

SWAMI VIVEKANAND UNIVERSITY, SIRONJA, SAGAR (M.P.)



SYLLABUS

For

**Diploma in Mechanical Engg.
Semester -IV**

**Swami Vivekanand University, Sironja Sagar
2013-2014**

PROGRAMME NAME : **MECHANICAL ENGG**

Name of Scheme :CGPA 2012

Scheme of Studies and Examinations for : **FOURTH SEMESTER**

Implemented from Session : JULY 2012

Exam Code:

COURSE CODE	COURSE TITLE	PAPER CODE	THEORY COMPONENT							PRACTICAL COMPONENT						TOTAL CREDIT	GRAND TOTAL OF MARKS			
			LECTURES	CONTINUOUS EVALUATION			END OF THE TERM/ SEMESTER EVALUATION			THEORY CREDIT	PRACTICAL Hrs. Per Week	CONTINUOUS EVALUATION	END OF THE TERM/ SEMESTER EVALUATION					PRACTICAL CREDIT		
				Hrs. Per Week	TERM WORK QUIZ, ASSIGNMENT	MID TERM TEST (TWO)		THEORY PAPER					LAB. WORK QUIZ, ASSIGNMENT	PRACTICAL / ORAL EXAMINATION (VIVA)						
						I	II	NO.	MARKS					DURATION (Hrs)	NO.				MARKS	DURATION (Hrs.)
401	Fluid mechanics & Hydraulic Machine	6254	04	10	10	10	01	70	3 hrs	04	03	20	01	30	3hrs	2	06	150		
402	Thermal Engineering	6255	04	10	10	10	01	70	3 hrs	04	04	20	1	30	3hrs	2	06	150		
403	Theory of Machine	6056	03	10	10	10	01	70	3 hrs	04	02	20	1	30	3hrs	2	06	150		
404	Industrial Management	6129	02	10	10	10	01	70	3 hrs	04	06	-	-	-	-	-	04	100		
405	Entrepreneurship	6046	04	10	10	10	01	70	3 hrs	04	02	20	1	30	3hrs	2	06	150		
	Professional activities										02									
	total		17	50	50	50		350		20	19	80		120		08	28	700		

Theory Credits : 20
 Practical Credits :08
Total Credits :28

Theory Marks : 350
 Practical Marks : 120
 Quiz, Mid Term, Lab. Work : 230
Total : 700

Minimum Pass Grade in Theory & Practical 'D'

ME-401 FLUID MECHANICS & HYDRAULIC MACHINES

Fundamentals of Fluid Flow : Definition of fluid, ideal and practical, compressible and incompressible fluids, fluid properties- density, specific weight, specific gravity, dynamic and kinetic viscosity, types of flow- laminar and turbulent, steady and unsteady, uniform and non-uniform. Continuity equation, Simple numerical problems on continuity equation.

Pressure and Its Measurement: Concept of pressure, intensity of pressure, Pascal's law, pressure head, gauge pressure, vacuum pressure, absolute pressure, manometers- Piezometer, U-tube manometer inclined manometer, differential manometer ,inverted U-tube manometer Pressure gauges, Bourdon tube pressure gauge. Simple numerical problems on differential manometers.

Equation of Fluid Flow: Various form of energies applicable to fluid flow, potential energy, kinetic energy, pressure energy, total energy of fluid flow, Concept of datum pressure, velocity and total head of a fluid particle in motion. General steady flow energy equation, Bernaulli's theorem, assumptions made in deriving Bernaulli's theorem and derivation of Bernaulli's theorem, practical applications of Bernaulli's equation: venturimeter, orifice- meter, pitot tube, flow nozzle- Their construction, working and limitation. Simple problems on venturimeter, orifice meter, pitot tube.

low Through Orifices and Mouth Pieces and flow measurement: Definition and types of orifices, Vena contracta, coefficient of contraction., velocity, discharge and resistance . Torricell's theorem experimental determination of Cc, Cv and Cd. Head loss due to sudden enlargement, contraction and obstruction in pipe. Mouth pieces, Time of emptying vessel by orifice (cylindrical, conical) Flow from one vessel to another large orifices. Flow measurement by Rota meter, Volume flow meter

Flow Through Notches and Weirs : Weirs and notches definition, Classification, flow over rectangular weir with and without velocity of approach, calibration of rectangular weir, different formula for large rectangular weir. Time required to empty a reservoir with rectangular weir, V-notch. Advantages of triangular notch over rectangular notch. Trapezoidal notch. Broad crested and submerged weirs. Practical application of weirs. Spillway and Siphon spillway, guage weir.

Flow Through Pipes : Laminar and turbulent flow, Reynold's number, differentiation of laminar and turbulent flow on the basis of Reynold's number, loss of head due to friction in pipes, Darcy's formula and Chezy's equation. Hydraulic gradient and total energy line. Flow through long pipes, pipes in series and parallel simple problems based on above formulae water hammer and its effect surge tank.

Water Turbines : Meaning Classification Impulse and reaction turbine, Comparison description and working of Pelton, Francis and Kaplan turbines, Fanlaws specific speed & Selection of turbines.

Water Pumps : Centrifugal and reciprocating- principle construction, working classification and layout. Comparison of centrifugal and reciprocating pumps. Specific speed, selection of pumps. Use of air vessels in reciprocating pump, indicator diagram, horse power calculation in case of reciprocating pump. Horse power calculation in case of centrifugal pump. Operating characteristics.

Hydel Power Station : Schematic diagram, function of various elements, advantage over other power stations.

REFERENCE BOOKS

- 1 A text Book of Hydraulics, Fluid Mechanics and Hydraulic Machines. by Khurmi (S. Chand & Co.)
- 2 Fluid Machines by M. Manohar
- 3 Hydraulics & Hydraulic Machines by Dr. Jagdish lal (Metropolitan)
- 4 Hydraulics & Hydraulic Machines by Priyani.
- 5 Fluid Machines With Engineering Applications by R.L. Draught lery & A.C. Jugersoll. (McGraw Hills)
- 6 Journal of experiments in Hydraulic Laboratory by V. N. Rao & Husan New Heights.
- 7 Fluid Mechanics by Dr. M.L. Mathur (Std. Publications).
- 8 Taral Yantriki Avum Machinery (Hindi) by G.B. Bamanker. (Deepak Prakashan, Gwalior).

ME-402 THERMAL ENGINEERING

Dimensions and systems of units: Basic and Derived units for common engineering variables and properties like mass, length, time, temperature, area, volume, velocity, acceleration, force, pressure, work, heat, energy, power etc.

Sources of energy: Brief description of energy sources Classification of energy sources, Renewable, Non-Renewable, Fossil fuels, including CNG, LPG; Solar Energy- Its nature, merits and demerits, potential; Flat plate and concentrating collectors & their application. Solar Water Heater, Solar Air Heater, Photovoltaic Cell, Solar Distillation; Wind, Tidal, Geothermal, Biogas, Biomass, Bio-diesel, Hydraulic, Nuclear, Fuel cell – list of fuel cells

Basic Concepts of thermodynamics: Definition and importance of thermodynamics, thermodynamic system open, closed and Isolated system, boundary and surrounding forms of energy. Point and path functions, properties of system intensive and extensive properties thermodynamic state, thermodynamic process, cycles thermodynamic definition of work, heat and thermodynamic equilibrium, Zeroth law of thermodynamics, Quasi-static process, work done during Quasi Static process

First Law of Thermodynamics: Concept of heat reservoir, heat source and heat sink, Statement of first law, Mathematical representation, applications of first law to open and closed system. Concept of internal energy and its calculation, relationship between heat transfer, work transfer and change in internal energy. Differentiation between shaft work, flow work and displacement work; Steady flow energy equation and its application to various units such as boiler, nozzle, turbine compressor enthalpy.

Second Law of Thermodynamics: Limitation of first law. Statements of second law Kelvin, Planck and Clausius statements, Concept of heat pump, refrigerator and heat engine thermal efficiency. Parameters affecting thermal efficiency, means of increasing efficiency, COP. Equivalence and irreversible processes. Factors which make a process irreversible. Reversible cycle. Carnot cycle its efficiency and limitation ; Carnot theorem Clausius Inequality, concept of entropy, Principle of increase of entropy, determination of increase of entropy, principle of increase of entropy, determination of increase of entropy, Statement of third law of thermodynamics

Ideal Gases and Gas Processes: Definition of an ideal gas, gas law, characteristics gas equation, specific and universal gas constants specific heat constant pressure and specific heat, constant volume. Ideal gas processes- isobaric isothermal, isentropic, polytropic and throttling process as applied to open and closed systems. Representation of these processes on P-V, T-S and H-S diagrams. Computation of change in enthalpy, entropy and internal energy. Net heat transfer and work done.

Thermodynamic Cycles: Air Standard cycles- definition and purpose standard efficiency, Carnot, Otto Diesel dual and Brayton cycles, their representation on P.V. & T.S. Diagrams. Derivation of air Standard efficiency and their comparison and limitation of each cycle. Vapour power cycle - Carnot cycle its limitation, Rankine cycle modified Rankine cycle- their representation on P.V.T.S. and H.S. Planes, derivation of expression for thermal efficiency.

Two Phase System: Pure substance phase, phase changes steam as a two phase system steam formation and its representation on temp- enthalpy plane. Properties changes, representation of wet dry and saturated and superheated steam on P.V., T.S. and H.S. planes.

Dryness fraction of steam, methods of determination of dryness fraction separation and throttling calorimeter. Use of steam tables and Mollier's diagram . Determination of change in properties such as entropy enthalpy internal energy and work and heat transfer in the following processes- isobaric, isochoric, isothermal, isentropic, polytropic, throttling, and representation of various processes on P.V. and H.S. planes.

Steam Nozzle, Condensers and Turbines: Steam nozzle and its use, Condenser-Classification, construction and working of surface condenser, Classification, working principle of steam turbines, difference between impulse and reaction turbine, compounding of steam turbine, velocity diagram (introductory and its use) Governing.

Internal Combustion Engines: Introduction, classification I.C. Engine Components and their function, working of two stroke and four- stroke cycle engines and their comparison. Indicator diagram, Calculation of IHP, BHP thermal efficiency, Mechanical efficiency and relative efficiency, Governing, Cooling and lubrication of I.C.

Heat Transfer: Modes of heat transfer; Conduction convection and Radiation. Fourier's law of heat conduction, temperature gradient, expression for determination of heat transfer across a flat plate, thermal conductivity and thermal resistance. Newton's law for heat transfer by convection, free and forced convection. Heat transfer by radiation Stefan-Boltzmann Law of thermal radiation.

Define the terms- absorptivity, reflectivity and transmissivity; black body, emissive power, grey body.

Heat exchanger; Shell and tube, Plate type and their applications.

REFERENCE BOOK

- 1 Engineering Thermodynamics by P. K. Nag, Tata McGraw Hill Ltd.
- 2 Engineering Thermodynamics, C. P. Gupta, Rajendra Prakash
- 3 Thermal Engineering by P.L. Ballani. (Khanna Publisher's N. Delhi)
- 4 A Course in thermodynamics And Heat Engines by Kothanandran, Khajuria and Arora (Dhanpat Rai & Sons Delhi)
- 5 Treatise On Heat Engineering by Vasandani & Kumar (Metrocitan Book Co. Ltd, New Delhi)
- 6 Thermodynamics by G.T. Van Wylen (john Wiley & Sons)
- 7 Thermodynamic And Heat Engines Vol . I & II by R. Yadav. (Central Book Depot, Allahabad)
- 8 Heat Power by Kashitish Chandra Pal (Orient Longman Hyderabad)
- 9 I.S. 2986- 1966.
- 10 Tapiya Abhiyantriki (Hindi) by G.B. Bamankar (Deepak Prakashan, Morar

ME-403 THEORY OF MACHINES

Simple Mechanism: Introduction of theory of machines, definitions- statics, dynamics, kinematics, kinetics, kinematic pair, kinematic chain, mechanism, machine inversions, relation between number of links, number of joints and number of pairs, Four bar chain and its inversion, Slider crank chain and its inversions

Velocity and Acceleration of Points and Links : Angular and linear velocity, relative and absolute velocity, velocity in links. Instantaneous centre, locating instantaneous centre of rotation, velocity determination of four bar mechanism by relative velocity method, Acceleration of link centripetal and tangential, total relative and absolute acceleration. Velocity and acceleration diagrams for four bar and other mechanisms. Klein's construction for single slider crank mechanism. Analytical method of calculating the velocity and acceleration of piston in a reciprocating engine mechanism.

Dynamic force analysis, Crank Effort Diagrams and Flywheel : Dynamics of reciprocating engine mechanism. Inertia force due to reciprocating mass, piston effort crank effort, turning moment on crank shaft, Analytical and graphical methods of construction of turning moment diagrams for steam and I.C. engines. Fluctuation of energy and speed. Coefficient of fluctuation of energy and speed. Flywheel and its function . Calculation of moment of inertia. weight of flywheel for steam and I.C. engines.

Brakes and Dynamometers: Brakes - need, types, braking force, braking torque. band brakes, block brakes, internally expanded brakes, dynamometer- meaning, need and types . Simple numerical calculation on above items

Power Transmission : Drives : meaning, Classification, belt, chain, rope and gear drives. Flat and ' V ' belt, ratio of tensions . Slip length of belt calculation for open and cross belt drive. H.P. transmitted. Effect of centrifugal force, centrifugal tension, total tension maximum stress in belt. Maximum Power transmitted. Velocity for maximum H.P. condition. V-Belt drives, advantages and disadvantages of V-Belt drives. Rope Drives : Types, ratio of tensions, Designation of ropes as per B.I.S.

Chain Drive : Classification, designa

Governors : Functional difference with flywheel.

Classification : Watt, porter, proell and hartnell- their construction and working. Sensitivity, stability, power and effort, hunting phenomenon and isochorism of governor tion of chain drives as per

Cams and Followers : Need, Classification. motion of follower Displacement, velocity and acceleration diagrams uniform velocity, uniform acceleration and retardation. Simple harmonic motion. Cam profile for radial. offset knife edged follower.

Balancing of Machine Parts: Concept Static and dynamic balancing of rotating parts. Simple numerical problems on static balancing of several masses in single plane graphical and analytical method.

Gear and Gear Train: Introduction , classification of gears , gear terminology , law of gearing ,velocity of sliding , forms of teeth –cycloid profile teeth , involutes profile teeth, path of contact, arc of contact. Interference in involutes gear , minimum no of teeth in gear and pinion classification of gear train . Function of idler. Calculation of velocity ratio, train value of gear train- simple, compound epicyclic and reverted gear train, motor car gear box

REFERENCE BOOKS

- 1 Theory of Machines by J.M. Shah & H.M. Jadhvani.
- 2 Theory of Machines by Abdulla Shariff
- 3 Theory of Machines by M.R. Malhotra & H.C. Gupta. (Technical India Pub.)
- 4 Theory of machines by P.L. Ballani .
- 5 Theory of Machines by Thomas Bevan .
- 6 Theory of Machines by S. S. Ratan.
- 7 Theory of Machines By R.S.Khurmi
- 8 Theory of Mechanism and Machine By Jagdish Lal

ME-404I INDUSTRIAL MANAGEMENT

INTRODUCTION :

Definition and functions of management. Management theories - Decision, Quantitative, Mathematical and Behavioral Science.

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Definition and functions of management. Management theories - Decision, Quantitative, Mathematical and Behavioral Science

MATERIALS MANAGEMENT :

Introduction, function, purchase systems, stock turn-over, ordered quantity. Inventory, need of inventory control, EOQ and simple numerical problems on EOQ. Safety stock, different techniques of inventory control, ABC analysis (simple treatment only).

Stores management - storing procedure and store records e

PRODUCTION PLANNING AND CONTROL :

Production systems, characteristics of each type, production and consumption rate. PPC functions, Gantt chart, adva

VALUE ANALYSIS :

Concept of cost and value, types of value, objectives and procedure of value analysis, VA test, DARSIRI method of VA. ntages and preparation of Gantt chart (simple cases only), Critical ratio scheduling

PROJECT PLANNING BY NETWORK :

Network definition, objectives. CPM and PERT, activity, event, network formation, Fulkerson's rule, dependency of activities, dummy activity, duration, EST, EFT, LST, LFT, EPO, LPO, Total float and Free float.

Network analysis in tabular form

INDUSTRIAL RELATIONS :

Need, objectives and functions of personnel management, job analysis and job description, recruitment procedure, selection, difference between recruitment and selection, training and its advantages.

Communication in industry - its need and importance, techniques and barriers of communication.

Grievances - its meaning and factors responsible for grievances, procedure for handling grievances.

Strikes and Lock-out. Motivation - meaning and its benefits, techniques of motivation. Morale - definition and importance, factors responsible for high morale. Job satisfaction - factors influencing job satisfaction.

SUPERVISION AND LEADERSHIP :

Meaning and role of Supervisor in an industry. Older workers and their supervision. Concept of Leadership, qualities of good leader,

REFERENCE BOOKS

1. Learning Package on Industrial Management
Publisher : TTTI, Bhopal.
2. CPM and PERT - Principles and Applications
By L.S.Shrinath
3. Industrial Engg. and Management
By O.P.Khanna.
Khanna Publisher.
4. Industrial Organisation and Management
By K.K.Ahuja

5. Modern Production Operation Management
By Buffa
Willey Eastern Ltd. (latest edition)
6. Production Operation Management
By Goel B.S. Pragati Prakashan.

ME-405 ENTREPRENEURSHIP

1. INTRODUCTION TO ENTERPRENEURSHIP

- Definition of Entrepreneur / Entrepreneur
- Difference between Entrepreneurship / Entrepreneurship
- Need for Entrepreneurship
- qualities of successful entrepreneur
- Myths about Entrepreneurship
- Classification of entrepreneurs on the basis of different criteria
- Reasons for the failure of entrepreneurs

2. INDUSTRIES AND BUSINESS ORGANIZATIONS

- Concept of Industry or Enterprise
- Classification of Industries
- (a) On the basis of capital investment
 - Tiny (Micro) Industry
 - Small Scale
 - Medium Scale
 - Large Scale
- (b) Others
 - Rural Industry
 - Cottage Industry
- (c) Forms of Business Organization
 - Proprietorship
 - Board & Co-operative
 - Partnership
 - Public Ltd.

4. INCENTIVES / CONCESSION / FACILITIES AVAILABLE

- Seed money
- Incentive / subsidies
- Others (Phones, Lands etc)

5. PLANNING OF AN INDUSTRIAL UNIT (SSI)

- Pre- Planning Stage
 - Scanning the environment
 - Market survey
 - Seeking information
 - product / project selection
- Implementation Stage
 - PPR Preparation
 - DIC registration
 - Arrangement of Land
 - Arrangement of Power
 - Obtaining NOC / Licenses from various departments
 - DPR Preparation
 - Seeking financial assistance
 - Commercial Production
- Post Implementation stage

- Permanent registration from D.I.C.
- Availing Subsidies
- Diversification / Modification
- Setting up of marketing channel / Distribution

- Private Ltd.
- IT Sector
- Government Co-operative / Undertakings
- (d) Tiny small scale Industry
- Definition
- Its significance in National Development.
- Govt. policies for SSI promotions

ACHIVEMENT MOTIVATION

- Historical perspective
- Concept of achievement motivation
- Significance of achievement motivation
- Development of achievement motivation

7. FINANCIAL MANAGEMENT OF AN INDUSTRIAL UNIT (SSI)

- Tools of financial analysis
- Ratio analysis
- Fund Flow / Cash flow analysis
- Working capital and concepts
- Financial accounting

REFERENCES

1. Entrepreneurial Development Vol. I,II,III
By Vasant desai Himalaya Publicaton
2. CEDMAP (Center of Entrepreneurial development Madhya Pradesh)
3. Udyamita Vikas
By Anand Prakashan