RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 1/3

Branch	Cement Technology	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	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, Problems on 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		

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		C	0	1	4	0	1	1	1	

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Calculate stresses, strain and strain energy.
LO Description	Draw stress strain diagram for a given material.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	4	NIL	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	Student will be asked to draw stress strain diagram for a given material.	05	Test paper + Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of progressive I

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code	Course Code	CO Code	LO Code	Format No. 4

		C	0	1	4	0	1	1	2

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Calculate stresses, strain and strain energy.
LO Description	Calculate stresses, strains, elastic constants, principal stresses and strains for a given condition.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	6	NIL	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory exam	Student will be asked to calculate given properties for a given condition.	10	Question paper + rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

NIL

		C	0	1	4	0	1	1	3	

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Calculate stresses, strain and strain energy.
LO Description	Calculate strain energy under given loading for a given object.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	6	NIL	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	Student will be asked to calculate strain energy under given loading for a given object.	05	Test paper + Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of progressive I

		C	0	1	4	0	1	2	1	

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Perform mechanical testing of materials.
LO Description	Describe an appropriate test method for a mechanical property of a given material.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	NIL	09	Handouts, chalk board, PPT, text book, charts, video film, lab manual.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Laboratory test by observation	Student will be asked to select an appropriate test method for a mechanical property of a given materials.	20	Observation schedule/check-list /rating scales /rubrics	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of Lab Work

		C	0	1	4	0	1	2	2	

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Perform mechanical testing of materials.
LO Description	Perform a given destructive/ non-destructive test for a given material.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	NIL	36	Handouts, chalk board, PPT, text book, charts, video film, lab manual.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Laboratory test by observation	Student will be asked to perform a destructive test for a given material.	30	Observation schedule/check-list /rating scales /rubrics	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of end practical exam

		C	0	1	4	0	1	3	1

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Draw SFD and BMD for a given beam under loading.
LO Description	Describe types of load, shear force, bending moment acting on beams.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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,	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	4	NIL	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory exam	Student will be asked to describe shear force, bending moment, types of load acting on a given beam.	5	Question paper + rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

NIL

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Draw SFD and BMD for given beam under loading.
LO Description	Draw shear force, bending moment diagram for a beam under a given loading condition.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	10	NIL	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory exam	Student will be asked draw shear force, bending moment diagram for a beam under a given loading condition.	15	Question paper + rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

NIL

		C	0	1	4	0	1	4	1

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Calculate bending stresses for a given beam.
LO Description	Explain bending stresses, modulus of section and bending equation.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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,	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	04	NIL	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory exam	Student will be asked describe bending stresses, modulus of section for given sections and bending equation.	6	Test paper + Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

NIL

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Calculate bending stresses for a given beam.
LO Description	Express relation between bending stress and radius of curvature.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Introduction, assumptions in theory of simple bending, bending stress, relation between bending stress and radius of curvature(formula only).	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	04	NIL	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Assignment	Student will be asked theory of simple bending to express relation between bending stress and radius of curvature.	05	Rubrics/rating scales	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Term work

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		C	0	1	4	0	1	4	3	

COURSE NAME	STRENGTH OF MATERIALS

CO Description	Calculate bending stresses for a given beam.
LO Description	Calculate slope, deflection,flexural strength of a given beam.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Calculation of slope, deflection,flexural strength of cantilever and simply supported beams for point load and UDL.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	8	NIL	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	Student will be asked to calculate slope, deflection,flexural strength of a given beam under given loading.	10	Test paper + Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of progressive II

RGPV (Diploma Wing) Bhopal	**SCHEME FOR LEARNING OUTCOME**	**Branch Code**			**Course Code**			**CO Code**	**LO Code**	**Format No. 4**
		C	0	1	4	0	1	4	4	
COURSE NAME	STRENGTH OF MATERIALS									

CO Description	Calculate bending stresses for a given beam.
LO Description	Calculate stresses using bending equation on a given beam.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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, Problems on bending equation	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	08	NIL	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory exam	Student will be asked to calculate stresses using bending equation on a given beam.	14	Test paper + Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

NIL

		C	0	1	4	0	1	5	1

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Calculate design parameters of circular shafts and springs
LO Description	Calculate design parameters of a given shaft.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	8	0	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory exam	Student will be asked to calculate design parameters a given shaft.	10	Test paper + Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

NIL

		C	0	1	4	0	1	5	2

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Calculate design parameters of circular shafts and springs
LO Description	Explain springs, its classification and stiffness of a spring.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Classification of springs: Nomenclature of closed coil helical spring; Deflection formula for closed coil helical spring (without derivation); stiffness of spring.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	5	NIL	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Quiz	Student will be asked to explain springs, its classification and stiffness of a spring.	05	Rubrics/rating scales	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Term work

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		C	0	1	4	0	1	5	3	

COURSE NAME	STRENGTH OF MATERIALS
CO Description	Calculate design parameters of circular shafts and springs
LO Description	Calculate design parameters of a given spring.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	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.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	8	0	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory exam	Student will be asked to calculate design parameters a given spring.	10	Test paper + Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

NIL