RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 1/3
Branch	**Mechanical Engineering**		**Semester**	**IV**
Course Code	**401**	**Course Name**	**STRENGTH OF MATERIALS**	

Course Outcome 1	Calculate stresses, strain and strain energy.	Teach Hrs	Marks
Learning Outcome 1	Draw stress strain diagram for a given material.	04	05
Contents	Simple stresses and strains viz. tensile, compressive, Shear, Crushing, Thermal, fatigue stresses and strains, Hook's Law, Stress- Strain curve for ductile material and brittle material.		
Method of Assessment	Paper pen test		
Learning Outcome 2	Calculate stresses, strains, elastic constants, principal stresses and strains for a given condition.	06	10
Contents	Factor of Safety, Elastic Constants, Lateral Strain, Poisson's ratio, Bulk Modulus, Shear Modulus, Volumetric Strain. Relation between elastic constants-–Problems on Direct Stresses and Linear Strains, Hook's Law elastic constants. Principal stresses and strains. Mohr's Circle.		
Method of Assessment	Theory exam		
Learning Outcome 3	Calculate strain energy under given loading for a given object.	06	05
Contents	**Strain Energy:** Strain energy or resilience, proof resilience and modulus of resilience; formulae of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load, iii) Impact/shock load; numerical problems based on strain energy.		
Method of Assessment	Paper pen test		
Course Outcome 2	Perform mechanical testing of materials.		
Learning Outcome 1	Describe an appropriate test method for a mechanical property of a given material.	09	20
Contents	Mechanical properties of materials brittleness, creep, ductility, elasticity, hardness, malleability, plasticity, strength, stiffness, toughness, endurance limit, Destructive testing , tensile test, compression test, shear test bending test, hardness test, torsion test, impact test fatigue test, Non- destructive testing methods, visual testing, ultrasonic testing, radiography testing, electromagnetic testing, magnetic particle testing, acoustic emission testing, liquid penetrate testing, leak testing methods		
Method of Assessment	Laboratory test by observation		
Learning Outcome 2	Perform a given destructive/ non-destructive test for a given material.	36	30

Contents	Destructive testing , tensile test, compression test, shear test bending test, hardness test, torsion test, impact test fatigue test, Non- destructive testing methods, visual testing, ultrasonic testing, radiography testing, electromagnetic testing, magnetic particle testing, acoustic emission testing, liquid penetrate testing, leak testing methods		
Method of Assessment	Laboratory test by observation		
Course Outcome 3	Draw SFD and BMD for a given beam under loading.	Teach Hrs	Marks
Learning Outcome 1	Describe types of load, shear force, bending moment acting on beams.	04	05
Contents	Definition-Shear Force and Bending Moment, types of beams cantilever, simply supported, overhanging and fixed beams, types of load acting on beams- point load, uniformly distributed load, uniformly varying load,		
Method of Assessment	Theory exam		
Learning Outcome 2	Draw shear force, bending moment diagram for a beam under a given loading condition.	10	15
Contents	Bending Moment and its importance -sign convention to draw shear force diagram and bending moment diagram- Concept of Maximum bending moment, Point of Contra-flexure and its importance-Drawing shear force and bending moment diagram for Cantilever, Simply Supported Beams subjected to Point Load and U.D.L		
Method of Assessment	Theory exam		
Course Outcome 4	Calculate bending stresses for a given beam.	Teach Hrs	Marks
Learning Outcome 1	Explain bending stresses, modulus of section and bending equation.	04	06
Contents	Position of neutral axis in beams, moment of resistance, Bending equation (without proof), Modulus of section for rectangular, hollow rectangular, circular and hollow circular sections, Beams of uniform strength,		
Method of Assessment	Theory exam		
Learning Outcome 2	Express relation between bending stress and radius of curvature.	04	05
Contents	Introduction, assumptions in theory of simple bending, bending stress, relation between bending stress and radius of curvature (formula only).		
Method of Assessment	Assignment		
Learning Outcome 3	Calculate slope, deflection, flexural strength of a given beam.	08	10
Contents	Calculation of slope, deflection, flexural strength of cantilever and simply supported beams for point load and UDL.		
Method of Assessment	Paper pen test		

Learning Outcome 4	Calculate stresses using bending equation on a given beam.	08	14
Contents	Numerical problems on calculation of stresses using bending equation		
Method of Assessment	Theory exam		
Course Outcome 5	Calculate design parameters of circular shafts and springs	Teach Hrs	Marks
Learning Outcome 1	Calculate design parameters of a given shaft.	08	10
Contents	Definition and function of shaft: Calculation of polar M.I. for solid and hollow shafts; Assumptions in simple torsion; Derivation of the equation $T/J=f_s/R=G\theta/L$; Numerical Problems on design of shaft based on strength and rigidity		
Method of Assessment	Theory exam		
Learning Outcome 2	Explain springs, its classification and stiffness of a spring.	05	05
Contents	Classification of springs: Nomenclature of closed coil helical spring; Deflection formula for closed coil helical spring (without derivation); stiffness of spring.		
Method of Assessment	Quiz		
Learning Outcome 3	Calculate design parameters of a given spring.	08	10
Contents	Numerical Problems related to comparison of strength and weight of solid and hollow shafts. Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.		
Method of Assessment	Theory exam		