

SHANTILAL SHAH ENGINEERING COLLEGE
MECHANICAL ENGINEERING DEPARTMENT
PROGRESSIVE ASSESSMENT TEST SYLLABUS FOR AUGUST 2018
SEMESTER V
THEORY OF MACHINE (2151902)

Sr. No.	Content
1.	Friction Devices: Clutches, Brakes and Dynamometers Classification of clutches, torque transmission capacity, considerations for uniform wear and uniform pressure theory, single plate and multi-plate clutch, centrifugal clutch, Energy equation and thermal considerations. Classification of brakes, Braking effect, Analysis of Brakes: Block Brake, Band Brake, Band and Block Brake, Internal expansion shoe brake; Braking analysis of four wheelers. Classification of Dynamometers, Analysis of Dynamometers: Prony brake, Rope brake, Hydraulic, Belt Transmission, Epicyclic-Train and Bevis-Gibson torsion.
2.	Governors: Necessity of governor, Classification of Governors, Working principle of centrifugal governors, Concept of control force, Control force diagram, Stability of governor, Condition for stability, Concept of isochronism, Sensitivity of governor, Characteristics of governors, Hunting of governors.
3.	Introduction to Dynamics: Newton's Laws of Motion, Applied and constraint forces, Free-body diagrams, conditions for equilibrium, Two and Three forces members, Four force members, Friction forces, Centroid and Centre of Mass, D'alembert's Principle. Planar rotation about fixed centre, Complex algebra approach, Equation of motion. Application of concepts to dynamic analysis of slider-crank mechanism and 4-bar mechanism.

Subject Convener: Prof. J G Parmar

FLUID POWER ENGINEERING (2151903)

Sr. No.	Content
1.	Impact of Jet: Introduction, Force exerted on stationary plate held normal and inclined to jet, Force exerted on curved plate, force exerted on moving plate held normal and inclined in direction of moving jet, Force on a plate when vane is moving in direction of jet, jet striking on curved vane tangentially at one tip and leaving at other end, jet propulsion in ships.
2.	Hydraulic Turbines: Introduction, Classification of turbines, Impulse and reaction turbines, construction, working and performance of Pelton, Francis and Kaplan Turbines, Draft tube, Governing of hydraulic turbines, Cavitation.
3.	Centrifugal Pumps: Pump classification and selection criterion, Centrifugal pumps, Velocity vector diagrams, Pump losses and efficiencies, Net positive suction head, Pressure rise in impeller, Characteristic curves of centrifugal pumps, priming, maximum suction limit - minimum starting speed to deliver the discharge, Multistage pumps, cavitation, pump selection.

Subject Convener: Prof. V N Kalola

DESIGN OF MACHINE ELEMENT (2151907)

Sr. No.	Content
1.	Introduction: Design procedure, Selection of preferred sizes, Aesthetic and Ergonomic considerations in Design, Manufacturing considerations in Design, Mechanical Properties of Materials, Effect of Alloying elements and heat treatment on properties of steels, Materials Selection in Machine Design, IS coding of steels and Cast Irons.
2.	Design of Springs: Classification of springs, Helical Spring: Style of ends, Stresses, Correction Factors, and Deflection, Design against static and fluctuating loads, Concentric springs, surge phenomenon. Helical Torsion and Spiral Springs, Belleville spring, shot peening of springs. Multi-Leaf Spring: Terminology, Nipping, and Design of multi-leaf spring.
3.	Belt and Chain Drives: Flat Belt Drive: Belt Construction, Flat Belt Drive: Length of the Belt: Open and Cross drive types, Ratio of Tensions on tight side to slack side, Condition for maximum power transmission, Creep phenomenon, Methods for tensioning, Selection of Belts from catalogues, Design of Pulley for flat belt drive. Timing belt selection. V-Belt Drive: Nomenclature, Selection of V Belts from catalogues. Chain Drive: Nomenclature of roller chains, Length and power rating of chains, Design of chain drive.

Subject Convener: Prof. B D Upadhyay

CONTROL ENGINEERING (2151908)

Sr. No.	Content
1.	Basic Concept of Control Engineering: Terminology - plant, process, system, disturbances, controlled variable, manipulated variable etc., Classifications of control systems.
2.	Block Diagram Representations: Block diagram of basic control system, application areas with examples. Classifications of control systems, Concept of superposition for linear systems with examples
3.	Signal Flow Graph Representations : Signal flow graph representation of physical systems along with rules, properties, comparison of signal flow graph and block diagram, limitation, Mason's gain formula
4.	Transfer Function and Mathematical Modeling of Physical Control Systems: Translational and rotational mechanical, electrical, thermal, hydraulic and pneumatic systems, Force voltage and force current analogy, Position servo mechanism. Block diagram and signal flow graph representation of physical systems along with rules, properties, comparison and limitation, Mason's gain formula

Subject Convener: Prof. N D Jogadiya

HEAT TRANSFER (2151907)

Sr. No.	Content
1.	Fundamental: Modes of heat transfer, effect of temperature on thermal conductivity of different solids, liquids and gases, derivation of generalized equation in Cartesian, cylindrical and spherical coordinates and its reduction to specific cases, General laws of heat transfer
2.	Conduction : Fourier's law, One dimensional steady state conduction, heat conduction through plane and composite walls, cylinders and spheres, electrical analogy, critical radius of insulation for cylinder and sphere, overall heat transfer coefficient. Transient heat conduction- lumped heat capacity analysis, time constant, transient heat conduction in solids with finite conduction and convective resistances Heat transfer from extended surface: Types of fin, heat flow through rectangular fin, infinitely long fin, fin insulated at the tip and fin losing heat at the tip, efficiency and effectiveness of fin, Biot number, Estimation of error in temperature measurement in a thermometer well
3.	Heat exchanger: Classification, heat exchanger analysis, LMTD for parallel and counter flow exchanger, condenser and evaporator, overall heat transfer coefficient, fouling factor, correction factors for multi pass arrangement, effectiveness and number of transfer unit for parallel and counter flow heat exchanger, introduction of heat pipe and compact heat exchanger

Subject Convener: Prof. J S Dixit

DISASTER MANAGEMENT (2150003)

Sr. No.	Content
1.	Understanding Disasters : Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk and Capacity – Disaster and Development, and disaster management.
2.	Types, Trends, Causes, Consequences and Control of Disasters : Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves); Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters); Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.
3.	Disaster Management Cycle and Framework : Disaster Management Cycle – Paradigm Shift in Disaster Management Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action.

Subject Convener: Prof. U A Patel