RGPV(DiplomaWing)Bhopal	SEMESTERTEACHINGLEARNING&ASSESSMENTPLAN	FORMAT-6

NAMEOF PROGRAMME	THREEYEARSDIPLOMA	SCHEME	OBE	IMPLEMENTINGYEAR	2020-21

BRANCHCODE	A03	NAMEOF BRANCH	AUTOMOBILEENGINEERING	SEMESTER	FIFTH

S. No	COURSEDETAILS					T-LPLAN		ASSESSMENTPLAN								
	COURSE CODE	COURSE NAME	PAPER CODE	No. of COs	No. of LOs	Total T-L Hrs.	T-L Hrs. /Week	Internal Assessment		ExternalAssessment(UniversityExam)						Grand Total of Marks
										TheoryPaper			PracticalExam*			
								No.of LOs	Total Marks	No.of LOs	Total Marks	Duration	No.of LOs	Total Marks	Duration	
1	501	AUTODESIGN &DRAFTING	6956	05	15	120	08	05	50	07	70	03HRs.	03	30	03Hrs.	150
2	502	AUTO ELECTRICALS &ELECTRONICS	6957	05	15	120	08	05	50	07	70	03HRs.	03	30	03Hrs.	150
3	503	VEHICLE EMISSIONS &AIRCONDITIONING	6958	05	11	90	06	08	40	-	-	-	03	60	03Hrs	100
4	504	TRACTORS AND EARTH MOVERS	6959	04	12	105	07	05	30	07	70	03HRs.	-	-	-	100
5	505	PROFESSIONAL DEVELOPMENT-V		03	06	60	04	06	75	-	-	-	-	-	-	75
TOTAL				22	59	495	33	29	245	21	210	-	09	120	-	575
No.ofTheoryPapers												03	No.ofPracticalExams03			-

ExamforLOs(Psycho+Affect.)perbatch of20students*

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 1/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	501	Course Name	Auto Design & Drafting

Course Outcome 1	Student will be able to apply design related basic concepts in the given design problem situation	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain the various design related basic concepts with suitable examples**	9	10
Contents	Types of designs, design considerations, morphology of design, design optimization, factor of safety, factors governing FS, critical dimension, impact load and fatigue considerations, Interchangeability, standardization, limits, fits, tolerances, legal aspects of design.		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to conceptualize the design for the given simple machine element using the basic engineering design process**	11	10
Contents	Engineering design process, design need identification, analysis of design need, standards of performance and constraints, product design specifications, searching for design approach, conceptualizing design, assessing the conceptualized design for physical reliability, economic feasibility and utility. Design of keys, cotter, pins, bolts ,rivets, simple shaft, levers		
Method of Assessment	Theory exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 2/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	501	Course Name	Auto Design & Drafting

Course Outcome 2	Student will be able to apply appropriate design approach to design the given machine element	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to functionally design the given simple machine element**	8	10
Contents	Concept of design for function, functional requirements and constraints for any machine component, deciding shape, size, material selection and surface finish on basis of functional requirements		
Method of Assessment	Theory assignment		
Learning Outcome 2	**Student will be able to design the given simple machine element for its strength using IS Codes/Design data book/ design handbooks**	10	10
Contents	Concept of design for strength, strength requirements, and constrains for the component, different types of loading conditions, stress calculations at different portions / sections, critical dimension, factor of safety, material selection on basis of strength requirements, design of C-clamp, bell crank lever, overhang crank, arm of pulley, flange coupling		
Method of Assessment	Theory exam		
Learning Outcome 3	**Student will be able to design the given simple machine element using empirical relationships**	8	10
Contents	Concept of empirical design, empirical design relationships, procedure of developing empirical design relationships, sources of empirical design relationships, procedure for designing the component using empirical relationships, calculation of dimensions using empirical relationships for water jacket, cylinder head studs or bolts, crank shaft crank web, crank shaft sleeve bearing, design of knuckle and cotter joints		
Method of Assessment	Theory exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 3/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	501	Course Name	Auto Design & Drafting

Course Outcome 3	**Student will be able to follow the industrial design / drawing practice in solving the given design modification problem**	**T-L Hrs**	**Marks**
Learning Outcome 1	**Student will be able to design / draw the given simple machine component using any design / drawing software**	**12**	**5**
Contents	Design / drawing soft-wares and their benefits, introduction to various design drawing soft-wares, their salient features, settings, commands, viewing and editing the design created, practice for designing / drawing any simple machine component using any design/ drawing software.		
Method of Assessment	Theory assignment		
Learning Outcome 2	**Student will be able to explain the industrial design modification process with the help of examples**	**6**	**10**
Contents	Introduction to basic design modification process performed in the industry, different departments involved, examples of industrial design modification process for simple machine components, component design modification with the help of field failure data or lab research data		
Method of Assessment	Paper pen test		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 4/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	501	Course Name	Auto Design & Drafting

Course Outcome 4	Student will be able to design various automobile components	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to design the given simple engine component under given design conditions**	**10**	**10**
Contents	Study of important engine components regarding their working conditions and functional constraints, design for strength of cylinder head, cylinder, piston, piston pin, rocker arm		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to design the given simple chassis component under given design conditions**	**10**	**10**
Contents	Study of important chassis components regarding their working conditions and functional constraints, design for strength of single plate friction clutch, flywheel, simple internal expanding brake, helical tension & compression springs, leaf spring		
Method of Assessment	Theory exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 5/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	501	Course Name	Auto Design & Drafting

Course Outcome 5	Student will be able to select standard machine components and fasteners for the given design problem situation	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to select the appropriate bearing to be used in any automobile sub assembly**	10	10
Contents	Standardized machine components, examples, need and function of bearings, types of bearings and their uses, ball and roller bearings, series, specifications, codes for different standard ball bearings and roller bearings, procedure for selection of ball bearing for the given design situation		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to select the appropriate fastener to be used in any automobile sub assembly**	11	5
Contents	Various types of fasteners**,** their specific uses, examples, specifications, codes, series, general procedure for selection of common nuts, bolts and washers for the given design situation, selection of appropriate bolts, nuts and washers for the given design situation		
Method of Assessment	Theory assignment		

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

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to apply design related basic concepts in the given design problem situation**
LO Description	**Student will be able to explain the various design related basic concepts with suitable examples**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Types of designs, design considerations, morphology of design, design optimization, factor of safety, factors governing FS, critical dimension, impact load and fatigue considerations, Interchangeability, standardization, limits, fits, tolerances, legal aspects of design.	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	07	02	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One question will be asked in exam paper to explain the asked design related concepts with suitable examples	10	Framed question	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
		A	0	3	5	0	1	1	2	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to apply design related basic concepts in the given design problem situation**
LO Description	**Student will be able to conceptualize the design for the given simple machine element using the basic engineering design process**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Engineering design process, design need identification, analysis of design need, standards of performance and constraints, product design specifications, searching for design approach, conceptualizing design, assessing the conceptualized design for physical reliability, economic feasibility and utility. Design of keys, cotter, pins, bolts ,rivets, simple shaft, levers	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	08	03	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One question will be asked in exam paper in which student will design the simple machine component using design process, on basis of given standards of performance and location constraints	10	Framed question	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

A. Engineering design process:-

1. Describe the function of the element
2. Determine the shape of the element
3. Determine the forces on the element
4. Select the appropriate material
5. Determine the failure criteria
6. Determine geometric dimensions of the element
7. Design modification for manufacturing considerations
8. Preparing working drawing of element

B. Additional LR required is ‘Machine Design Data-book’ by Kamal Kumar and S. K. Dhagat , Khanna Publications

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	2	1	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to apply appropriate design approach to design the given machine element**
LO Description	**Student will be able to functionally design the given simple machine element**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Concept of design for function, functional requirements and constraints for any machine component, deciding shape, size, material selection and surface finish on basis of functional requirements	Traditional lecture method	Teacher will explain different concepts related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	05	03	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory assignment	One assignment will be given in which student will functionally design the given machine/ automobile component on basis of given description of its function and location constrains, along with sketches, reasons and justifications	10	Assignment Question and rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Functional design:- Every machine element is expected to perform certain task or function under certain location situation. Every new machine element is first designed for its functional design. Functional design basically deals with visualizing the shape, approx. surface finish and rough size of the element. Shape is the main aspect to be thought of. The designed shape should be justified. Functional design description includes

free hand sketches, rough dimensions and location situation drawings visualizing how the machine element working will work in the given situation.

Examples of functional design:- Design of tools, piston, connecting rod, flywheel, crank shaft, fasteners, engine head, engine block etc.

Why piston has particular cylindrical shape?

Why flywheel has disc like shape?

Why tools and fasteners have their unique shapes and sizes?

Procedure for functional design:-

1. Consider the part's purpose
2. Consider the part's function
3. Consider in which situation it will work (surroundings)
4. Consider how it will be used
5. Consider who will use it
6. Consider how does it handles mistakes (wrong use should not be harmful and there should be provision for resorting)
7. Creation, review and approval

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	2	2	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to apply appropriate design approach to design the given machine element**
LO Description	**Student will be able to design the given simple machine element for its strength using IS Codes/Design data book/ design handbooks**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Concept of design for strength, strength requirements, and constrains for the component, different types of loading conditions, stress calculations at different portions / sections, critical dimension, factor of safety, material selection on basis of strength requirements, design of C-clamp, bell crank lever, overhang crank, arm of pulley, flange coupling	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	07	03	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One question will be asked in which student will design the given machine component for strength on basis of given description of loading/ forces/ torque/ moments etc.	10	Question paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Additional LR required is ‘Machine Design Data-book’ by Kamal Kumar and S. K. Dhagat , Khanna Publications

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	2	3	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to apply appropriate design approach to design the given machine element**
LO Description	**Student will be able to design the given simple machine element using empirical relationships**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Concept of empirical design, empirical design relationships, procedure of developing empirical design relationships, sources of empirical design relationships, procedure for designing the component using empirical relationships, calculation of dimensions using empirical relationships for water jacket, cylinder head studs or bolts, crank shaft crank web, crank shaft sleeve bearing, design of knuckle and cotter joints	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	06	02	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One question will be asked in which student will design the given machine component for its strength under given design conditions using empirical relationship	10	Question paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

A. Empirical is something that is based solely on observation or experiment or experience. Empirical relationship between two variables is the relationship which is developed over years of experiences and works well but has no theoretical base. Empirical design is one which depends upon

use of empirical formulae based on the practice and past experience. The basis of empirical design is previous experience, without regard for any systematic theory. Its benefit is the ability to make expedient decisions on layout and sizing (and to communicate these decisions to the rest of the design team) prior to undertaking a detailed design. Following are examples of empirical relationships and formula used in designing engine components:-

1. Various dimensions related bolt joints
2. Thickness of cylinder wall
3. Thickness of water jacket wall
4. Water space between the outer wall and inner jacket wall
5. Thickness of cylinder dry liner
6. Cylinder flange thickness
7. Nominal or major diameter of cylinder head stud or bolt
8. Pitch circle diameter of cylinder head studs
9. Diameter of cup in the top of piston head
10. Thickness of piston head ribs
11. Piston top land
12. Piston ring land
13. Gap between free ends of the piston ring
14. Axial thickness of piston rings
15. Piston barrel thickness and piston wall thickness
16. Radial and vertical thickness of piston ring grooves
17. Inside to outside diameter ration of piston pin
18. Length of crank shaft sleeve bearing
19. Thickness and width of crank web

B. Additional LR required is ‘Machine Design Data-book’ by Kamal Kumar and S. K. Dhagat , Khanna Publications

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

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to follow the industrial design / drawing practice in solving the given design modification problem**
LO Description	**Student will be able to design / draw the given simple machine component using any design / drawing software**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Design / drawing soft-wares and their benefits, introduction to various design drawing soft-wares, their salient features, settings, commands, viewing and editing the design created, practice for designing / drawing any simple machine component using any design/ drawing software.	Traditional lecture method	Teacher will explain different concepts related to computer based designing and drawing, demonstrate procedure of using the software; students will practice to design /draw machine elements under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	07	05	Manual of concerned software operation	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory assignment	An assignment will be given to students in which students have to design /draw the given simple machine component using the available design /drawing software	05	Assignment question & Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

A. Few suggested design soft-wares are as below:-

20. CATIA
21. NX (from Siemens)

22. Pro/Engineer
23. SOLIDWORKS

B. Few suggested drawing / sketching soft-wares are as below:-

24. AutoCAD
25. Car Sketch Tool
26. ALIAS
27. VRED
28. MAYA

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	3	2	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to follow the industrial design / drawing practice in solving the given design modification problem**
LO Description	**Student will be able to explain the industrial design modification process with the help of examples**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
2.	Introduction to basic design modification process performed in the industry, different departments involved, examples of industrial design modification process for simple machine components, component design modification with the help of field failure data or lab research data	Traditional lecture method	Teacher will explain different learning contents with help of examples and cases. Teacher will give them assignments for practice, teacher will assess their knowledge and provide necessary remedial and tutorials for improvements	04	02	NIL	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
2.	Paper pen test	A test will be conducted to assess the learnt knowledge of the students	10	Test questions and rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Product improvement cycle:-

1. Complaint / deficiency / potential improvement observed in the component
2. Formation of component evaluation group comprising of representatives from design, assembly, production, service departments and supplier

3. Brief research on complaint/deficiency/ potential improvement by the group
4. Search of possible ways to improve the component by the group
5. Discussion on issues related to design, production, service, legal and cost of improved component by the group
6. Selection and finalization of way to improve the component by the group
7. Visualizing the new form of component by the group
8. Development of detailed specifications and drawing including detailed production and testing specifications by the group
9. Official Release of new specifications and drawing to all concern departments
10. Post production follow-up and feedback regarding performance of the component

Different departments involved:-

1. Production department
2. Assembly department
3. Design department
4. Service department
5. Vender

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

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to design various automobile components**
LO Description	**Student will be able to design the given simple engine component under given design conditions**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of important engine components regarding their working conditions and functional constraints, design for strength of cylinder head, cylinder, piston, piston pin, rocker arm	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will provide necessary remedial and tutorials	07	03	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One simple numerical question, based on use of formula, will be asked to design any one engine component to work under given conditions	10	Question paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

1. The design procedure will also include the designing using empirical relationships as per requirement
2. Additional LR required is ‘Machine Design Data-book’ by Kamal Kumar and S. K. Dhagat , Khanna Publications

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	4	2	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to design various automobile components**
LO Description	**Student will be able to design the given simple chassis component under given design conditions**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of important chassis components regarding their working conditions and functional constraints, design for strength of single plate friction clutch, flywheel, simple internal expanding brake, helical tension & compression springs, leaf spring	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will provide necessary remedial and tutorials	07	03	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One simple numerical question, based on use of formula, will be asked to design any one engine component to work under given conditions	10	Question paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

1. The design procedure will also include the designing using empirical relationships as per requirement
2. Additional LR required is ‘Machine Design Data-book’ by Kamal Kumar and S. K. Dhagat , Khanna Publications

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

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to select standard machine components and fasteners for the given design problem situation**
LO Description	**Student will be able to select the appropriate bearing to be used in any automobile sub assembly**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Standardized machine components, examples, need and function of bearings, types of bearings and their uses, ball and roller bearings, series, specifications, codes for different standard ball bearings and roller bearings, procedure for selection of ball bearing for the given design situation	Traditional lecture method	Teacher will explain different concepts related to contents, demonstrate methods of selection of bearings through examples and cases. Students will practice to select bearings under guidance of the teacher. Teacher will provide necessary remedial and tutorials	07	03	Commercial bearing selection manuals	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One simple question will be asked in which student will demonstrate selection procedure to select an appropriate ball bearing on basis of given data	10	Question paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

1. There are free soft copies of many commercial bearing selection manuals available on internet

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	5	2	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to select standard machine components and fasteners for the given design problem situation**
LO Description	**Student will be able to select the appropriate fastener to be used in any automobile sub assembly**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Various types of fasteners**,** their specific uses, examples, specifications, codes, series, general procedure for selection of common nuts, bolts and washers for the given design situation, selection of appropriate bolts, nuts and washers for the given design situation	Traditional lecture method	Teacher will explain different concepts related to contents, demonstrate methods of selection through examples and cases. Students will practice to select fastener under guidance of the teacher. Teacher will provide necessary remedial and tutorials	07	04	Commercial Fastener selection manuals	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory assignment	One simple question will be asked in which student will demonstrate selection procedure to select three appropriate bolts, nuts and washers on basis of given three sets of data	05	Question & rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

1. There are soft copies of many fastener selection manuals freely available on internet.

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

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to apply design related basic concepts in the given design problem situation**
LO Description	**Student will be able to explain the various design related basic concepts with suitable examples**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Types of designs, design considerations, morphology of design, design optimization, factor of safety, factors governing FS, critical dimension, impact load and fatigue considerations, Interchangeability, standardization, limits, fits, tolerances, legal aspects of design.	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	07	02	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One question will be asked in exam paper to explain the asked design related concepts with suitable examples	10	Framed question	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
		A	0	3	5	0	1	1	2	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to apply design related basic concepts in the given design problem situation**
LO Description	**Student will be able to conceptualize the design for the given simple machine element using the basic engineering design process**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Engineering design process, design need identification, analysis of design need, standards of performance and constraints, product design specifications, searching for design approach, conceptualizing design, assessing the conceptualized design for physical reliability, economic feasibility and utility. Design of keys, cotter, pins, bolts ,rivets, simple shaft, levers	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	08	03	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One question will be asked in exam paper in which student will design the simple machine component using design process, on basis of given standards of performance and location constraints	10	Framed question	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

A. Engineering design process:-

1. Describe the function of the element
2. Determine the shape of the element
3. Determine the forces on the element
4. Select the appropriate material
5. Determine the failure criteria
6. Determine geometric dimensions of the element
7. Design modification for manufacturing considerations
8. Preparing working drawing of element

B. Additional LR required is ‘Machine Design Data-book’ by Kamal Kumar and S. K. Dhagat , Khanna Publications

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	2	1	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to apply appropriate design approach to design the given machine element**
LO Description	**Student will be able to functionally design the given simple machine element**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Concept of design for function, functional requirements and constraints for any machine component, deciding shape, size, material selection and surface finish on basis of functional requirements	Traditional lecture method	Teacher will explain different concepts related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	05	03	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory assignment	One assignment will be given in which student will functionally design the given machine/ automobile component on basis of given description of its function and location constrains, along with sketches, reasons and justifications	10	Assignment Question and rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Functional design:- Every machine element is expected to perform certain task or function under certain location situation. Every new machine element is first designed for its functional design. Functional design basically deals with visualizing the shape, approx. surface finish and rough size of the element. Shape is the main aspect to be thought of. The designed shape should be justified. Functional design description includes

free hand sketches, rough dimensions and location situation drawings visualizing how the machine element working will work in the given situation.

Examples of functional design:- Design of tools, piston, connecting rod, flywheel, crank shaft, fasteners, engine head, engine block etc.

Why piston has particular cylindrical shape?

Why flywheel has disc like shape?

Why tools and fasteners have their unique shapes and sizes?

Procedure for functional design:-

1. Consider the part's purpose
2. Consider the part's function
3. Consider in which situation it will work (surroundings)
4. Consider how it will be used
5. Consider who will use it
6. Consider how does it handles mistakes (wrong use should not be harmful and there should be provision for resorting)
7. Creation, review and approval

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	2	2	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to apply appropriate design approach to design the given machine element**
LO Description	**Student will be able to design the given simple machine element for its strength using IS Codes/Design data book/ design handbooks**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Concept of design for strength, strength requirements, and constrains for the component, different types of loading conditions, stress calculations at different portions / sections, critical dimension, factor of safety, material selection on basis of strength requirements, design of C-clamp, bell crank lever, overhang crank, arm of pulley, flange coupling	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	07	03	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One question will be asked in which student will design the given machine component for strength on basis of given description of loading/ forces/ torque/ moments etc.	10	Question paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Additional LR required is ‘Machine Design Data-book’ by Kamal Kumar and S. K. Dhagat , Khanna Publications

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	2	3	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to apply appropriate design approach to design the given machine element**
LO Description	**Student will be able to design the given simple machine element using empirical relationships**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Concept of empirical design, empirical design relationships, procedure of developing empirical design relationships, sources of empirical design relationships, procedure for designing the component using empirical relationships, calculation of dimensions using empirical relationships for water jacket, cylinder head studs or bolts, crank shaft crank web, crank shaft sleeve bearing, design of knuckle and cotter joints	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	06	02	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One question will be asked in which student will design the given machine component for its strength under given design conditions using empirical relationship	10	Question paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

A. Empirical is something that is based solely on observation or experiment or experience. Empirical relationship between two variables is the relationship which is developed over years of experiences and works well but has no theoretical base. Empirical design is one which depends upon

use of empirical formulae based on the practice and past experience. The basis of empirical design is previous experience, without regard for any systematic theory. Its benefit is the ability to make expedient decisions on layout and sizing (and to communicate these decisions to the rest of the design team) prior to undertaking a detailed design. Following are examples of empirical relationships and formula used in designing engine components:-

1. Various dimensions related bolt joints
2. Thickness of cylinder wall
3. Thickness of water jacket wall
4. Water space between the outer wall and inner jacket wall
5. Thickness of cylinder dry liner
6. Cylinder flange thickness
7. Nominal or major diameter of cylinder head stud or bolt
8. Pitch circle diameter of cylinder head studs
9. Diameter of cup in the top of piston head
10. Thickness of piston head ribs
11. Piston top land
12. Piston ring land
13. Gap between free ends of the piston ring
14. Axial thickness of piston rings
15. Piston barrel thickness and piston wall thickness
16. Radial and vertical thickness of piston ring grooves
17. Inside to outside diameter ration of piston pin
18. Length of crank shaft sleeve bearing
19. Thickness and width of crank web

B. Additional LR required is ‘Machine Design Data-book’ by Kamal Kumar and S. K. Dhagat , Khanna Publications

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

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to follow the industrial design / drawing practice in solving the given design modification problem**
LO Description	**Student will be able to design / draw the given simple machine component using any design / drawing software**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Design / drawing soft-wares and their benefits, introduction to various design drawing soft-wares, their salient features, settings, commands, viewing and editing the design created, practice for designing / drawing any simple machine component using any design/ drawing software.	Traditional lecture method	Teacher will explain different concepts related to computer based designing and drawing, demonstrate procedure of using the software; students will practice to design /draw machine elements under guidance of the teacher. Teacher will assess their ability and provide necessary remedial and tutorials	07	05	Manual of concerned software operation	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory assignment	An assignment will be given to students in which students have to design /draw the given simple machine component using the available design /drawing software	05	Assignment question & Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

A. Few suggested design soft-wares are as below:-

20. CATIA
21. NX (from Siemens)

22. Pro/Engineer
23. SOLIDWORKS

B. Few suggested drawing / sketching soft-wares are as below:-

24. AutoCAD
25. Car Sketch Tool
26. ALIAS
27. VRED
28. MAYA

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	3	2	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to follow the industrial design / drawing practice in solving the given design modification problem**
LO Description	**Student will be able to explain the industrial design modification process with the help of examples**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
2.	Introduction to basic design modification process performed in the industry, different departments involved, examples of industrial design modification process for simple machine components, component design modification with the help of field failure data or lab research data	Traditional lecture method	Teacher will explain different learning contents with help of examples and cases. Teacher will give them assignments for practice, teacher will assess their knowledge and provide necessary remedial and tutorials for improvements	04	02	NIL	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
2.	Paper pen test	A test will be conducted to assess the learnt knowledge of the students	10	Test questions and rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Product improvement cycle:-

1. Complaint / deficiency / potential improvement observed in the component
2. Formation of component evaluation group comprising of representatives from design, assembly, production, service departments and supplier

3. Brief research on complaint/deficiency/ potential improvement by the group
4. Search of possible ways to improve the component by the group
5. Discussion on issues related to design, production, service, legal and cost of improved component by the group
6. Selection and finalization of way to improve the component by the group
7. Visualizing the new form of component by the group
8. Development of detailed specifications and drawing including detailed production and testing specifications by the group
9. Official Release of new specifications and drawing to all concern departments
10. Post production follow-up and feedback regarding performance of the component

Different departments involved:-

1. Production department
2. Assembly department
3. Design department
4. Service department
5. Vender

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

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to design various automobile components**
LO Description	**Student will be able to design the given simple engine component under given design conditions**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of important engine components regarding their working conditions and functional constraints, design for strength of cylinder head, cylinder, piston, piston pin, rocker arm	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will provide necessary remedial and tutorials	07	03	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One simple numerical question, based on use of formula, will be asked to design any one engine component to work under given conditions	10	Question paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

1. The design procedure will also include the designing using empirical relationships as per requirement
2. Additional LR required is ‘Machine Design Data-book’ by Kamal Kumar and S. K. Dhagat , Khanna Publications

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	4	2	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to design various automobile components**
LO Description	**Student will be able to design the given simple chassis component under given design conditions**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of important chassis components regarding their working conditions and functional constraints, design for strength of single plate friction clutch, flywheel, simple internal expanding brake, helical tension & compression springs, leaf spring	Traditional lecture method	Teacher will explain different concepts and formulas related to contents, demonstrate methods of solving different problems. Students will practice to solve problems under guidance of the teacher. Teacher will provide necessary remedial and tutorials	07	03	Book:- Machine Design by R. S. Khurmi Or Its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One simple numerical question, based on use of formula, will be asked to design any one engine component to work under given conditions	10	Question paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

1. The design procedure will also include the designing using empirical relationships as per requirement
2. Additional LR required is ‘Machine Design Data-book’ by Kamal Kumar and S. K. Dhagat , Khanna Publications

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

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to select standard machine components and fasteners for the given design problem situation**
LO Description	**Student will be able to select the appropriate bearing to be used in any automobile sub assembly**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Standardized machine components, examples, need and function of bearings, types of bearings and their uses, ball and roller bearings, series, specifications, codes for different standard ball bearings and roller bearings, procedure for selection of ball bearing for the given design situation	Traditional lecture method	Teacher will explain different concepts related to contents, demonstrate methods of selection of bearings through examples and cases. Students will practice to select bearings under guidance of the teacher. Teacher will provide necessary remedial and tutorials	07	03	Commercial bearing selection manuals	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory exam	One simple question will be asked in which student will demonstrate selection procedure to select an appropriate ball bearing on basis of given data	10	Question paper	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

1. There are free soft copies of many commercial bearing selection manuals available on internet

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	1	5	2	

COURSE NAME	**Auto Design & Drafting**
CO Description	**Student will be able to select standard machine components and fasteners for the given design problem situation**
LO Description	**Student will be able to select the appropriate fastener to be used in any automobile sub assembly**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Various types of fasteners**,** their specific uses, examples, specifications, codes, series, general procedure for selection of common nuts, bolts and washers for the given design situation, selection of appropriate bolts, nuts and washers for the given design situation	Traditional lecture method	Teacher will explain different concepts related to contents, demonstrate methods of selection through examples and cases. Students will practice to select fastener under guidance of the teacher. Teacher will provide necessary remedial and tutorials	07	04	Commercial Fastener selection manuals	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1.	Theory assignment	One simple question will be asked in which student will demonstrate selection procedure to select three appropriate bolts, nuts and washers on basis of given three sets of data	05	Question & rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

1. There are soft copies of many fastener selection manuals freely available on internet.

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 1/5

Branch	AUTOMOBILE ENGINEERING	Semester	Fifth

Course Code	502	Course Name	Auto Electricals & Electronics

Course Outcome 1	Student will be able to explain the theory, construction, working and main components of the starting system for the given vehicle	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain theory / circuit / construction / working / components of the starting system of given vehicle with help of line diagram**	**10**	**10**
Contents	Requirements of starting system, basic car starting circuit, , need of starting drive units, bendix, pr-engauged, permanent magnet, folothru and overrunning clutch drives		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to explain the construction, circuit and working of given starting motor**	**6**	**10**
Contents	Requirements and characteristics of the starting motor, study of starting motor regarding theory, construction, working and major components, types of starting motors		
Method of Assessment	Theory assignment		
Learning Outcome 3	**Student will be able to identify major components of the given car starting system**	**7**	**10**
Contents	Study of major components of the common car starting systems regarding their location, purpose, construction and function		
Method of Assessment	Practical exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 2/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	502	Course Name	Auto Electricals & Electronics

Course Outcome 2	Student will be able to explain the theory, construction, working and main components of the charging and auxiliary system for the given vehicle	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain theory / circuit/ /construction / working components of the charging system of given vehicle with help of line diagram**	**10**	**20**
Contents	Need and requirements of charging system, basic charging system for the car, alternators and charging circuits, rectification of AC to DC, regulation of output voltage, theory, study of alternator regarding construction, working and components		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to explain theory / circuit / construction / working and components of lighting / auxiliary system**	**7**	**10**
Contents	Various types of lights in a car, their circuits, , functions of turn, stop, and hazard warning lights types of headlights, circuits and components used in operation of speedometer, horn, wiper system, types of fuel gauges, oil pressure gauges & engine temperature gauges etc.		
Method of Assessment	Theory exam		
Learning Outcome 3	**Student will be able to identify major components of given charging system / voltage regulators / auxiliary systems**	**7**	**10**
Contents	Study of major components of the charging system, voltage regulators and auxiliary systems of common car regarding their location, purpose, construction and function		
Method of Assessment	Practical exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 3/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	502	Course Name	Auto Electricals & Electronics

Course Outcome 3	Student will be able to explain the theory, construction, working and main components of the ignition system for the given vehicle	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain theory / circuit /construction / working / components of the ignition system of given vehicle**	**8**	**10**
Contents	Need and requirements of ignition system, basic ignition circuit for car, construction and working of car ignition system, types of spark plugs, their construction, ignition coil, types of distributors, spark advance, types of spark advances, electronic ignition system, electronic spark control/ spark advance control, distributor-less ignition		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to identify the major components of the ignition system of given vehicle**	**7**	**10**
Contents	Study of major components of the ignition system of common car regarding their location, purpose, construction and function		
Method of Assessment	Practical exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 4/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	502	Course Name	Auto Electricals & Electronics

Course Outcome 4	Student will be able to explain the theory, construction, working and components of the battery and wiring system for the given vehicle	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain theory, construction, working and components of the given automobile battery**	8	10
Contents	Principle and construction of lead acid battery, principle and construction of batteries used in electric vehicles, characteristics of good battery, rating, capacity and efficiency of batteries, various tests on batteries, charging methods and equipments		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to perform tests on given battery for determining its condition**	6	10
Contents	Fitting and removing the battery, charging of battery, measurement of cell voltage, test for serviceability by means of high rate discharge tester and hydrometer, measuring the battery capacity and comparing the results with its rated output		
Method of Assessment	Practical assignment		
Learning Outcome 3	**Student will be able to explain the wiring circuit diagram / wiring system / different components of the wiring system of the given vehicle**	7	10
Contents	Wire strips, wiring harness, ribbon cables, specifications, color codes for circuits, circuit numbers printed circuits, relay controls, multi-pin plugs, rubber grommets, terminals, crimp connectors, special or multiple sleeve connectors, strip or cable connectors, fuses		
Method of Assessment	Theory assignment		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 5/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	502	Course Name	Auto Electricals & Electronics

Course Outcome 5	Student will be able to explain the theory, circuit, construction and working of the electrical system for the given electric and hybrid vehicle	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain theory, circuit, construction and working of the electrical system for the given electric / hybrid vehicle**	**9**	**10**
Contents	Theory, circuit, construction and working of electrical drive system of common electric and electric-hybrid vehicles, major components, characteristics of electric traction motor, chopper control of motor, SRM drives		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to compare electric vehicle and electric hybrid vehicle regarding construction, working, merits and limitations**	**6**	**10**
Contents	Comparison of electrical systems of electric vehicle and electric hybrid vehicle* regarding construction, working, merits and limitations		
Method of Assessment	Theory assignment		
Learning Outcome 3	**Student will be able to identify major components of electrical system for the given electric / hybrid vehicle**	**7**	**10**
Contents	Study of major components of the electrical systems of electric vehicles and electric hybrid vehicles regarding purpose, location and function		
Method of Assessment	Practical assignment		

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		A	0	3	5	0	2	1	1	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, construction, working and main components of the starting system for the given vehicle**
LO Description	**Student will be able to explain theory / circuit / construction / working / components of the starting system of given vehicle with help of line diagram**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Requirements of starting system, basic car starting circuit, , need of starting drive units, bendix, pr-engauged, permanent magnet, folothru and overrunning clutch drives	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	07	03	Kholi.P.L "Automotive Electrical Equipment", Tata McGraw-Hill Co., Ltd., New Delhi or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One question related to the learned content will be asked in the university question paper	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
		A	0	3	5	0	2	1	2	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, construction, working and main components of the starting system for the given vehicle**
LO Description	**Student will be able to explain the construction, circuit and working of given starting motor**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Requirements and characteristics of the starting motor, study of starting motor regarding theory, construction, working and major components, types of starting motors	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	04	02	Kholi.P.L "Automotive Electrical Equipment", Tata McGraw-Hill Co., Ltd., New Delhi or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory assignment	Two questions related to the learned content will be asked in the assignment	10	Test paper, Check list	Internal

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
		A	0	3	5	0	2	1	3	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, construction, working and main components of the starting system for the given vehicle**
LO Description	**Student will be able to identify major components of the given car starting system**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of major components of the common car starting systems regarding their location, purpose, construction and function	Lab demonstration method	Teacher will demonstrate major components inside the lab to students, students will practice, provide quiz, assignment etc., teacher will conduct remedial and tutorials	04	03	System/ components/ diagrams/ charts/ posters	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Practical exam	The student will be asked to identify five components and state their purpose, function and location in the system	10	System/ components/ diagrams/ charts/ posters	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
		A	0	3	5	0	2	2	1	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, construction, working and main components of the charging and auxiliary system for the given vehicle**
LO Description	**Student will be able to explain theory / circuit/ /construction / working components of the charging system of given vehicle with help of line diagram**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Need and requirements of charging system, basic charging system for the car, alternators and charging circuits, rectification of AC to DC, regulation of output voltage, theory, study of alternator regarding construction, working and components	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	07	03	Kholi.P.L "Automotive Electrical Equipment", Tata McGraw-Hill Co., Ltd., New Delhi or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	Two questions related to the learned content will be asked in the university question paper	20	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
		A	0	3	5	0	2	2	2	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, construction, working and main components of the charging and auxiliary systems for the given vehicle**
LO Description	**Student will be able to explain theory / circuit / construction / working and components of lighting / auxiliary system**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Various types of lights in a car, their circuits, , functions of turn, stop, and hazard warning lights types of headlights, circuits and components used in operation of speedometer, horn, wiper system, types of fuel gauges, oil pressure gauges & engine temperature gauges etc.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	05	02	Young A.P. & Griffiths. L. "Auto. Electrical Equipment", ELBS & New Press or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One question related to the learned content will be asked in the university question paper	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
		A	0	3	5	0	2	2	3	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, construction, working and main components of the charging and auxiliary systems for the given vehicle**
LO Description	**Student will be able to identify major components of given charging system / voltage regulators / auxiliary systems**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of major components of the charging system, voltage regulators and auxiliary systems of common car regarding their location, purpose, construction and function	Lab demonstration method	Teacher will demonstrate major components inside the lab to students, students will practice, provide quiz, assignment etc., teacher will conduct remedial and tutorials	04	03	Systems/ components/ diagrams/ charts/ posters	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Practical exam	The student will be asked to identify five components and state their purpose, function and location in the system	10	Systems/ components/ diagrams/ charts/ posters	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
		A	0	3	5	0	2	3	1	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, construction, working and main components of the ignition system for the given vehicle**
LO Description	**Student will be able to explain theory / circuit /construction / working / components of the ignition system of given vehicle**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Need and requirements of ignition system, basic ignition circuit for car, construction and working of car ignition system, types of spark plugs, their construction, ignition coil, types of distributors, spark advance, types of spark advances, electronic ignition system, electronic spark control/ spark advance control, distributor-less ignition	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	06	02	Kholi.P.L "Automotive Electrical Equipment", Tata McGraw-Hill Co., Ltd., New Delhi or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One question related to the learned content will be asked in the university question paper	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
		A	0	3	5	0	2	3	2	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, circuit, construction, working and components of the ignition system for the given vehicle**
LO Description	**Student will be able to identify the major components of the ignition system of given vehicle**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of major components of the ignition system of common car regarding their location, purpose, construction and function	Lab demonstration method	Teacher will demonstrate major components inside the lab to students, students will practice, provide quiz, assignment etc., teacher will conduct remedial and tutorials	04	03	System/ components/ diagrams/ charts/ posters	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Practical exam	The student will be asked to identify five components and state their purpose, function and location in the system	10	System/ components/ diagrams/ charts/ posters	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
		A	0	3	5	0	2	4	1	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, construction, working and components of the battery and wiring system for the given vehicle**
LO Description	**Student will be able to explain theory, construction, working and components of the given automobile battery**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Principle and construction of lead acid battery, principle and construction of batteries used in electric vehicles, characteristics of good battery, rating, capacity and efficiency of batteries, various tests on batteries, charging methods and equipments	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	06	02	Kholi.P.L "Automotive Electrical Equipment", Tata McGraw-Hill Co., Ltd., New Delhi or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One question related to the learned content will be asked in the university question paper	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
		A	0	3	5	0	2	4	2	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, construction, working and components of the battery and wiring system for the given vehicle**
LO Description	**Student will be able to perform tests on given battery for determining its 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.	Fitting and removing the battery, charging of battery, measurement of cell voltage, test for serviceability by means of high rate discharge tester and hydrometer, measuring the battery capacity and comparing the results with its rated output	Lab demonstration method	Teacher will demonstrate procedures and tests to students, students will practice under guidance of teacher, teacher will improve their performance through feedback and suggestions, teacher will conduct remedial and tutorials	04	02	Battery/ charger/ fitting and testing instruments	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Practical assignment	The student will be asked to perform any one activity either fitting or removing or charging the battery AND will perform any one asked test in front of teacher	10	Battery/ charger/ fitting and testing instruments	Internal

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
		A	0	3	5	0	2	4	3	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, construction, working and components of the battery and wiring system for the given vehicle**
LO Description	**Student will be able to explain the wiring circuit diagram / wiring system / different components of the wiring system of the given vehicle**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Wire strips, wiring harness, ribbon cables, specifications, color codes for circuits, circuit numbers printed circuits, relay controls, multi-pin plugs, rubber grommets, terminals, crimp connectors, special or multiple sleeve connectors, strip or cable connectors, fuses	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	04	03	Kholi.P.L "Automotive Electrical Equipment", Tata McGraw-Hill Co., Ltd., New Delhi or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory assignment	Two questions related to the learned content will be given in the assignment	10	Assignment questions, Rating scale	Internal

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
		A	0	3	5	0	2	5	1	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, circuit, construction and working of the electrical system for the given electric and hybrid vehicle**
LO Description	**Student will be able to explain theory, circuit, construction and working of the electrical system for the given electric / hybrid vehicle**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Theory, circuit, construction and working of electrical drive system of common electric and electric-hybrid vehicles, major components, characteristics of electric traction motor, chopper control of motor, SRM drives	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	07	02	M. Ehsani, Y. Gao, S. Gay and Ali Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, CRC Press, 2005 or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One question related to the learned content will be asked in the university question paper	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
		A	0	3	5	0	2	5	2	

COURSE NAME	**Auto Electrical & Electronics**
CO Description	**Student will be able to explain theory, construction and working of electrical system of the electric and hybrid electric vehicle.**
LO Description	**Student will be able to compare electric vehicle and electric hybrid vehicle regarding construction, working, merits and limitations**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Comparison of electrical systems of electric vehicle and electric hybrid vehicle* regarding construction, working, merits and limitations	Lab demonstration	Teacher will demonstrate the contents to the students. Students will practice under the guidance of teacher	04	02	M. Ehsani, Y. Gao, S. Gay and Ali Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, CRC Press, 2005 or its equivalent	If necessary teacher will suggest video link, learning resources *two and four wheelers

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory assignment	An assignment will be given to students to compare the electrical system of electric and electric hybrid vehicles	10	Assignment question, rating scale	Internal

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
		A	0	3	5	0	2	5	3	

COURSE NAME	**Auto Electricals & Electronics**
CO Description	**Student will be able to explain the theory, circuit, construction and working of the electrical system for the given electric and hybrid vehicle**
LO Description	**Student will be able to identify major components of electrical system for the given electric / hybrid vehicle**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of major components of the electrical systems of electric vehicles and electric hybrid vehicles regarding purpose, location and function	Lab demonstration method	Teacher will demonstrate major components inside the lab to students, students will practice, provide quiz, assignment etc., teacher will conduct remedial and tutorials	04	03	Systems/ components / diagrams/ charts/ posters	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Practical assignment	The student will be asked to identify five components and state their purpose, function and location in the system	10	Systems/ components/ diagrams/ charts/ posters	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

NIL

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 1/5

Branch	AUTOMOBILE ENGINEERING	Semester	Fifth

Course Code	503	Course Name	Vehicle Emissions & Air Conditioning

Course Outcome 1	Student will be able to demonstrate his / her knowledge about control of pollutants in engine exhaust emissions	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain the mechanism of formation of exhaust pollutants in SI and CI engines**	7	10
Contents	Pollutant formation in SI and CI Engines, mechanism of HC and CO formation, NOx formation, smoke and particulate emissions, effects of design and operating variables on engine emissions		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to explain the construction /working /components of systems for recovery of leaked hydrocarbons and blow-by gases**	10	15
Contents	Sources of vapor leakages, vapor recovery systems, fuel vapor return line, charcoal canister, vapor separation from fuel, sealed fuel tanks, vapor storage in crank case, expansion tank. need of removing blow-by gases, Open & Closed crankcase ventilation system, function of PCV valve, Construction & working of PCV valve.		
Method of Assessment	Theory exam		
Learning Outcome 3	**Student will be able to identify major components of commonly used vapor recovery systems / PCV valve**	8	10
Contents	Study of major components of fuel vapor return line, charcoal canister, vapor separation from fuel, sealed fuel tanks, vapor storage in crank case, expansion tank. Open & Closed crankcase ventilation system, PCV valve regarding their location, construction and function		
Method of Assessment	Practical exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 2/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	503	Course Name	Vehicle Emissions & Air Conditioning

Course Outcome 2	Student will be able to explain the various techniques to control pollutants in exhaust gases	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain different method to improve combustion quality and reduction in emission.**	7	10
Contents	Various methods to improve combustion quality, efficient control of A/F Ratio, faster acting choke, reducing combustion chamber surface area, compression ratio, increasing combustion temperature, valve overlap, control of vacuum advance, Electronic engine control and microprocessor based engine control, Non conventional vehicles.		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to explain the theory/ construction / working /components of electronic engine control system and various types of catalytic convertors**	10	20
Contents	Study of electronic engine control systems, micro-processor based systems and various types of catalytic converters regarding their theory/construction/ working/ components		
Method of Assessment	Theory assignment		
Learning Outcome 3	**Student will be able to identify major components of electronic engine control systems and commonly used catalytic converters**	8	10
Contents	Study of main components of Electronic engine control and microprocessor based engine control, commonly used catalytic converters		
Method of Assessment	Practical exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 3/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	503	Course Name	Vehicle Emissions & Air Conditioning

Course Outcome 3	Student will be able to measure the exhaust emissions of given vehicle	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain the theory / construction / working / components of commonly used gas analyzers and smoke meters**	**8**	**15**
Contents	Concept of exhaust measurement for S.I and C.I engines, smoke testing for S.I and C. I. engines. Measurement of CO, HC and NOx. Study of commonly used gas analysers and smoke meters regarding their theory/ construction/ working/ components		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to measure the exhaust emissions of given vehicle using gas analyzer / smoke meter**	**8**	**10**
Contents	Concept of exhaust measurement for S.I and C.I engines, gas analysis and smoke testing for S.I and C. I. engines, measurement of CO, HC and NOx. and opacity using the available gas analyzer and smoke meter		
Method of Assessment	Practical assignment		
Learning Outcome 3	**Student will be able to identify the causes of pollutants in given exhaust measurement report and suggest the appropriate treatment to reduce the level of pollutants**	**9**	**10**
Contents	Assessment of nature and composition of pollutants in exhaust through study of available data such as color of the exhaust, measured values of CO, HC and NOx. and opacity, recommending treatment required to reduce the pollutants in the exhaust		
Method of Assessment	Theory assignment		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 4/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	503	Course Name	Vehicle Emissions & Air Conditioning

Course Outcome 4	Student will be able to explain the construction/working/components/control mechanism of a car air conditioning system.	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain the construction/working/components of a car air-conditioning system.**	**8**	**10**
Contents	Human comfort, air conditioning, variables to be controlled, theory of air conditioning, theory, construction, working and components of basic air conditioning system, theory, construction, working, components of common car air conditioning system.		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to identify the main components of the given car air conditioning system.**	**7**	**10**
Contents	Study of major components of common car air conditioning system regarding their location, purpose, function and relative position with other neighbor components		
Method of Assessment	Practical exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 5/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	503	Course Name	Vehicle Emissions & Air Conditioning

Course Outcome 5	Student will be able to recharge the refrigerant in the given car air conditioning system	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain the important characteristics of commonly used refrigerants for car AC system**	**6**	**10**
Contents	Need and importance of refrigerants, important characteristics of refrigerants, types of refrigerants and their codes, study of important characteristics of refrigerants used in common car AC system		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to follow the SOP for testing and recharging the given car AC system**	**9**	**10**
Contents	Introduction to refrigerant charging and re-charging, tools and equipments required for re-charging the refrigerant in car AC system, SOP for recharging the car AC system		
Method of Assessment	Practical assignment		

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

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to demonstrate his / her knowledge about control of pollutants in engine exhaust emissions**
LO Description	**Student will be able to explain the mechanism of formation of exhaust pollutants in SI and CI engines**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Pollutant formation in SI and CI Engines, mechanism of HC and CO formation, NOx formation, smoke and particulate emissions, effects of design and operating variables on engine emissions	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	05	02	**B.P Pundir** "Engine Emissions", Pub.: Alpha Science Int. Ltd. Or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One question related to the learned content will be asked in the university question paper	10	Question paper, Check list	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
		A	0	3	5	0	3	1	2	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to demonstrate his / her knowledge about control of pollutants in engine exhaust emissions**
LO Description	**Student will be able to explain the construction /working /components of systems for recovery of leaked hydrocarbons and blow-by gases**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Sources of vapor leakages, vapor recovery systems, fuel vapor return line, charcoal canister, vapor separation from fuel, sealed fuel tanks, vapor storage in crank case, expansion tank. need of removing blow-by gases, Open & Closed crankcase ventilation system, function of PCV valve, Construction & working of PCV valve.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	07	03	**B.P Pundir** "Engine Emissions", Pub.: Alpha Science Int. Ltd. Or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One and half question related to the learned content will be asked in the university question paper	15	Question paper, Check list	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
		A	0	3	5	0	3	1	3	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to demonstrate his / her knowledge about control of pollutants in engine exhaust emissions**
LO Description	**Student will be able to identify major components of commonly used vapor recovery systems / PCV valve**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of major components of fuel vapor return line, charcoal canister, vapor separation from fuel, sealed fuel tanks, vapor storage in crank case, expansion tank. Open & Closed crankcase ventilation system, PCV valve regarding their location, construction and function	Lab demonstration method	Teacher will demonstrate major components inside the lab to students, students will practice, provide quiz, assignment etc., teacher will conduct remedial and tutorials	05	03	Systems/ components/ diagrams/ charts/ posters	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Practical exam	The student will be asked to identify five components and state their purpose, function and location in the system	10	Systems/ components/ diagrams/ charts/ posters	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
		A	0	3	5	0	3	2	1	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to explain the various techniques to control pollutants in exhaust gases**
LO Description	**Student will be able to explain different method to improve combustion quality and reduction in emission.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Various methods to improve combustion quality, efficient control of A/F Ratio, faster acting choke, reducing combustion chamber surface area, compression ratio, increasing combustion temperature, valve overlap, control of vacuum advance, Electronic engine control and microprocessor based engine control, Non conventional vehicles.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	05	02	**B.P Pundir** "Engine Emissions", Pub.: Alpha Science Int. Ltd. Or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One question related to the learned content will be asked in the university question paper	10	Question paper, Check list	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
		A	0	3	5	0	3	2	2	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to explain the various techniques to control pollutants in exhaust gases**
LO Description	**Student will be able to explain the theory/ construction / working /components of electronic engine control system and various types of catalytic convertors**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of electronic engine control systems, micro-processor based systems and various types of catalytic converters regarding their theory/construction/ working/ components	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	07	03	**B.P Pundir** "Engine Emissions", Pub.: Alpha Science Int. Ltd. Or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory assignment	Two questions related to the learned content will be asked in the theory assignment	20	Assignment question, rating scale	Internal

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
		A	0	3	5	0	3	2	3	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to explain the various techniques to control pollutants in exhaust gases**
LO Description	**Student will be able to identify major components of electronic engine control systems and commonly used catalytic converters**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of main components of Electronic engine control and microprocessor based engine control, commonly used catalytic converters	Lab demonstration method	Teacher will demonstrate major components inside the lab to students, students will practice, provide quiz, assignment etc., teacher will conduct remedial and tutorials	05	03	Systems/ components/ diagrams/ charts/ posters	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Practical exam	The student will be asked to identify five components and state their purpose, function and location in the system	10	Systems/ components/ diagrams/ charts/ posters	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
		A	0	3	5	0	3	3	1	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to measure the exhaust emissions of given vehicle**
LO Description	**Student will be able to explain the theory / construction / working / components of commonly used gas analyzers and smoke meters**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Concept of exhaust measurement for S.I and C.I engines, smoke testing for S.I and C. I. engines. Measurement of CO, HC and NOx. Study of commonly used gas analysers and smoke meters regarding their theory/ construction/ working/ components	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	06	02	**B.P Pundir** "Engine Emissions", Pub.: Alpha Science Int. Ltd. Or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One and half questions related to the learned content will be asked in the university question paper	15	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
		A	0	3	5	0	3	3	2	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to measure the exhaust emissions of given vehicle**
LO Description	**Student will be able to measure the exhaust emissions of given vehicle using gas analyzer / smoke meter**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Concept of exhaust measurement for S.I and C.I engines, gas analysis and smoke testing for S.I and C. I. engines, measurement of CO, HC and NOx. and opacity using the available gas analyzer and smoke meter	Lab demonstration method	Teacher will demonstrate the method of exhaust measurement to students, students will practice, teacher will conduct remedial and tutorials to improve their performance	05	03	Exhaust measuring instruments and accessories, vehicles	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Practical assignment	The student will be asked to measure any two parameters related to exhaust using appropriate instrument for given vehicle	10	Exhaust measuring instruments and accessories, vehicles	Internal

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
		A	0	3	5	0	3	3	3	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to measure the exhaust emissions of given vehicle**
LO Description	**Student will be able to identify the causes of pollutants in given exhaust measurement report and suggest the appropriate treatment to reduce the level of pollutants**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Assessment of nature and composition of pollutants in exhaust through study of available data such as color of the exhaust, measured values of CO, HC and NOx. and opacity, recommending treatment required to reduce the pollutants in the exhaust	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	06	03	**B.P Pundir** "Engine Emissions", Pub.: Alpha Science Int. Ltd. Or its equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory assignment	A set of data regarding pollution level measured in a given vehicle, will be provided to the student group and they will analyze and interpret the data to find the causes and suggest the treatment	10	Case study, rating scale	Internal

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
		A	0	3	5	0	3	4	1	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to explain the construction/working/components/control mechanism of a car air conditioning system.**
LO Description	**Student will be able to explain the construction/working/components of a car air- conditioning system.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Human comfort, air conditioning, variables to be controlled, theory of air conditioning, theory, construction, working and components of basic air conditioning system, theory, construction, working, components of common car air conditioning system.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	06	02	**Book:** Refrigeration & Air Conditioning by R. S. Khurmi OR equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One question related to the learned content will be asked in the university question paper	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
		A	0	3	5	0	3	4	2	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to explain the construction/working/components/control mechanism of a car air conditioning system.**
LO Description	**Student will be able to identify the main components of the given car air conditioning system.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Study of major components of common car air conditioning system regarding their location, purpose, function and relative position with other neighbor components	Lab demonstration method	Teacher will demonstrate major components inside the lab to students, students will practice, provide quiz, assignment etc., teacher will conduct remedial and tutorials	04	03	System/ components/ diagrams/ charts/ posters	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Practical exam	The student will be asked to identify five components and state their purpose, function and location in the system	10	System/ components/ diagrams/ charts/ posters	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
		A	0	3	5	0	3	5	1	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to recharge the refrigerant in the given car air conditioning system**
LO Description	**Student will be able to explain the important characteristics of commonly used refrigerants for car AC system**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Need and importance of refrigerants, important characteristics of refrigerants, types of refrigerants and their codes, study of important characteristics of refrigerants used in common car AC system	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc., conduct remedial and tutorials	04	02	**Book:** Refrigeration & Air Conditioning by R. S. Khurmi OR equivalent	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One question related to the learned content will be asked in the university question paper	10	Question paper, Check list	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
		A	0	3	5	0	3	5	2	

COURSE NAME	**Vehicle Emissions & Air Conditioning**
CO Description	**Student will be able to recharge the refrigerant in the given car air conditioning system**
LO Description	**Student will be able to follow the SOP for testing and recharging the given car AC system**

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 to refrigerant charging and re-charging, tools and equipments required for re-charging the refrigerant in car AC system, SOP for recharging the car AC system	Laboratory demonstration method	Teacher will demonstrate the procedure of recharging the car AC system, he will explain the purpose / function of various tools and equipments used in re-charging, students will practice to re-charge under guidance of teacher, teacher will correct /improve their performance through feedback / suggestions.	06	03	Car AC system/ related tools and equipments	Teacher will suggest more video links, LRs to assist in learning

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Practical assignment	Student will be asked to demonstrate the SOP to recharge the given car AC system	10	Car AC system/ related tools and equipments	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

NIL

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 1/5

Branch	AUTOMOBILE ENGINEERING	Semester	Fifth

Course Code	504	Course Name	TRACTORS AND EARTHMOVERS

Course Outcome 1	Student will be able to explain the construction/ working/ components of the given hydraulic control system	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain the construction / working/ components of the basic hydraulic control circuit**	7	10
Contents	Introduction to basic hydraulic control system, purpose, construction, working and components with schematic &flow diagram and applications		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to identify the main components of the given hydraulic control system**	7	10
Contents	Main components used in basic hydraulic control systems, their purpose, construction with neat sketch and working		
Method of Assessment	Laboratory exam		
Learning Outcome 3	**Student will be able to develop simple hydraulic control circuit for the given purpose and operational conditions**	7	10
Contents	Introduction to development of various types of simple logical control circuits for the given purpose and operational conditionsin hydraulics mode.		
Method of Assessment	Theory exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 2/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	504	Course Name	TRACTORS AND EARTHMOVERS

Course Outcome 2	Student will be able to explain the construction / working /systems / components / specifications of the given tractor	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to classify the various tractors on basis of their use / technology adopted/ special features**	**10**	**15**
Contents	Introduction, development, purpose, applications and classifications of tractor on the basis of various features.		
Method of Assessment	Paper-pen test		
Learning Outcome 2	**Student will be able to explain the construction / working/ systems / components / specifications of the basic tractor**	**7**	**10**
Contents	Working of various systems of basic tractor with layout. Main components and their functions. Technical specifications of basic tractor.		
Method of Assessment	Theory exam		
Learning Outcome 3	**Student will be able to identify various system / components of the given tractor**	**7**	**10**
Contents	Demonstration of various system and components of a tractor		
Method of Assessment	Laboratory exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 3/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	504	Course Name	TRACTORS AND EARTHMOVERS

Course Outcome 3	**Student will be able to explain the construction / working/ components of the special purpose systems of the given tractor**	**T-L Hrs**	**Marks**
Learning Outcome 1	**Student will be able to explain construction/ working / main components of the transmission system / power take off unit / hydraulic control system / ballasting of the given tractor**	**13**	**20**
Contents	Main components of the transmission system, gear shift pattern, gear box layout, power take off (PTO) unit, ballasting, breaking and hydraulic control system.		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to identify the various components of the transmission system / power take off unit / hydraulic control system of the given tractor**	**8**	**10**
Contents	Demonstration of the transmission system, gear shift pattern, gear box layout, power take off (PTO) unit, wheel, and braking and hydraulic control system.		
Method of Assessment	Laboraory exam		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 4/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	504	Course Name	TRACTORS AND EARTHMOVERS

Course Outcome 4	Student will be able to explain the construction / working / systems / main components / specifications of the given earthmover	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to classify different earthmovers on basis of their application/ technology used / special features**	**10**	**15**
Contents	Introduction, purpose, applications and classifications of earthmovers on the basis of various features.		
Method of Assessment	Paper-pen test		
Learning Outcome 2	**Student will be able to explain the construction /working / main components/ specifications of the given power shovel/ backhoe / bulldozer**	**7**	**10**
Contents	Main components and their functions of power shovel, backhoe and bulldozer with labelled diagram.		
Method of Assessment	Theory exam		
Learning Outcome 3	**Student will be able to identify various system / components of the given tractor**	**7**	**10**
Contents	Demonstration of various system and their components of power shovel, backhoe and bulldozer		
Method of Assessment	Laboratory Test by Observation		

RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 5/5
Branch	AUTOMOBILE ENGINEERING	Semester	Fifth
Course Code	504	Course Name	TRACTORS AND EARTHMOVERS

Course Outcome 5	Student will be able to explain the construction / working / components / specifications of special purpose systems used on the earthmovers	T-L Hrs	Marks
Learning Outcome 1	**Student will be able to explain the construction / working / components / specifications of special purpose systems (three systems) used on the earthmovers**	**8**	**10**
Contents	Construction, working, components and specifications of special purpose systems used in power shovel, backhoe and bulldozer with diagrams.		
Method of Assessment	Theory exam		
Learning Outcome 2	**Student will be able to identify the components of given special purpose system used in earth movers**	**7**	**10**
Contents	Demonstration of special purpose systems and their components of power shovel, backhoe and bulldozer		
Method of Assessment	Laboratory Test by Observation		

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

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction/ working/ components of the given hydraulic control system**
LO Description	**Student will be able to explain the construction / working/ components of the basic hydraulic control circuit**

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 to basic hydraulic control system, purpose, construction, working and components with schematic &flow diagram and applications	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc.	6	1	Book:- Oil hydraulic Systems : principles and maintenance by S R Majumdar or its equivalent	Teacher may suggest more video/PDF links, which will help the students to solve quiz, prepare assignments etc.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One theory question related to the learned content will be asked in the university question paper	10	Question paper, Check list	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.
		A	0	3	5	0	4	1	2	4

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction/ working/ components of the given hydraulic control system**
LO Description	**Student will be able to identify the main components of the given hydraulic control system**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Main components used in basic hydraulic control systems, their purpose, construction with neat sketch and working	Lab demonstration	Teacher will demonstrate the contents to the students. Students will practice under the guidance of teacher.	3	4	Laboratory equipped with diagrams and/or trainer kit	Teacher may suggest more videos/PDF links, which will help the students to identify systems.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Laboratory Exam	Examiner will ask each students to identify at least five main components and state their purpose, location and function.	10	Group of components of basic hydraulic control system or diagrams, 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.
		A	0	3	5	0	4	1	3	4

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction/ working/ components of the given hydraulic control system**
LO Description	**Student will be able to develop simple hydraulic control circuit for the given purpose and operational conditions**

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 to development of various types of simple logical control circuits for the given purpose and operational conditionsin hydraulics mode.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc.	5	2	Book:- Oil hydraulic Systems : principles and maintenance by S R Majumdar Or its equivalent	Teacher may suggest more video/PDF links, which will help the students to solve quiz, prepare assignments etc.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory exam	One theory question related to the learned content will be asked in the university question paper	10	Question paper, Check list	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
		A	0	3	5	0	4	2	1	

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction / working /systems / components / specifications of the given tractor**
LO Description	**Student will be able to classify the various tractors on basis of their use / technology adopted/ special features**

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, development, purpose, applications and classifications of tractor on the basis of various features.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc.	7	3	Books:- • Tractor Mechanics by R. B. Gupta • Farm Tractor, Power Tiller Maintenance & Repair by S. C. Jain and C. R. Roy	Teacher may suggest more video/PDF links, which will help the students to solve quiz, prepare assignments etc.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Paper-pen test	Two theory questions related to the learned content will be asked in the test paper	15	Test paper, Check list	Internal

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
		A	0	3	5	0	4	2	2	

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction / working /systems / components / specifications of the given tractor**
LO Description	**Student will be able to explain the construction / working/ systems / components / specifications of the basic tractor**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Working of various systems of basic tractor with layout. Main components and their functions. Technical specifications of basic tractor.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc.	5	2	Books:- • Tractor Mechanics by R. B. Gupta • Farm Tractor, Power Tiller Maintenance & Repair by S. C. Jain and C. R. Roy	Teacher may suggest more video/PDF links, which will help the students to solve quiz, prepare assignments etc.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory Exam	One theory question related to the learned content will be asked in university question paper.	10	University paper, Check list	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
		A	0	3	5	0	4	2	3	

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction / working /systems / components / specifications of the given tractor**
LO Description	**Student will be able to identify various system / components of the given tractor**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Demonstration of various system and components of a tractor	Lab demonstration	Teacher will demonstrate the contents to the students. Students will practice under the guidance of teacher.	3	4	Preferably actual tractor, model otherwise diagrams are compulsory	Teacher may suggest more videos/PDF links, which will help the students to identify systems.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max.Marks	Resources Required	External / Internal
1.	Laboratory Exam	Examiner will ask each students to identify at least five main components and state their purpose, location and function.	10	Actual tractor or model or diagrams, 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
		A	0	3	5	0	4	3	1	

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction / working/ components of the special purpose systems of the given tractor**
LO Description	**Student will be able to explain construction/ working / main components of the transmission system / power take off unit / hydraulic control system / ballasting of the given tractor**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Main components of the transmission system, gear shift pattern, gear box layout, power take off (PTO) unit, ballasting, breaking and hydraulic control system.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc.	8	5	Books:- • Tractor Mechanics by R. B. Gupta • Farm Tractor, Power Tiller Maintenance & Repair by S. C. Jain and C. R. Roy	Teacher may suggest more video/PDF links, which will help the students to solve quiz, prepare assignments etc.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory Exam	Two theory questions related to the learned content will be asked in university question paper.	20	University paper, Check list	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
		A	0	3	5	0	4	3	2	

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction / working/ components of the special purpose systems of the given tractor**
LO Description	**Student will be able to identify the various components of the transmission system / power take off unit / hydraulic control system of the given tractor**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Demonstration of the transmission system, gear shift pattern, gear box layout, power take off (PTO) unit, wheel, and braking and hydraulic control system.	Lab demonstration	Teacher will demonstrate the contents to the students. Students will practice under the guidance of teacher.	3	5	Preferably actual tractor otherwise model, diagrams are compulsory	Teacher may suggest more videos/PDF links, which will help the students to identify systems.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Laboratory Exam	Examiner will ask each students to identify at least five main components and state their purpose, location and function.	10	Actual tractor or diagrams, 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
		A	0	3	5	0	4	4	1	

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction / working / systems / main components / specifications of the given earthmover**
LO Description	**Student will be able to classify different earthmovers on basis of their application/ technology used / special features**

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, purpose, applications and classifications of earthmovers on the basis of various features.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc.	7	3	• Construction Equipment and Management by S. C. Sharma • Manuals of Earth moving Equipments	Teacher may suggest more video/PDF links, which will help the students to solve quiz, prepare assignments etc.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Paper-pen test	Two theory questions related to the learned content will be asked in the test paper	15	Test paper, Check list	Internal

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
		A	0	3	5	0	4	4	2	

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction / working / systems / main components / specifications of the given earthmover**
LO Description	**Student will be able to explain the construction /working / main components/ specifications of the given power shovel/ backhoe / bulldozer**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Main components and their functions of power shovel, backhoe and bulldozer with labelled diagram.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc.	4	3	Books:- • Construction Equipment and Management by S. C. Sharma • Manuals of Earth moving Equipments	Teacher may suggest more video/PDF links, which will help the students to solve quiz, prepare assignments etc.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory Exam	One theory question related to the learned content will be asked in university question paper.	10	University paper, Check list	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
		A	0	3	5	0	4	4	3	

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction / working / systems / main components / specifications of the given earthmover**
LO Description	**Student will be able to identify various system / components of the given tractor**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Demonstration of various system and their components of power shovel, backhoe and bulldozer	Lab demonstration	Teacher will demonstrate the contents to the students. Students will practice under the guidance of teacher.	3	4	Preferably actual earthmovers otherwise models/ diagrams/posters are compulsory	Teacher may suggest more videos/ PDF links, which will help the students to identify systems.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Laboratory Test by Observation	Examiner will ask each students to identify at least five main components and state their purpose, location and function.	10	Actual earth movers or diagrams/posters, Rating scale	Internal

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
		A	0	3	5	0	4	5	1	

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction / working / components / specifications of special purpose systems used on the earthmovers**
LO Description	**Student will be able to explain the construction / working / components / specifications of special purpose systems (three systems) used on the earthmovers**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Construction, working, components and specifications of special purpose systems used in power shovel, backhoe and bulldozer with diagrams.	Traditional Lecture method	Teacher will organize lecture inside the class based on his/her session plan. Discuss the topics with students, provide quiz, assignment etc.	5	3	Books:- • Construction Equipment and Management by S. C. Sharma • Manuals of Earth moving Equipments	Teacher may suggest more video/PDF links, which will help the students to solve quiz, prepare assignments etc.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Theory Exam	One theory question related to the learned content will be asked in university question paper.	10	University paper, Check list	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
		A	0	3	5	0	4	5	2	

COURSE NAME	**TRACTORS AND EARTHMOVERS**
CO Description	**Student will be able to explain the construction / working / components / specifications of special purpose systems used on the earthmovers**
LO Description	**Student will be able to identify the components of given special purpose system used in earth movers**

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Demonstration of special purpose systems and their components of power shovel, backhoe and bulldozer	Lab demonstration	Teacher will demonstrate the contents to the students. Students will practice under the guidance of teacher.	2	5	Preferably actual earthmovers otherwise model/ diagrams/ posters are compulsory	Teacher may suggest more videos/PDF links, which will help the students to identify systems.

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Max. Marks	Resources Required	External / Internal
1.	Laboratory Test by Observation	Examiner will ask each students to identify at least five main components and state their purpose, location and function.	10	Actual earth movers or model/ diagrams/ posters, Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

NIL