

SHANTILAL SHAH ENGINEERING COLLEGE BHAVNAGAR
MECHANICAL ENGINEERING DEPARTMENT

Mid Sem. Exam Syllabus: 2020 (ODD TERM)
B.E. 3rd SEMESTER
MECHANICAL ENGINEERING (19)
SUBJECT NAME: KINEMATICS AND THEORY OF MACHINES
SUBJECT CODE: 3131906

Sr. No.	Content
1.	Introduction of Mechanisms and Machines: Concepts of Kinematics and Dynamics, Mechanisms and Machines, Planar and Spatial Mechanisms, Kinematic Pairs, Kinematic Chains, Kinematic Diagrams, Kinematic Inversion, Four bar chain and Slider Crank Mechanisms and their Inversions, Degrees of Freedom, Mobility and range of movement - Kutzbach and Grubler's criterion, Number Synthesis, Grashof's criterion, straight line mechanisms
2.	Graphical and Analytical Linkage Synthesis: Synthesis, Function, Path, and Motion Generation, Dimensional synthesis (Graphical): Two position synthesis, Three Position synthesis, Coupler curves, Position Analysis : Graphical position analysis of linkages, Algebraic position analysis of linkages, Four bar slider crank position solution, Two position motion generated by analytical synthesis, Three position motion generated by analytical synthesis.
3.	Cams: Types of cams, Types of followers, Follower displacement programming, Derivatives of follower Motion, Motions of follower, Layout of cam profiles.
4.	Belt, Ropes and Chains: Types of belt drive, Velocity ratio, Slip, Pulley arrangement, Length of belt, Law of belting, Ratio of friction tension, Power transmitted, Centrifugal effects on belts, Maximum power transmitted, Creep, Chains, Chain length, Angular speed ratio, Classification of chain

SYLLABUS FOR PAT- EXAM 2020

SUBJECT: ET(3131905)

DIV-A(JSD,VNK) AND DIV-B(HSP)

SR NO.	TOPIC NAME
1	Introduction: Basic Concepts: Thermodynamic system and control volume, Microscopic and macroscopic point of view, thermodynamic properties, state of a substance, process and cycle, Thermodynamic equilibrium, Concept of Continuum, Quasi-static process, The Zeroth Law of Thermodynamics, Temperature scales
2	First law of Thermodynamics: First law for a closed system undergoing a cycle and change of state, energy, PMM1, first law of thermodynamics for steady flow process, steady flow energy equation applied to nozzle, diffuser, boiler, turbine, compressor, pump, heat exchanger and throttling process, filling and emptying process
3	Vapor Power cycles: Carnot vapor cycle, Rankine cycle, comparison of Carnot and Rankine cycle, calculation of cycle efficiencies, variables affecting efficiency of Rankine cycle, reheat cycle, regenerative cycle, reheat-regenerative cycle, feed water heaters.
4	Gas Power cycles: Recapitulation of Carnot, Otto and Diesel cycle, Dual cycle, Comparison of Otto, Diesel and Dual cycles, air standard efficiency, mean effective pressure, brake thermal efficiency, relative efficiency, Simple Brayton cycle
5	Refrigeration Cycles: Simple Vapour Compression Refrigeration (VCR) cycle on P-h and T-s diagrams, analysis of the simple cycle, factors affecting the performance of the cycle, actual cycle, Reversed Carnot cycle and its limitation, Bell-Coleman cycle.

Material Science and Metallurgy

Sem : 3

Sub. Code: 3131904

PAT EXAM syllabus SEPT-2020 SYLLABUS

Sr No	TOPIC
1	Introduction to Material Science Metallurgy: Classification of Engineering Materials, Engineering requirements of materials, , Criterion for selection of materials for engineering applications through Structure-Properties-Performance relationship; Introduction to levels of internal structure like macro, micro, crystal and atomic and their correlated properties; Methods/Tools to reveal the different levels of structure
2	Solidification and Theory of Alloys Solidification of metals and an alloy, Nucleation and Growth during freezing of pure metal and alloy ingot/a casting Resultant macrostructures; Effects of Structure on Mechanical Properties. Systems, phases and phase rule, structural constituents, Gibb's free energy for thermodynamic stability of phases, Gibb's phase rule. Solid solutions and compounds, Hume-Rothery rules; Cooling curves, lever-arm principle.
3	Metallic Materials Types, properties and applications, Structure of Metals, Fracture, Macro-examination, Spark Test, Sculptures Print, Macro-etching, Microscopic examinations, Magnetic Testing, Chemical analysis of steel and iron for Carbon, Sulphur & Phosphorous.
4	TTT diagram and Heat Treatment of Steel Time-Temperature-Transformation Diagram, Isothermal and continuous transformations. Study of heat treatment processes such as annealing, normalizing, spheroidizing, hardening, tempering, carburizing, nitriding, cyaniding, induction hardening, flame hardening and hardenability of steel. Application of above processes to machine components and mechanical equipments such as gears, shaft bearings, turbine blades, crank shafts, pistons etc.