RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-**3**	Sheet No. 1/4

Branch	Mechanical Engineering	Semester	VI

Course Code	601	Course Name	Design of Machine Elements

Course Outcome 1	Explain fundamentals of design of machine elements.	Teaching Hrs	Marks
Learning Outcome 1	Calculate stresses, strain for a component under loading.	3	10
Contents	Machine Design philosophy and phases in design, design considerations, Types of loads, concepts of stress, Strain, Types of Stresses, Crushing, Bending and Torsion stresses, Principal Stresses, Stress – Strain Diagram for Ductile and Brittle Materials, Bearing pressure, , concept of Creep, Creep Curve, Fatigue, S-N curve, Endurance Limit, numerical problems		
Method of Assessment	Paper-Pen Test (Part of Progressive – 1)		
Learning Outcome 2	Use mechanical design data book for design of machine elements.	5	5
Contents	Factor of Safety, condition for selection of factor of Safety, Stress Concentration, Causes & Remedies, Designation of materials as per IS, introduction to International standards, advantages of standardization, Use of standards in design and preferred numbers series Use of design data book,		
Method of Assessment	Theory Exam		
Learning Outcome 3	Explain theory of elastic failures, modern design considerations for a given design problem.	5	5
Contents	Theories of Elastic Failures, Principal normal stress theory, Maximum shear stress theory & Maximum distortion energy theory. Modern design considerations, Ergonomics & Aesthetic consideration in design, Ecology, Social consideration and concept of product design.		
Method of Assessment	Theory Exam		

Course Outcome 2	**Design machine elements subject to direct loads, shear loads.**	Teaching Hrs	Marks
Learning Outcome 1	Calculate design stresses, parameters for joints, levers.	8	10

Contents	Design of Cotter Joint, Knuckle Joint Design of Levers- Hand/Foot Lever & Bell Crank Lever		
Method of Assessment	Theory Exam		
Learning Outcome 2	Calculate design stresses, parameters for C–Clamp, Off-set links, Overhang Crank.	6	6
Contents	Design of C–Clamp, Off-set links, Overhang Crank		
Method of Assessment	Paper-Pen Test (Part of Progressive – 2)		
Learning Outcome 3	Select a suitable bearing for a given application.	6	4
Contents	Antifriction Bearings: Classification of Bearings, sliding contact & Rolling contact, Terminology of Ball bearings, Life Load relationship, Basic static load rating and Basic dynamic load rating, Selection of ball bearings using manufacturer's catalogue.		
Method of Assessment	Paper-Pen Test (Part of Progressive – 2)		
Course Outcome 3	**Design machine elements subject to bending moments, twisting moments.**	Teaching Hrs	Marks
Learning Outcome 1	Design a shaft	8	10
Contents	Introduction to pure bending, fundamental equation of pure bending viz: $M/I = f/y = E/R$ Types of Shafts, Shaft materials, Standard Sizes, Design of Shafts (Hollow and Solid) using strength and rigidity criteria,		
Method of Assessment	Theory Exam		
Learning Outcome 2	Design keys, couplings	7	10
Contents	Design of Sunk Keys (Rectangular and square), Effect of Keyways on strength of shaft, Design of Couplings – Muff Coupling, Protected type Flange Coupling.		
Method of Assessment	Theory Exam		
Course Outcome 4	**Select a power screw, spur gear for given application.**	Teaching Hrs	Marks
Learning Outcome 1	Select a power screw for given application	7	10

Contents	Basic concept of power screw, Thread Profiles used for power Screws, Relative merits and demerits of each, Torque required to overcome thread friction, Self-locking and overhauling. Efficiency of power screws, Types of stresses induced, Design of Screw Jack; Toggle Jack (Only screw and nut)		
Method of Assessment	Theory Exam		
Learning Outcome 2	Select a suitable spur gear for given application.	6	10
Contents	Spur gear design considerations, Lewis equation for static beam strength of spur gear teeth, Power transmission capacity of spur gears in bending		
Method of Assessment	Paper-Pen Test (Term Work)		
Course Outcome 5	**Design bolted joints, welded joints, springs**	Teaching Hrs	Marks
Learning Outcome 1	Design bolted joints, welded joints for given loading.	7	10
Contents	Stresses in Screwed fasteners, Bolts of Uniform Strength, Design of Bolted Joints subjected to eccentric loading, Design of Parallel and Transverse fillet welds, axially loaded symmetrical section, Merits and demerits of screwed and welded joints.		
Method of Assessment	Theory Exam		
Learning Outcome 2	Calculate dimensions of a spring under given loading for a given application.	7	10
Contents	Design of springs: Classification and Applications of Springs, Spring terminology, Materials and Specifications, Stresses in springs, Wahl's correction factor, Deflection of springs, Energy stored in springs, Design of Helical, Tension and Compression springs subjected to uniform applied loads. like I.C. engine valves, Weighing balance, Railway buffers, Leaf springs- Construction and Application		
Method of Assessment	Theory Exam		

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code			CO Code	LO Code	Format No. **4**
		M	*0*	*2*	*6*	*0*	*1*	*1*	*1*

COURSE NAME	Design of Machine Elements
CO Description	**Explain fundamentals of design of machine elements.**
LO Description	Calculate stresses, strain for a component under loading.

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Machine Design philosophy and phases in design, design considerations, Types of loads, concepts of stress, Strain, Types of Stresses, Crushing, Bending and Torsion stresses, Principal Stresses, Stress – Strain Diagram for Ductile and Brittle Materials, Bearing pressure, , concept of Creep, Creep Curve, Fatigue, S-N curve, Endurance Limit, numerical problems	Interactive classroom teaching, quiz	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz to make students practice their knowledge	3	0	Handouts, chalk board, PPT, text book, charts,	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper-Pen Test	Students will be asked to calculate stresses/strain for a component under given loading.	10	Test Paper + Rating Scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of Progressive – 1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code		CO Code	LO Code	Format No. **4**
		M	*0*	*2*	*6*	*0*	*1*	*1*	*2*	

COURSE NAME	**Design of Machine Elements**
CO Description	**Explain fundamentals of design of machine elements.**
LO Description	Use mechanical design data book for design of machine elements.

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, condition for selection of factor of Safety, Stress Concentration, Causes & Remedies, Designation of materials as per IS, introduction to International standards, advantages of standardization, use of standards in design and preferred numbers series Use of design data book,	Interactive Classroom teaching, quiz	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz to make students practice their knowledge	5	0	Handouts, chalk board, PPT, text book, charts.	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory Exam	Students will be asked to make use of mechanical design data book for a given problem.	5	Question Paper + Rating Scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Nil

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code		Course Code		CO Code	LO Code	Format No. 4
		M	0	2	6	0 1	1 3	

COURSE NAME	Design of Machine Elements
CO Description	Explain fundamentals of design of machine elements.
LO Description	Explain theory of elastic failures, modern design considerations for a given design problem.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Theories of Elastic Failures, Principal normal stress theory, Maximum shear stress theory & Maximum distortion energy theory. Modern design considerations, Ergonomics & Aesthetic consideration in design, Ecology, Social consideration and concept of product design.	Interactive Classroom teaching, quiz	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz to make students practice their knowledge	5	0	Handouts, chalk board, PPT, manual, charts,	NIL

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory Exam	Students will be asked to explain a given theory of elastic failure/ design consideration for a product design problem.	5	Question Paper + Rating Scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Nil

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code		CO Code	LO Code	Format No. **4**
		M	*0*	*2*	*6*	*0*	*1 2*	*1*	

COURSE NAME	**Design of Machine Elements**
CO Description	**Design machine elements subject to direct loads, shear loads.**
LO Description	Calculate design stresses, parameters for joints, levers.

SCHEME OF STUDY

S. No	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
1	Design of Cotter Joint, Knuckle Joint Design of Levers- Hand/Foot Lever & Bell Crank Lever	Interactive classroom teaching, demonstration, quiz	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz to make students practice their knowledge	8	0	Handouts, chalk board, PPT, text book, charts,	

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 stresses, design parameters for Cotter Joint/Knuckle Joint/Hand or Foot Lever/Bell Crank Lever for a given loading.	10	Question Paper + Rating Scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Nil

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code		CO Code	LO Code	Format No. **4**
		M	*0*	*2*	*6*	*0*	*1*	*2*	*2*	

COURSE NAME	**Design of Machine Elements**
CO Description	**Design machine elements subjected to direct loads, shear loads.**
LO Description	Calculate design stresses, parameters for C–Clamp, Off-set links, Overhang Crank.

SCHEME OF STUDY

S.No	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
1	Design of C–Clamp, Off-set links, Overhang Crank	Interactive Classroom teaching, demonstration, quiz, assignments	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz and give assignments to make students practice their knowledge	6	0	Handouts, chalk board, PPT, text book, charts,	

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 design stresses, design parameters for C–Clamp/Off-set links/Overhang Crank for a given loading.	06	Question Paper + Rating Scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of Progressive – 2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code		CO Code	LO Code	Format No. **4**
		M	*0*	*2*	*6*	*0*	*1*	*2*	*3*	

COURSE NAME	Design of Machine Elements
CO Description	**Design machine elements subjected to direct loads, shear loads.**
LO Description	**Select a suitable bearing for a given application.**

SCHEME OF STUDY

S. No	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
	Antifriction Bearings: Classification of Bearings, sliding contact & Rolling contact, Terminology of Ball bearings, Life Load relationship, Basic static load rating and Basic dynamic load rating, Selection of ball bearings using manufacturer's catalogue.	Interactive Classroom teaching, demonstration, quiz, assignments	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz and give assignments to make students practice their knowledge	6	0	Handouts, chalk board, PPT, text book, charts,	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper-Pen Test	Students will be asked to select a bearing for a given application using manufacturing catalogue/data book.	04	Test Paper + Rating Scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of Progressive – 2

COURSE NAME	Design of Machine Elements
CO Description	Design machine elements subject to bending moments, twisting moments.
LO Description	Design a shaft

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
1	Introduction to pure bending, fundamental equation of pure bending viz: $M/I = f/y = E/R$ Types of Shafts, Shaft materials, Standard Sizes, Design of Shafts (Hollow and Solid) using strength and rigidity criteria,	Interactive Classroom teaching, demonstration, quiz, assignment	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz and give assignments to make students practice their knowledge	8	0	Handouts, chalk board, PPT, text book, charts,	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
	Theory Exam	Student will be asked to calculate design stresses, design parameters of a given shaft for given loading.	10	Question Paper + Rating Scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Nil

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code		CO Code	LO Code	Format No. **4**
		M	*0*	*2*	*6*	*0*	*1* *3*	*2*	

COURSE NAME	**Design of Machine Elements**
CO Description	**Design machine elements subject to bending moments, twisting moments.**
LO Description	Design keys, couplings

SCHEME OF STUDY

S. No	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
	Design of Sunk Keys (Rectangular and square), Effect of Keyways on strength of shaft, Design of Couplings – Muff Coupling, Protected type Flange Coupling.	Interactive Classroom teaching, demonstration, quiz	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz to make students practice their knowledge	7	0	Handouts, chalk board, PPT, text book, charts,	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
	Theory Exam	Student will be asked to calculate design stresses, design parameters given key/coupling for given loading.	10	Question Paper + Rating Scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Nil

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code		CO Code	LO Code	Format No. 4
		M	0	2	6	0	1	4	1	

COURSE NAME	Design of Machine Elements
CO Description	**Select a power screw, spur gear for given application.**
LO Description	Select a power screw for given application

<div align="center">SCHEME OF STUDY</div>

S. No.	Learning Content	T-L Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
	Basic concept of power screw, Thread Profiles used for power Screws, Relative merits and demerits of each, Torque required to overcome thread friction, Self-locking and overhauling. Efficiency of power screws, Types of stresses induced, Design of Screw Jack; Toggle Jack (Only screw and nut)	Interactive Classroom teaching, demonstration, quiz, assignment	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz and give assignments to make students practice their knowledge	7	0	Handouts, chalk board, PPT, text book, charts,	

<div align="center">SCHEME OF ASSESSMENT</div>

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
	Theory Exam	Students will be asked to select a power screw by calculating required design parameters for given conditions.	10	Question Paper + Rating Scale	External

<div align="center">ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)</div>

<div align="center">Nil</div>

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. **4**
		M	*0*	*2*	*6*	*0*	*1*	*4*	*2*	

COURSE NAME	**Design of Machine Elements**
CO Description	**Select a power screw, spur gear for given application.**
LO Description	Select a suitable spur gear for given application.

SCHEME OF STUDY

S. No.	Learning Content	T-L Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
	Spur gear design considerations, Lewis equation for static beam strength of spur gear teeth, Power transmission capacity of spur gears in bending	Interactive Classroom teaching, demonstration, quiz, assignment	Teacher will explain the contents and provide handout to students. The students will learn through practice.	6	0	Handouts, chalk board, PPT, charts,	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
	Paper-Pen Test	Students will be asked to select a spur gear for a given application using manufacturing catalogue/data book.	10	Test Paper + Rating Scale	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**
		M	*0*	*2*	*6*	*0*	*1 5*	*1*	

COURSE NAME	**Design of Machine Elements**
CO Description	**Design bolted joints, welded joints, springs**
LO Description	Design bolted joints, welded joints for given loading.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
	Stresses in Screwed fasteners, Bolts of Uniform Strength, Design of Bolted Joints subjected to eccentric loading, Design of Parallel and Transverse fillet welds, axially loaded symmetrical section, Merits and demerits of screwed and welded joints.	Interactive Classroom teaching, demonstration, quiz	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz to make students practice their knowledge	7	0	Handouts, chalk board, PPT, text book, charts,	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
	Theory Exam	Students will be asked to design (a) a bolted joint (b) a welded joint for given loading.	10	Question Paper + Rating Scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Nil

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. **4**
		M	*0*	*2*	*6*	*0*	*1*	*5*	*2*	

COURSE NAME	**Design of Machine Elements**
CO Description	**Design bolted, welded joints, springs**
LO Description	Calculate dimensions of a spring under given loading for a given application.

SCHEME OF STUDY

S. No.	Learning Content	T-L Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
	Design of springs: Classification and Applications of Springs, Spring terminology, Materials and Specifications, Stresses in springs, Wahl's correction factor, Deflection of springs, Energy stored in springs, Design of Helical, Tension and Compression springs subjected to uniform applied loads. like I.C. engine valves, Weighing balance, Railway buffers, Leaf springs- Construction and Application	Interactive Classroom teaching, demonstration, quiz	Teacher will explain the contents and provide handout to students. The students will learn through practice.	7	0	Handouts, chalk board, PPT, text book, charts,	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
	Theory Exam	Students will be asked to calculate dimensions of a spring under given loading for a given application.	10	Question Paper + Rating Scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Nil