART-B (5×12=60 Marks)
First Question is compulsory
Answer ONE question from each unit of PART – B
All parts of the questions must be answered at one place only

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PART-A				
			CO	**MARKS**
1	**a)**	What are the different types of sands used in sand casting?	**1**	[2M]
	b)	Discuss any two casting defects?	**2**	[2M]
	c)	State the importance of angle of bite in rolling?	**3**	[2M]
	d)	How does coining differ from embossing?	**4**	[2M]
	e)	Discuss the various types of weld joints.	**5**	[2M]
PART - B				
UNIT - I				
2		Define the term pattern and explain the various pattern allowances in use with neat sketches.	**1**	[12M]
OR				
3	**a)**	Discuss the different moulding sand properties required to produce sound castings.	**1**	[6M]
	b)	Define the term core and name the various types of cores used in casting.	**1**	[6M]
UNIT - II				
4		Explain the various elements of gating system with a neat sketch	**2**	[12M]
OR				
5	**a)**	Explain the Shell mould casting process with a neat sketch.	**2**	[6M]
	b)	Explain the Investment casting processes with a neat sketch.	**2**	[6M]
UNIT - III				
6	**a)**	Distinguish between hot working and cold working	**3**	[6M]
	b)	Describe the various rolling stand arrangements with neat sketches?	**3**	[6M]
OR				
7	**a)**	Explain the different types of forging techniques with neat sketches.	**3**	[6M]
	b)	Discuss the hydrostatic and impact extrusion techniques briefly.	**3**	[6M]
		UNIT - IV		
8	**a)**	Explain the various sheet metal forming operations with neat sketches.	**4**	[6M]

	b)	Explain different types of punches used in sheet metal working operations?	**4**	[6M]
OR				
9	**a)**	Explain different types of dies used in sheet metal working operations?	**4**	[6M]
	b)	Explain the process of deep drawing technique with a neat diagram.	**4**	[6M]
		UNIT - V		
10	**a)**	Explain the GMAW technique with a neat sketch	**5**	[6M]
	b)	Write a short note on oxy-fuel gas welding	**5**	[6M]
OR				
11	**a)**	Explain the principle of resistance welding giving the equipment, parameters controlled and the applications.	**5**	[6M]
	b)	Explain various weld defects, causes and their remedies.	**5**	[6M]

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Course code	Title of the course	Contact periods for delivering the course	Credits
2295306P	**FUELS & MECHANICS LAB**	**L T P 0 0 3**	**Credits: 1.5**

Course Outcomes: At the end of the laboratory course, the student will be able to:

CO 1	Understand the flash, fire points and carbon residue of different fuels.
CO 2	Distinguish the absolute and kinematic viscosity of different fuels.
CO 3	Calibrate a given pressure guage, determine moment of inertia of a given flywheel and determine the modulus of rigidity of a given wire using a torsion pendulum.
CO 4	Verify law of polygon of forces and principle of moments using bell crank lever apparatus and also evaluate the coefficient of friction between two surfaces.

FUELS &MECHANICS LAB

1. Determination of the kinematic and absolute viscosity of the given sample oil using Redwood viscometer I.
2. Determination of the kinematic and absolute viscosity of the given sample oil using Redwood viscometer II.
3. Determination of flash point using Abels flash point apparatus.
4. Determination of flash and fire points using Cleveland open cup tester.
5. Determination of carbon residue in a given sample using Conradsons carbon residue test.
6. Calibration of the given pressure gauge.
7. Determination of moment of inertia of the given flywheel.
8. Determination of modulus of rigidity of the given wire with torsion pendulum.
9. Verification of polygon law of forces.
10. Verification of principle of moments using the bell crank lever apparatus.
11. Determination of co efficient of friction between two surfaces.
12. Study of Bomb calorimeter. (Demonstration only)

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2295302P	**Strength of Materials Lab**	**0**	**0**	**3**	**50**	**50**	1.5

Course Objectives:

1. To determine experimental data include universal testing machines and torsion equipment.
2. To determine experimental data for spring testing machine, compression testing machine, impact tester, hardness tester.
3. To understand the different types of loading and measure the loads.
4. To understand the material properties of different materials and the ways of finding them.

List of Experiments:

1. To study the stress strain characteristics by Tension test of metals by using UTM.
2. To study the stress strain characteristics by Compression test of metals by using UTM.
3. Determination of compression strength of wood.
4. Determination of hardness using Brinell's hardness testing machine of different materials.
5. Determination of hardness using Rockwell's hardness testing machine of different materials.
6. Impact test by using Izod method.
7. Impact test by using Charpy method.
8. Determination of deflection of cantilever beam (different materials)
9. Determination of deflection of simply support beam (different materials)
10. To find stiffness and modulus of rigidity by conducting Tension test on springs.
11. To find stiffness and modulus of rigidity by conducting compression test on springs.
12. Torsion tests on circular shafts.

Course Outcomes:

1. Ability to identify different types of loads and measure them.
2. Analyse and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
3. Understand the basic concepts of stress, strain, deformation, and material behavior under different types of loading (axial, torsion).
4. Ability to measure material properties of different materials using different methods.

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES (A)

ENGINEERING AND TECHNOLOGY PROGRAM

DEPARTMENT OF MECHANICAL ENGINEERING

Syllabus for II B.Tech – I Semester (R-22)

SOC-I (IOT LAB)

Course code	Periods			Total contact hours/ per week	Sessional Marks	Exam Marks	Total Marks	Credits
	L	T	P					
	0	0	3	3	50	50	100	1.5

COURSE OBJECTIVES

COB-1	Able to understand the application areas of IoT.
COB-2	Able to realize the revolution of the Internet in Mobile Devices, Cloud & Sensor Networks
COB-3	Able to understand the building blocks of the Internet of Things and its characteristics**.**

COURSE OUTCOMES

Student will be able to

CO-1	Interface various input and output devices with Arduino board
CO-2	Design the minimum system for sensor-based application
CO-3	Solve the problems related to the primitive needs using IoT

LIST OF EXPERIMENTS

1. Write a program using Arduino IDE to blink LED and execute it using the Arduino Board.
2. Write a program and develop Traffic Light controlling system using Arduino.
3. Write a program to develop IoT based Temperature and Humidity Monitoring System.
4. Write a program to develop water level Monitoring system using Arduino
5. Write a program to detect an obstacle using IR Sensor and Arduino.
6. Write a program to interface Light Dependent Resistors (LDR) using Arduino.
7. Write a program to use Arduino board to check the dissolved salts (TDS) for water quality monitoring.
8. Write a program to measure distance using Ultrasonic Sensor.
9. Write a program to develop a temperature controlled fan using Arduino board.
10. Write a program to interface RFID sensor with Arduino.
11. Write a program to interface Gas sensor with Arduino.
12. Write a program to develop heart beat Monitoring system using Arduino.

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int	Ext	
2295308	MECHANICAL ENGINEERING DRAWING	2	5	0	50	50	1.5

COURSE OBJECTIVES:

1. To provide an understanding and draw the assembly drawing of various engine components and machine tool components to the students.
2. To expose the students to draw and place feature control symbols and datum references on a drawing various fastenings (Screw, Riveted, welded etc.), Bearings, keys and couplings, .
3. Students will be able to understand machine elements and their assembly drawings and prepare process sheets.

Course Outcomes: At the end of the course, the student will be able to:

CO1	Understand and draw the orthographic views and sectional views of machine tool parts.
CO2	Understand and draw various thread profiles, Screwed fasteners, joints, couplings and bearings.
CO3	Draw Assembly drawings of various engine components and other machine parts.
CO4	Draw the production drawings indicating limits, geometrical tolerances, surface roughness and prepare process and also sheets stock strip layouts.

Note: L – Lecture periods; T- Tutorial periods; P- Practical periods

UNIT-I

Introduction to machine drawing, Orthogonal Projection: B.I.S. code, symbols for methods of projection. Sectional views of machine parts: Half sectional View and Full Sectional View.

UNIT-II

Screw Threads and Fastenings: Screw Threads: Forms of screw threads, Metric Thread, Whit worth Thread, B.S. F., Sellers Thread, B.A., and Square Threads.

Screw Fasteners: Types of nuts-hexagonal, square. Bolts-types-hexagonal, square headed. Washers, Screws, Foundation bolts- eye foundation, Rag foundation bolts using standard Empirical formulae.

UNIT-III

Keys, cotters and Joints:
Keys : Introduction –sunk keys Taper sunk Keys, Parallel keys, Woodruff key.
Cotter joints: Cotter joint with socket and spigot ends, Cotter joint with a gib.
Pin Joints: Pin or knuckle joint.
Riveted joints: Introduction, Definitions, types of rivet-heads, Classification of Riveted joints, Lap Joint and Butt Joint.

UNIT-IV

Shaft Couplings and Bearings:

Shaft Couplings: Introduction –Classification- Box or Butt-muff coupling and split muff couplings. Flanged couplings; Flexible couplings, and Universal and Oldham couplings.

Shaft Bearings: Introduction Solid journal Bearings, Bushed journal bearings, Plummer block, Foot-step bearing.

UNIT-V

Assembly Drawing &Production drawing:

Assembly Drawing : Engine parts: Stuffing box, Cross head, Eccentric.

Production drawing: Conventional Presentation, Geometric Tolerances, Surface roughness, Preparation of process sheets..

Text Book:

1. N D Bhatt, "Machine Drawing", 44th Edition, Charotar publishers,2009.
2. K.L.Narayana, P.Kannaiah & K. Venkata Reddy, "MachineDrawing", 3rd Edition,New age international publishers, 2007.

Reference Books:

1. Textbook of Machine Drawing by K.C. John, PHI Learning

2. Machine Drawing by K.L Narayana, P. Kannaiah and K. VenkataReddy, New age international Publishers
3. A Text Book of Machine Drawing by Dr. R.K. Dhawan,S.Chand Publications
4. Production Engineering by P.C. Sharma, S. Chand and Company.

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE&P.G.COURSES (A)
ENGINEERING & TECHNOLOGY PROGRAM
DEPARTMENT OF MECHANICAL ENGINEERING

SEMESTER IV

(II Year II Semester)

Sl.No.	Category	Code	Course Title	Hours per week			ALLOTMENT OF MARKS		Total marks	Credits
				L	T	P	Internal	External		
1	PCC	2295401	**Applied thermodynamics**	3	0	0	30	70	100	3
2	PCC	2295402	**Theory of Machines - 1**	3	0	0	30	70	100	3
3	PCC	2295403	**Metal cutting &Machine tools**	3	0	0	30	70	100	3
4	PCC	2295404	**Fluid Mechanics and hydraulic machines**	3	0	0	30	70	100	3
5	ESC	2295405	**Metallurgy and Material science**	2	0	0	30	70	100	2
6	MC	2295406	**Environmental science**	3	0	0	30	70	100	0
7	PCC	2295403P	**Manufacturing Technology Lab-I**	0	0	3	50	50	100	1.5
8	PCC	2295404P	**FMM lab**	0	0	3	50	50	100	1.5
9	SOC	2295407S	**Computer aided drafting**	1	0	2	50	50	100	2
			TOTAL	19	0	8	330	570	900	20
10	pcc	2295408	**Minor course-I**	3	1	0	30	70	100	4
11	pcc	2295409	**Honors Course-I**	3	1	0	30	70	100	4

BSC	:	BASIC SCIENCE COURSE
PCC	:	PROFESSIONAL CORE COURSE
ESC	:	ENGINEERING SCIENCE COURSE
PEC	:	PROFESSIONAL ELECTIVE COURSE
OEC	:	OPEN ELECTIVE COURSE
MC	:	MANDATORY COURSE
HSSC	:	HUMANITIES AND SOCIAL SCIENCES COURSE
SOC	:	SKILL ORIENTED COURSE

SKILL ORIENTED COURSE
SOC-II - COMPUTER AIDED DRAFTING

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE&P.G.COURSES (A)
ENGINEERING & TECHNOLOGY PROGRAM
DEPARTMENT OF MECHANICAL ENGINEERING

Course code	Title of the course	Contact periods for delivering the course	Credits
2295401	**APPLIED THERMODYNAMICS**	**L T P** **3 0 0**	**3**

COURSE OBJECTIVES:

- To give a clear understanding of performance of steam nozzles , condensers and steam turbines suitable for a thermal power plant
- To gain knowledge on gas turbines which in turn satisfy the pre-requisite on understanding jet propulsion and aerospace engineering
- To understand the internal combustion engines and combustion phenomena for computing its performance
- To understand the various refrigeration systems and air-conditioning systems for designing them suitable to the requirement

COURSE OUTCOMES: At the end of the course, the student will be able to:

CO 1	Understand the flow of steam through nozzle and the factors influencing on the efficiency of steam nozzle and then understand the working and performance of steam condenser
CO 2	Know the types of steam turbines and their role in steam power plant and to compute thermal efficiency and understand the effect of design parameters on performance of turbines
CO 3	Understand the working principle of gas turbine and its classification with thermodynamic analysis and to know the working and efficiency of reciprocating compressors
CO 4	Know the working of various I.C.engines and to analyze the stages of combustion to improve the performance of IC engines with respect to fuel economy and control of emissions.
CO5	Evaluate performance of refrigeration cycles and able to thorough understanding of Psychrometric properties enable to study various air-condition system

APPLIED THERMODYNAMICS
SYLLABUS

UNIT- I:

Steam Nozzles & Steam Condensers:

Steam Nozzles: Types of nozzles- Flow through nozzles- Condition for maximum discharge - Nozzle efficiency- Super saturated flow in nozzles - Relationship between area velocity and pressure in nozzle flow.

Steam Condensers: Introduction, vacuum, Classification of condensers-Jet and surface condensers, Sources and effects of air leakage in condensers, Vacuum efficiency and Condenser efficiency, Determination of mass of cooling water.

UNIT- II:

Steam Turbines

Introduction, classification of steam turbines; Impulse Turbines: Velocity diagrams, condition for maximum blade efficiency for single stage impulse turbine,

Reaction Turbines: Velocity diagrams,Parson's reaction turbine, condition for maximum blade efficiency of Parson's turbine

UNIT- III:

Gas Turbines & Air compressors:

Simple Gas Turbine Plant – Ideal Cycle – Closed Cycle and Open Cycle for Gas Turbines, Constant Pressure Cycle, Constant Volume Cycle, Efficiency – Work Ratio and Optimum Pressure Ratio for Simple Gas Turbine Cycle.

Air Compressors: compressors classifications(reciprocating & centrifugal)- working of single stage compressor - effect of work with and without clearance,centrifugal compressor working and components.

UNIT- IV:

Internal Combustion Engines: Classification of I.C.engines; Main components of I.C.Engines; Working of two-stroke and four stroke S.I and C.I engines, performance parameters.(simple problems)

S. I. engines stages of combustion, Flame front propagation , Phenomenon of knock in SI engines, Effect of Engine variables on knock, and Combustion chambers for SI engines;

C.I. engines- Stages of combustion, Phenomenon of knock in CI engines, Combustion chambers for CI engine. Fuel requirements and fuel rating- SI engines, CI engines.

UNIT- V:

Refrigeration & Air-conditioning:

Refrigeration: Concept of refrigeration, air refrigeration systems- closed and open systems , Bell-colleman cycle, vapor compression refrigeration system, T-s, p-h diagrams, simple Vapor absorption refrigeration system, refrigerants and properties of common refrigerants.

Text Books:

1. Thermal Engineering by R.K. Rajput, Laxmi Publications, 10th Edition.
2. I.C.Engines by V.Ganesan, Tata McGraw Hill Education Private Limited, 3rd Edition

References:

1. Thermal Engineering, by Mahesh M. Rathore, Tata McGraw Hill Education Private Limited
2. Applied Thermodynamics-I by R. Yadav, Central Book House

GayatriVidya Parishad College for Degree and PG Courses (A)

II B.Tech II Sem Regular Examinations

APPLIED THERMODYNAMICS **R 22**

Course Code: 2295401

Time: 3 hours **Total Max. Marks: 70**

PART-A (2×5=10 Marks) ; PART-B (5×12=60 Marks)

First Question is compulsory

Answer ONE question from each unit of PART – B

All parts of the questions must be answered at one place only

PART-A				
			CO	**M**
1	**a)**	What is a steam nozzle?	**1**	2M
	b)	What is meant by compounding in steam turbines	**2**	2M
	c)	Name the main components involved in a simple gas turbine plant	**3**	2M
	d)	Write any four differences between S.I engine and C.I engine	**4**	2M
	e)	Define the following terms (i) Dry bulb temperature (ii) Dew point temperature	**5**	2M
PART - B				
UNIT-I				
2	**a)**	Derive an expression for maximum discharge condition through the nozzle and obtain maximum velocity through the nozzle?	**1**	[6M]
	b)	Steam expands from 2.5 bar to 1 bar in a nozzle. The initial velocity of steam is 80 m/s and initial temperature is 200°C. Taking nozzle efficiency as 96%, find the exit velocity.	**1**	[6M]
OR				
3	a)	Compare the merits and demerits of surface condenser over jet condenser	**1**	[6M]

	b)	Explain the principles of operation of any two jet condensers.	**1**	[6M]
		UNIT -II		
4	**a)**	Explain the principle of impulse turbine	**2**	[4M]
	b)	The velocity of steam, leaving the nozzles of an impulse turbine, is 1200 m/s and the nozzle angle is 20°. The blade velocity is 375 m/s and the blade velocity coefficient is 0.75. Assuming no loss due to shock at inlet, calculate for a mass flow of 0.5 kg/s and symmetrical blading : (i) blade inlet angle ; (ii) driving force on the wheel; (iii) axial thrust on the wheel; and (iv) power developed by the turbine	**2**	[8M]
		OR		
5	**a)**	Derive the condition for maximum efficiency of an impulse turbine and show that the maximum efficiency is $\cos^2\alpha$, where α is the angle at which the steam enters the blade	**2**	[6M]
	b)	At a stage of a reaction turbine, the rotor diameter is 1.4m and speed ratio 0.7. If the blade outlet angle is 20° and the rotor speed 3000 r.p.m., find the blade inlet angle and diagram efficiency.	**2**	[6M]
		UNIT -III		
6	**a)**	Draw the layout of gas turbine plant which has two stage compression with complete inter cooling	**3**	[6M]
	b)	A simple closed cycle gas turbine plant receives air at 1 bar and 15° C, and compresses it to 5 bar and then heats it to 80(f C in the heating chamber. The hot air expands in a turbine back to 1bar. Calculate the power developed per kg of air supplied per second. Take c_p for the air as 1 kJ/kg K.	**3**	[6M]
		OR		
7	**a)**	Discuss the working of a single stage reciprocating air compressor with a neat sketch	**3**	[6M]
	b)	A single-stage reciprocating air compressor is required to compress 72 m^3 of air per minute from 15°C and 1.0 bar to 8 bar pressure. Find the temperature at the end of compression, work done, power, and heat rejected during each of the following processes: (i) isothermal process, (ii) adiabatic process	**3**	[6M]
		UNIT -IV		
8	**a)**	Write the differences between two stroke and four stroke engine	**4**	[6M]
	b)	Discuss the phenomenon of knock in C. I engines	**4**	[6M]

		OR		
9	**a)**	Explain the different stages in normal combustion of S.I engines with diagram and discuss the effects of induction pressure, engine speed, compression ratio and ignition timing on normal combustion in S.I engines	**4**	[12M]
		UNIT –V		
10	**a)**	Explain simple vapour compression refrigeration system with a neat sketch	**5**	[6M]
	b)	A refrigerator using Ammonia works between the temperatures – 10°C and 25°C. The gas is dry at the end of compression and there is no under cooling of liquid. Calculate the theoretical C.O.P of the cycle.	**5**	[6M]
		OR		
11	a)	Briefly explain about the Bell-Coleman cycle with a neat sketch? Draw the p-v & T-s diagram	**5**	[12M]

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE&P.G.COURSES (A)
ENGINEERING & TECHNOLOGY PROGRAM
DEPARTMENT OF MECHANICAL ENGINEERING

Year and Semester:	**II B.Tech – II Sem**	**Regulation:**	**R22**

Course code	**Title of the Course**	**Contact Hours/week**			**Allotment of Marks**		**Credits**
		L	T	P	**Int**	**Ext**	
2095403	**Theory of Machines-1**	3	0	0	30	70	**3**

COURSE OBJECTIVES:

COB 1	To know about the basics of Machine and mechanism and to learn about velocity and acceleration analysis
COB 2	To learn about lower pairs and understand the Steering gear mechanism, Friction
COB 3	To understand the governors and Dynamic force analysis

COURSE OUTCOMES:

Student will be able to

CO 1	To understand the knowledge of machine and mechanism and able to perform the geometric analysis for various mechanisms.
CO 2	To analyze velocity and acceleration of various mechanisms.
CO 3	To demonstrate straight line motion mechanism, Automobile Steering gear mechanism and Hooke's joint. To understand the principles of friction.
CO 4	To illustrate the principles of governors and sensitiveness of a governor
CO 5	To Outline the static and dynamic strength parameters for a material and design a dynamically equivalent system.

SYLLABUS

UNIT 1: Mechanisms and Machines

Introduction; Mechanism and machine – Rigid and resistant bodies – Link, Kinematic pair; Degrees of freedom – Classification of kinematic pairs – Kinematic chain, Linkage, mechanism and structure – Mobility of mechanisms – The four-bar chain – The slider-crank chain – Double slider-crank chain – Inversions of mechanisms.

UNIT 2: Velocity and Acceleration Analysis

Introduction, Motion of a link – Four-link mechanism – Angular velocity of links – Instantaneous center (I-center) – Kennedy's theorem – Locating of I-centers – Velocity and acceleration of Slider-crank mechanism – Coriolis component of acceleration, Velocity and acceleration of Crank and slotted lever mechanism

UNIT 3: Lower Pairs & Friction

Introduction – Pantograph – Automobile steering gears – Davis steering gear mechanism – Ackerman Steering gear Mechanism

Introduction – Types of friction – Laws of friction – Coefficient of friction – Inclined plane – Pivots and collars – Friction clutches.

UNIT 4: Governors

Introduction – Types of governors – Watt governor (simple conical governor) – Portor governor – Proell governor – Hartnell governor – Hartung governor – Wilson-Hartnell governor (radial-spring governor) – Pickering governor – Spring-controlled gravity governor – Inertia governor – Sensitiveness of a governor – Hunting – Isochronism – Stability – Effort of a governor – Power of a governor – Controlling force.

UNIT 5: Dynamic Force Analysis

Introduction – D'Alembert's principle – Equivalent offset inertia force – Dynamic analysis of four-link mechanism – Dynamic analysis of slider-crank mechanism – Engine force analysis – Dynamically equivalent system.

Text books :

1. Theory of Machines by S.S. Rattan, McGraw Hill publishers; Fifth edition
2. Theory of Machines & Mechanisms, Prof.P.L.Ballaney, Khanna Publishers, 6th edition

Reference books :

1. Theory of Machines by Thomas Bevan, Pearson publishers, 3rd edition
2. Mechanism and Machine Theory, Ashok G Amberkar, PHI Publications, 1st edition
3. Theory of Machines and Mechanisms, John J. Uicker Gordon R. Pennock and Joseph E. Shigley, Oxford University Press, 5th edition
4. Theory of Machines by R.S.Khurmi &J.K.Gupta, S Chand publishers; 14th edition

Gayatri Vidya Parishad College for Degree and PG Courses (A)

Engineering and Technology Program

II B.Tech II Sem Regular Examinations

Subject Name: Theory of Machines - 1

Course Code: 2095403

Time: 3 hours **Total Max. Marks: 70**

PART-A (2×5=10 Marks) PART-B (5×12=60 Marks)

First Question is compulsory

Answer ONE question from each unit of PART – B

All parts of the questions must be answered at one place only

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PART-A

			CO	M
1	**a**	What is a machine and differentiate between machine and a mechanism?	**1**	2M
	b	State and explain kennedy's theorm?	**2**	2M
	c	Define friction and classify?	**3**	2M
	d	What is meant by effort and power of a governor?	**4**	2M
	e	State and explain D'Alembert's principle?	**5**	2M

PART - B

UNIT-I

2	a	Sketch and describe various inversions of single slider crank chain?	**1**	[12M]

OR

3	**a**	In a crank and slotted lever quick return mechanism the distance between fixed centres is 15 cm and the driven crank is 10 cm long. Find the ratio of time taken to the cutting and return strokes?	**1**	[12M]

UNIT -II

4	**a)**	Explain how the Coriolis component of acceleration of a point arises and derive an expression for the magnitude of Coriolis component of	**2**	[12M]

acceleration

OR

5	**a**	In a four link mechanism, the crank AB rotates at 36 rad/s. The lengths of the links are: AB =200 mm, BC = 400 mm, CD = 450 mm and AD = 600 mm. AD is the fixed link. At the instant when AB is at right angle to AD, determine the velocity of a. The midpoint of link BC b. A point on link CD, 100 mm from the pin connecting the links CD and AD	**2**	[12M]

UNIT -III

6	**a)**	What is a pantograph? Explain it with a neat sketch.	**3**	[4M]
	b)	What are the fundamental equation of steering gears? Which steering gear fulfils this condition?	**3**	[8M]

OR

7	**a**	Determine the axial force required to engage a cone clutch transmitting 25 kW of power at 750 rpm. Average friction diameter of the cone is 400 mm and average pressure intensity is 60 kN/m^2 semi cone angle is 10^0 and the coefficient of friction is 0.25. Also find the width of the friction cone.	**3**	[12M]

UNIT -IV

8	**a**	A porter governor has equal arms. Each arm is 240 mm long and is pivoted on the axis of rotation. Each ball has a mass of 5 kg and the load on the sleeve is 18 kg. The ball radius is 150 mm when the sleeve is 18 kg. The ball radius is 150 mm when the sleeve begins to rise and 200 mm at the maximum speed. Find the range of speed. Also determine the coefficient of insensitiveness if the friction at the sleeve is equivalent to a force of 10 N.	**4**	[12M]

OR

9	**a**	In a Hartnell governor, the lengths of ball and sleeve arms of a bell crank lever are 120 mm and 100 mm respectively. The distance of the fulcrum of the bell crank lever from the governor axis is 140 mm. Each governor ball has a mass of 4 kg. The governor runs at mean speed of 300 rpm with the ball arms vertical and sleeve arms horizontal. For an increase of speed of 4%, the sleeve moves 10 mm upwards. Neglecting friction, find: a. The minimum equilibrium speed if the total sleeve movement is limited to 20 mm,	**4**	[12M]

b. The spring stiffness,

c. The sensitiveness of the governor, and

d. The spring stiffness if the governor is to be isochronous at 300 rpm.

UNIT - V

10	**a**	What are the different forces acting on an engine? Explain about them? Derive their expressions.	**5**	[12M]

OR

11	**a**	Explain briefly about dynamically equivalent system	**5**	[12M]

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GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE&P.G.COURSES (A)
ENGINEERING & TECHNOLOGY PROGRAM
DEPARTMENT OF MECHANICAL ENGINEERING

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int	Ext	
2295403	Metal Cutting and Machine Tools	3	0	0	30	70	3

Note: L – Lecture periods; T- Tutorial periods; P- Practical periods

Course Objectives:

1. To give a clear understanding of the mechanism of machining to the students
2. To describe the mechanisms of the various metal cutting machines, types of machines, various operations that can be performed on them, machining time and force calculations etc to the students.
3. To expertise in advance numerical control machines to maxims the work output and efficiency of the numerical machines.

Course Outcomes:

CO1	Apply cutting mechanics to metal machining based on cutting force and power consumption.
CO2	Apply the fundamentals and principles of metal cutting to practical applications using lathe Machines
CO3	Utilize Drilling, Milling and Boring machines to practically apply the fundamentals and concepts of metal cutting.
CO4	Understanding the working principles of Shaping and Planning machines
CO5	Understanding the CNC Machine Tools, CNC part programming

Syllabus:

Unit I

Mechanics of Metal Cutting: Chip formation & Types; Tool geometry and tool signature ASA&ISO systems; Orthogonal and Oblique Cutting, Merchant Circle analysis, Tool wear and tool life; Cutting forces and power; Tool materials; Cutting fluid:-simple problems

Unit II

Lathe Machines: Engine lathe – principle of working, specification of lathe – types of lathe – work holders tool holders – box tools taper turning, thread turning – for lathes and attachments, constructional features of speed gear box and feed gear box. Turret and capstan lathes – collet chucks – other work holders – tool holding devices

Unit III

Drilling & Boring machines: Principles of working, specifications, types, operations performed –tool holding devices – twist drill – deep hole Drilling Machine. Boring Machines – fine Boring Machines – jig boring machine & Broaching operations.

Jigs & Fixtures: Principles of design of jigs and fixtures and uses, classification of jigs &

Fixtures.**Milling Machines:** Principles of working – specifications – classification of Milling Machines – Principle features of horizontal, vertical and universal Milling Machine, machining operations, types of cutters, geometry of milling cutters – methods of indexing, accessories of milling machines.

Unit IV

Reciprocating Machines: Shaping, Slotting and Planing Machines: Principles, Types, Operations,Mechanism, specifications, operations performed, machining time calculations.

Finishing Processes: Theory of grinding – classification of grinding machines, cylindrical and surface grinding machines, tool and cutter grinding machines, specification and selection of a grinding wheel. Lapping, Honing.

Unit V

Computer-Numerical Control Machines: CNC Machines, working principle, classification, constructional features of CNC machines, CNC controller, types of motion controls in CNC machines, applications of CNC machines.

Part Programming: Designation of co-ordinate axes for CNC machines, Functions of machine control units, Tape format, Manual part programming and computer assisted part programming (using APT language). Exercises involving simple contours and positioning.

Text Book:

1. Process and Materials of Manufacture (4th Edition) by Roy A. Lindberg, Prentice-Hall of India Private Limited.
2. Manufacturing technology II, P.N Rao. TMH Ltd 1998(Revised edition).
3. CAD/CAM- Computer Aided Design & Manufacturing, by M.D.Groover & E.W.Zimmer.

Reference Books:

1. Metal Cutting Principles by M.C. Shaw, MIT Press, Cambridge.
2. Metal Cutting-Theory and Practice by Amitabha Bhattacharya, Central Book Publishers.
3. Production Engineering by P.C. Sharma, S. Chand and Company.
4. Production Technology by H.M.T. (Hindustan Machine Tools).
5. Production Engineering, K.C Jain & A.K Chitaley, PHI Publishers.
6. Technology of machine tools, S.F.Krar, A.R. Gill, Peter SMID, TMH (I).

Gayatri Vidya Parishad College for Degree and PG Courses(A)

Subject with Course code : METAL CUTTING AND MACHINE TOOLS (2295403)
Year and Semester : II B.Tech II Semester
Time: 3 hours **Total Max. Marks: 70**

PART-A (2x5=10 Marks) PART-B (5x12=60 Marks)
First Question is compulsory
Answer ONE question from each unit of PART – B
All parts of the questions must be answered at one place only

1.		**PART – A**		
	a.	Give the expression for Tool life.	CO 1	2 M
	b.	Differentiate two jaw chuck and three jaw chuck	CO 2	2 M
	c.	Differentiate between boring and reaming	CO 3	2 M
	d.	What is an abrasive	CO 4	2 M
	e.	Explain about BUE-continuous chip	CO 5	2 M
		PART – B		
2	a.	Differentiate between Orthogonal cutting and Oblique Cutting	CO 1	06 M
	b.	Explain in Detail about Cutting tool Materials	CO 1	06 M
		OR		
3	a	Explain Merchant Circle Analysis with neat Diagram	CO 2	12 M
4	a	Explain various Lathe tool operations with neat sketches	CO 2	12 M
		OR		
5	a	Explain various working holding device of lathe	CO2	06 M
	b	Determine the angle at which the compound rest would be swiveled for cutting a taper on a work piece having a length of 150mm and outside diameter 80mm. The smallest diameter on the tapered end of the rod should be 50mm and the required length of the tapered portion is 80mm.	CO2	06 M
6	a	Explain various types of Drilling Machines.	CO3	06 M
	b	Explain the nomenclature of twist drill with neat sketch.	CO3	06 M
		OR		
7	a	List the Classification of Milling machine in detail	CO3	04 M
	b	Explain the features of Horizontal, Vertical and Universal Milling Machine	CO3	08 M
8	a	Explain Quick-Return motion mechanism of a shaper with neat sketch.	CO4	06 M
	b	Differentiate between a shaper and planar	CO4	06 M
		OR		
9	a	Give in detail about the selection and specification of grinding wheel	CO4	06 M
	b	Write about the Lapping, Honing and Brazing	CO4	06 M
10	a	Discuss the constructional features of CNC machines.	CO5	06 M
	b	What are the advantages and disadvantages of CNC machines?	CO5	06 M
		OR		
11	a	Discuss the working principle of CNC with a neat block diagram.	CO5	06 M
	b	Describe the main features of CNC machines, which distinguish them from conventional machine tools.	CO5	06 M

Gayatri Vidya Parishad College for Degree and PG Courses(A)

Year and Semester	II B.Tech - II SEMESTER	Regulation:			R – 20		
Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
2095405	FLUID MECHANICS AND HYDRAULIC MACHINES	L	T	P	Int	Ext	3
		3	0	0	30	70	

Course Objectives:	
COB 1	To give a clear understanding of basic concepts of fluid statics, kinematics and dynamics
CO B2	To describe the flow phenomena using boundary layer theory and able to understand the compressible fluid flow
COB 3	To understand the hydraulic machines and its design and significance

Course Outcomes: At the end of the course, the student will be able to :	
CO 1	Strengthen knowledge on basic concepts of fluid statics, kinematics and fluid dynamics
CO 2	Analyze the flow of incompressible laminar and turbulent flows and flow through pipes
CO 3	Describe fluid flow using boundary layer theory and able to understand the different types of fluid flows
CO 4	Understand the principle and working hydraulic turbines and their study their design aspects and characteristics
CO 5	Understand the principle and working hydraulic pumps and their study their characteristics
Note: L – Lecture periods; T- Tutorial periods; P- Practical periods	

SYLLABUS

UNIT-

I:

Fluid Statics and Kinematics : Fundamentals of fluid properties; pressure measurement – Manometry - U-tube manometer and differential U-tube manometers ; Hydrostatic forces onsurfaces; Bouyancy and flotation - Meta centre (Theory only); Kinematics of fluid flow - Types of fluid flow; Description of fluid flow pattern - path lines, stream lines , streak lines, stream tube; Continuity equation in one dimension ; Continuity equation in Cartesian coordinates ; Velocity potential function and Stream function.

Fluid Dynamics: Dynamics of fluid flow – Euler's equation of motion - Bernoulli's equation

- Application of Benoulli's equation - Venturimeter and Orifice meter. Impulse-momentum equation - Moment of momentum equation - Applications - Impact of jets on stationary and moving plate

UNIT- II:

Laminar flow, Turbulent flow: Introduction-Laminar flow - Reynolds experiment; Navier- Stokes equations of motion (Explanation only, No derivation); Relationship between Shear Stress and Pressure Gradient; Flow of viscous fluid in circular pipes-Hagen Poiseuille Law; Flow of viscous fluid between two parallel plates - one plate moving and other at rest ; both plates at rest ; Turbulent flow - Introduction- Loss of head due to friction in pipe flow-Darcy equation- characteristics of turbulent Flow.

Flow through Pipes: Introduction- Major Energy Losses- Darcy-weisbach formula; Minor Energy Losses- Losses due to sudden enlargement, sudden contraction, loss of head at the entrance to pipe, exit of a pipe, loss of head due to bend in pipe and various pipe fittings ; pipes in series; equivalent pipe; pipes in parallel; Power Transmission through pipes

UNIT- III:

Boundary Layer theory: Introduction - Boundary layer definitions and characteristics - Momentum equation for boundary layer by Von Karman (Explanation only, no derivation), laminar boundary layer; turbulent boundary layer; Boundary layer separation and its control.

UNIT- IV:

Hydraulic turbines: Introduction to hydraulic turbines, Heads and efficiencies of a turbine; Classification of hydraulic turbines; Impulse turbine - Principle of impulse turbines; Pelton wheel - construction and working ; velocity triangles - work done and efficiencies of Pelton wheel ; Design aspects of Pelton wheel. Reaction turbines - Principle of reaction turbines; component parts, construction and operation of a Francis turbine and Kaplan turbine; velocity triangles - work done and efficiencies of Francis turbine and Kaplan turbine; Working proportions of Francis and Kaplan turbines; Unit quantities; Specific speed of turbines - Characteristics curves of turbines.

UNIT-V:

Hydraulic pumps: Hydraulic pumps - classification; Centrifugal Pumps- Main parts, principle and working, heads and efficiencies, work done; Minimum speed for starting; Classification, Multi-stage centrifugal pumps, Specific speed of a centrifugal pump, Priming of a centrifugal pump, Characteristic curves; Effects of Cavitation in hydraulic pumps. Reciprocating Pumps: Classification, main parts-working - slip, velocity and acceleration variation in suction and delivery pipes due to acceleration of piston; Indicator diagram - Effect of acceleration in suction and delivery pipes on indicator diagram.

Text Books:

1. A Text book of Fluid Mechanics and Hydraulic machines , by R.K. Rajput, S.Chand & Co
2. A Text book of Fluid Mechanics and Hydraulic machines , by R.K. Bansal,Laxmi Publications

References:

1. Hydraulics and Fluid Mechanics Including Hydraulic machines and by P.NModi and S.M Seth, Standard Book house publishers,22nd edition
2. Hydraulic Machines by K.Subramanya - McGraw Hill Education

GAYATHRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES (A)

Engineering and Technology Program

II/IV B.Tech Semester Regular & Supply ExaminationsMechanical Engineering

Subject: Fluid Mechanics and Hydraulic Machines (R 20)

(20954904)

Time: Three Hours **Maximum Marks: 70**

Marks

Part-A

Answer ALL the Questions **5×2 = 10 M**

1 a Define absolute, gauge and vacuum pressures?

b Derive Bernoulli's equation from Euler's equation.

c Difference between Laminar Flow and Turbulent Flow?

d Differentiate between stream function and velocity potential.

e What is priming of a centrifugal pump? Why it is needed.

Part-B

Answer ALL the Questions **5×12 = 10 M**

2 a Describe the differential manometer with neat sketch.

b The right limb of a simple U- tube manometer containing mercury is open to the atmosphere

while the left limb is connected to a pipe in which a fluid of sp.gr. 0.9 is flowing. The centre ofthe pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the

pipe if the difference of Mercury level in the two limbs is 20 cm.

OR

3 a Derive the expression for the force exerted by the jet of water on a fixed curved plate in the

direction of the jet

b A jet of water of diameter 7.5 cm strikes a curved plate at its centre with a velocity of 20 m/s.

The curved plate is moving with a velocity of 8 m/s in the direction jet. The jet is deflected

through an angle 165^0 . Assuming the plate smooth find: Force exerted on the plate in

thedirection of jet, Power of the jet and Efficiency of the jet.

4 a Derive an Expression for head loss due to friction in pipe flow. How friction varies from the

Reynolds Number?

b Two reservoirs are connected by three pipes laid in parallel, their respective diameters being

d, 2d, and 3d. These are all of the same length l. If f is the same for all the pipes find thedischarge through the larger pipes if the discharge through the smallest is 0.05 m3 /sec.

OR

5 a Derive an expression for head loss due to friction.

b The rate of flow of water through a horizontal pipe is 0.25 m3 /s. The diameter of the pipe

which is 200 mm is suddenly enlarged to 400 mm. The pressure intensity in the smaller pipe is

11.772 N/cm^2 . Determine: (i)Loss of head due to sudden enlargement. (ii) Pressure intensityin the large pipe. (iii) Power lost due to enlargement.

6 a Explain about the boundary layer separation? Methods to prevent the separation of boundary

layer?

b Water is flowing over a thin smooth plate of length 4 m and width 2 m at a velocity of 1.0 m/s.

If the boundary layer flow changes from laminar to turbulent at a Reynold number 5 x 10°, find

(i) the distance from leading edge up to which boundary layer is laminar, (ii) the thickness ofthe boundary layer at the transition point, and (iii) the drag force on one side of the plate. Take

viscosity of water jt = 9.81 x 107 Ns/m®.

OR

7 a What do you understand by Boundary Layer? Explain the development of Boundary layer over

a flat plate.

b A thin plate is moving in still atmospheric air at a velocity of 5 m/s. The length of the plate is

0.6 m and width 0.5 m. Calculate (i) the thickness of the boundary layer at the end of the plate,and (ii) drag force on one side of the plate. Take density of air as 1.24 kg/m® and kinematic

viscosity 0.15 stokes.

8 a Show that for the maximum efficiency, the bucket speed of a Pelton wheel should be equal to

one half of the jet speed.

b A Kaplan turbine develops 15000 kW power with a head of 30 m. Hub diameter of runner is

0.35 times the outer diameter of runner. Find the diameter of the runner, rotational speed ofturbine and Specific speed. Take the speed ratio 2.0, flow ratio 0.65 and overall efficiency 90%.

OR

9 a Define a turbine and bring out the differences between reaction turbine and impulse turbine

in a tabular form.

b The details of a Pelton wheel turbine installation are given below. Find the power developed

and hydraulic
efficiency.Gross head
= 510 m

Loss of head in penstock = 30%
Discharge through nozzle = 2.2 m3 /
secAngle of deflection of jet = 165^0
Coefficient of velocity Cv = 1

Speed ratio Ku= 0.45

10 a What is indicator diagram? Prove that work done by a reciprocating pump is proportional to

the area of indicator diagram.

b A centrifugal pump has an impeller 500 mm in diameter running at 400 rpm. The discharge at

the inlet is entirely radial. The velocity of the flow at outlet is 1 m/s. The vanes are curved backwards at outlet at 300 to the wheel tangent. If the discharge of the pump is 0.14m3 /s, calculate the impeller power and the torque on the shaft.

OR

11 a What is effect of acceleration of the Piston on the velocity and acceleration of the water in

suction and delivery pipes? Obtain Expression for the pressure head due to acceleration in thesuction and delivery pipes?

b A single acting reciprocating pump has a plunger of diameter 250 mm and stroke of 350 mm. if

the speed of the pump is 60 r.p.m. and it delivers 16.5 litres per second of water against a suction head of 5m and a delivery head of 20 m, find the theoretical discharge, coefficient of discharge, the slip, the percentage slip of the pump and the power required to drive the pump.

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE&P.G.COURSES (A)
ENGINEERING & TECHNOLOGY PROGRAM
DEPARTMENT OF MECHANICAL ENGINEERING

Department of Mechanical Engineering

Course code	Title of the course	Contact periods for delivering the course			Credits
		L	T	P	
220402	Metallurgy and Material Science	3	0	0	3

Course Outcomes: At the end of the course the student will be able to

1. Identify crystal structures and characterize them
2. Categorise types of binary phase diagrams and iron-iron carbide phase diagram and other binary phase diagrams can be notated and characterized.
3. Understand different heat treatment regimes in steels and their transformations, various surface heat treating and precipitation hardening techniques can be identified and analysed.
4. Identify Iron alloys and cast iron alloys depending on the various alloying elements
5. Understand how composite materials are manufactured and their applications

Syllabus:

Unit I

Structure of crystalline solids: Atomic structure & bonding in solids- Crystal structures- calculations of radius, Crystallography: Classification of Crystal lattices-Miller Indices Coordination Number and Atomic Packing Factor for different cubic structures - Imperfection in solids, point defects, linear defects, planar defects and volume defects, Grain Size: Factors for nucleation – Grain Size Measurement- Concept of Slip & twinning.

UNIT II

Solid Solutions: Substitutional and interstitial solid solutions. Phase diagrams: Basic terms- phase rule- Lever rule & free energy of phase mixtures cooling curves- Phase diagram & phase transformation - construction of phase diagrams-Invariant reactions, eutectic, peritectic, eutectoid, peritectoid, monotectic reactions, Iron carbon phase diagram & microstructures of plain carbon steel & cast iron

UNIT III

Heat treatment: Heat treatment of steel- Annealing, and its types, normalizing, hardening, tempering, martempering, austempering - TTT diagrams, drawing of TTT diagram, TTT diagram for hypo-& hypereutectoid steels, effect of alloying elements, CCT diagram- Martensitic transformation, nature of martensitic transformation- Surface hardening processes like case hardening, carburizing, cyaniding, nitriding, induction hardening, hardenabilty, Jominy end- quench test, Age hardening of Al & Cu alloys, Precipitation Hardening

UNIT IV

Engineering Alloys: Properties, composition, microstructure and uses of low carbon, mild medium & high carbon steels. stainless steels, high speed steels, Hadfield steels, tool steels - Cast irons, gray CI, white CI, malleable CI, SC iron-The light alloys- Al & Mg & Titanium alloys- Copper & its alloys: brasses & bronzes- super alloys.

UNIT V

Composite Materials: Classification of composite materials, dispersion strengthened, particle reinforced and fiber reinforced composite laminates properties of matrix and reinforcement materials and structural applications of different types of composite materials.

Text Books:

1. Introduction to Physical Metallurgy by Sidney H Avner, 2nd Edition, Tata McGraw-Hill, 1997
2. Physical Metallurgy, Principles & Practices, V Raghavan, PHI 3rd Edition 2016, New Delhi.

References:

1. Materials Science & Engineering- An Introduction, William D.Callister Jr., David G Rethwisch, Wiley India Pvt. Ltd., 9th Edition, 2014, New Delhi.
2. Materials Science and Engineering: A First Course , V. Raghavan, PHI 5th Edition 2011, New Delhi.

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES (A)
VISAKHAPATANAM 530045 | WEBSITE: www.gvpcdpgc.edu.in
(Permanently Affiliated to Andhra University | Accredited by NAAC)
PG-MBA and UG Engineering B.Tech.(CE,CSE,ECE,ME) programs accredited by NBA

Department of Mechanical Engineering

Course code	Title of the course	Contact periods for delivering the course			Credits
		L	T	P	
2295405	Metallurgy and Material Science	3	0	0	3

Course Outcomes: At the end of the course the student will be able to

1.Identify crystal structures and characterize them
2.Categorise types of binary phase diagrams and iron-iron carbide phase diagram and other binary phase diagrams can be notated and characterized.
3.Understand different heat treatment regimes in steels and their transformations, various surface heat treating and precipitation hardening techniques can be identified and analysed.
4.Identify Iron alloys and cast iron alloys depending on the various alloying elements
5.Understand how composite materials are manufactured and their applications

Syllabus:

Unit I
Structure of crystalline solids: Atomic structure & bonding in solids- Crystal structures- calculations of radius, Crystallography: Classification of Crystal lattices-Miller Indices Coordination Number and Atomic Packing Factor for different cubic structures - Imperfection in solids, point defects, linear defects, planar defects and volume defects, Grain Size: Factors for nucleation – Grain Size Measurement- Concept of Slip & twinning.

UNIT II

Solid Solutions: Substitutional and interstitial solid solutions. Phase diagrams: Basic terms- phase rule- Lever rule & free energy of phase mixtures cooling curves- Phase diagram & phase transformation - construction of phase diagrams-Invariant reactions, eutectic, peritectic, eutectoid, peritectoid, monotectic reactions, Iron carbon phase diagram & microstructures of plain carbon steel & cast iron

UNIT III

Heat treatment: Heat treatment of steel- Annealing, and its types, normalizing, hardening, tempering, martempering, austempering - TTT diagrams, drawing of TTT diagram, TTT diagram for hypo-& hypereutectoid steels, effect of alloying elements, CCT diagram- Martensitic transformation, nature of martensitic transformation- Surface hardening processes like case hardening, carburizing, cyaniding, nitriding, induction hardening, hardenabilty, Jominy end- quench test, Age hardening of Al & Cu alloys, Precipitation Hardening

UNIT IV

Engineering Alloys: Properties, composition, microstructure and uses of low carbon, mild medium & high carbon steels. stainless steels, high speed steels, Hadfield steels, tool steels - Cast irons, gray CI, white CI, malleable CI, SC iron-The light alloys- Al & Mg & Titanium alloys- Copper & its alloys: brasses & bronzes- super alloys.

UNIT V

Composite Materials: Classification of composite materials, dispersion strengthened, particle reinforced and fiber reinforced composite laminates properties of matrix and reinforcement materials and structural applications of different types of composite materials.

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3. Introduction to Physical Metallurgy by Sidney H Avner, 2nd Edition, Tata McGraw-Hill, 1997
4. Physical Metallurgy, Principles & Practices, V Raghavan, PHI 3rd Edition 2016, New Delhi.

References:

3. Materials Science & Engineering- An Introduction, William D.Callister Jr., David G Rethwisch, Wiley India Pvt. Ltd., 9th Edition, 2014, New Delhi.
4. Materials Science and Engineering: A First Course , V. Raghavan, PHI 5th Edition 2011, New Delhi.

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE AND PG COURSES (A)
ENGINEERING AND TECHNOLOGY PROGRAM
MODEL QUESTION PAPER
2295405
II/IV B.Tech, II SEM END EXAMINATION
Metallurgy and Material Science

Time: 3 hours Maximum Marks: 70

First question is compulsory
Answer ONE question from each unit
All parts of the questions must be answered at one place only

1				
	a	Write a short note on Twinning with an example	2 marks	CO1
	b	Explain with an example about eutectoid reaction	2 marks	CO2
	c	Write a short note Normalising	2 marks	CO3
	d	Classify Tool steels	2 marks	CO4
	e	Write a short note about bronzes	2 marks	CO5
UNIT I				
2	a	Classify crystal systems and discuss about FCC, BCC and HCP	6 marks	CO1
	B	Compare and contrast slip and twinning	6 marks	CO1
		OR		
3	A	Discuss about various imperfections in solids	12 marks	CO1
UNIT II				
4	a	Elaborate about different Invariant reactions in a binary phase diagram	12 marks	CO2
		OR		
5	a	Draw and mark different regions and the invariant reactions occurring in an Fe-Fe_3C Phase diagram	12 marks	CO2
UNIT III				
6	a	Elaborate about different surface hardening techniques with diagrams	12 marks	CO3
		OR		
7	a	How is a TTT diagram plotted? Elaborate about the TTT diagram of eutectoid steel.	8 marks	CO3
	b	Explain about age hardening with an example of an alloy.	4 marks	CO3
UNIT IV				
8	a	How are cast irons classified? Elaborate about any two cast irons	12 marks	CO4
		OR		
9	a	Discuss about Maraging Steels and Hadfield Steels	8 marks	CO4
	b	Discuss about Cold working tool steels	4 marks	CO4
UNIT V				
10	a	Give the classifications and applications of composite materials	8 marks	CO5
	b	Explain about particle reinforced composites	4 marks	CO5
		OR		

11	a	What is a composite? Describe the methods for fabrication of composites	8 marks	CO5
	b	What is the role of fibers and matrix in fiber reinforced composites	4 marks	CO5

Course Code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
2295406	**Environmental Science**	L	T	P	Int.	Ext	0
		3	**0**	**0**	**30**	**70**	

COURSE OBJECTIVES:

The objectives of the Environmental Science course are to

1. Familiarize the fundamental aspects of environment and the environmental management'
2. Make realize the importance of natural resources management for the sustenance of the life and the society.
3. Apprise the impact of pollution getting generated through the anthropogenic activities on the environment
4. Provide the concept of Sustainable Development, energy and environment.
5. Impart knowledge on the new generation waste like e-waste and plastic waste

COURSE OUTCOMES:

CO1: In this unit the students learn about the scope and importance of Environmental studies. The students understand about different kinds of ecosystems.

CO2: The students learn about biodiversity and its conservation. They also learn about types of biodiversity, values of biodiversity and threats to biodiversity.

CO3: The students understand about the types of natural resources and problems associated with them.

CO4: In this unit the students gain knowledge about different types of environmental pollution- causes, effects and control measures.

CO5: In this unit the students gain knowledge about characteristics of human population growth and its impact on environment. The students develop deep understanding about the environmental legislation.

UNIT-I

Introduction to Environmental studies and Ecosystems: Definition, Scope and importance of environmental studies. Concept of an Eco system, Biotic and Abiotic components of ecosystem, structure and function of an ecosystem. Food Chains, Food web and Ecological Pyramids. Forest ecosystem, Grassland ecosystem, Desert ecosystem, Pond ecosystem and Marine ecosystem.

UNIT-II

Bio-Diversity and its Conservation: Introduction – Definition and types of biodiversity – value of biodiversity - India as mega diversity nation – Hot spots of biodiversity – Threats to biodiversity – Conservation methods of biodiversity – In-situ & Ex – situ methods of conservation - Concept of sustainable development.

UNIT-III

Environment and Natural Resources Management: Soil erosion and desertification, Effects of modern agriculture, fertilizer-pesticide problems, Forest Resources: Use and over-exploitation, Mining and dams – their effects on forest and tribal people, Water resources: Use and over-utilization of surface and ground water, Floods, droughts, Water logging and salinity, Dams – benefits and costs, Conflicts over water, Energy Resources: Energy needs, Renewable and non-renewable energy sources.

UNIT-IV

Environmental Pollution – climate change and environmental problems: Definition, causes, effects and control measures of (a) air pollution (b) water pollution (c) soil pollution (d) noise pollution. Global Warming – Acid Rain – Ozone depletion – Photochemical smog. Drinking water, Sanitation and public health, Effect of Human activities of the quality of environment- Urbanization, transportation, Industrialization. Water scarcity and ground water depletion, Controversies on major dams – resettlement and rehabilitation of people problems and concerns. concept of plastic waste and e-waste.

UNIT-V

Human Population and Environmental legislations: Population Explosion – characteristics of population explosion. Impact of population growth on Environment – Role of Information technology in Environment and Human Health. Environmental Ethics. Environmental acts: Water (Prevention and control of pollution) act, air (Prevention and control of pollution) act, Environmental Protection Act, Wild life protection act, Forest conservation act.

TEXT BOOKS:

1. Bharucha, Erach (2004). Textbook for Environmental Studies for Undergraduate Courses of all Branches of Higher Education, University Grants Commission, New Delhi.
2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India
3. Masters, G. M., & Ela, W. P. (1991). Introduction to environmental engineering and science. Englewood Cliffs, NJ: Prentice Hall.
4. Enger, E. and Smith, B., Environmental Science: A Study of Interrelationships, Publisher: McGraw-Hill Higher Education; 12th edition, 2010.

5.Anubha Kaushik and C.P.Kaushik. Environmental Science by New age International Publishers.

Gayatri Vidya Parishad College for Degree and P G Courses (A)
B.Tech(CSE,CSE(AI&ML) and CIVIL ENGINEERING
II Year I Semester

ENVIRONMENTAL SCIENCE

MODEL QUESTION PAPER

Exam: 3 Hrs. Ext.Marks: 70

Answer all Questions 5X2=10M

1. a) Environment [CO1]
   b) Food Chain [CO1]
   c) Endangered Species [CO2]
   d) Pesticides [CO3]
   e) Ozone Depletion [CO4]

Answer all Questions 5X12=60M

2. a)Expalin in Detail about Various Components of Ecosystem [CO1]06M

   b) Describe Scope and Importance of Environmental Studies. [CO1] 06M

or

3. a) Explain about the Classification and Functions of Ecosystem. [CO1] 06M

   b) Explain about Ecological Pyramids [CO1] 06M

4. a) Define Biodiversity and explain the types of biodiversity. [CO2] 06M

   b) Discuss about Value of Biodiversity and Threats to Biodiversity. [CO2] 06M

or

5. a) Explain the Conservation Methods of Biodiversity [CO2] 06M

   b) Write about Bio geographical classification of India. [CO2] 06M

6. a) Explain the Classification of Energy Resources. [CO3] 06M

   b Explain about the Impacts of Mining and Dams on Forests and Tribal People.[CO3]06M

or

7. a) Explain about Forest resources-use and over exploitation. .[CO3]06M

   b) Define soil erosion and explain the different types of soil erosion .[CO3]06M

and its problems

8. a) Write about Definition,Causes,Effects and Control Measures of Air Pollution [CO4] 06M

b) What is Global Warming? Explain about its Causes, impacts and Prevention [CO4] 06M

or

9. a)Write about Definition,Causes,Effects and Control Measures of Water Pollution [CO4] 06M

b) What is Acid Rain? Explain about its Causes, impacts and Prevention [CO4] 06M

10. a) Define Population Explosion? Explain its impact on environment. [CO5] 06M

b) Explain the Role of Information technology on Environment and Human health [CO5] 06M

or

11. a) Explain the salient features of Air Act . [CO5]06M

b) Explain the salient features of Environmental Protection Act [CO5]06M

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