

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 1	
Branch	MECHANICAL ENGINEERING			Semester	III	
Course Code	302	Course Name	THERMAL ENGINEERING			
Course Outcome 1	Explain renewable sources of energy			Teah. Hrs	Marks	
Learning Outcome 1	Classify renewable and non-renewable energy sources.			2	3	
Contents	Definition and Classification of energy sources- Renewable and Non-Renewable, Examples of renewable and non renewable sources.					
Method of Assessment	Paper-Pen Test (Part of Prg 1)					
Learning Outcome 2	Sketch the schematic diagram of solar, bio-gas, tidal, geothermal power generation.			8	10	
Contents	Flat plate and concentrating solar collectors, their application. Photovoltaic Cell, Solar Distillation system, solar cooker. Wind energy horizontal and vertical wind mill, site selection for wind energy power plants, introduction to Tidal energy, Geothermal energy, Biogas energy, Bio-gas plant.					
Method of Assessment	Theory Exam					
Learning Outcome 3	Identify components of Solar systems			9	8	
Contents	Demonstration of components of Flat plate and concentrating solar collectors. Photovoltaic Cell, Solar Distillation system, solar cooker.					
Method of Assessment	Laboratory Test by Observation (Part of LW)					

Course Outcome 2	Solve simple problems based on basic concepts of thermodynamics, and its laws.	Teach Hrs	Marks
Learning Outcome 1	Explain thermodynamic systems, properties, processes, cycles, gas equation and modes of heat transfer.	6	7
Contents	Concept of thermodynamic System– definition, classification and applications, State, processes, cycles, Properties- Intensive and Extensive with examples, Point and Path function, Concept of Work and Heat, Definitions: Enthalpy, Internal energy, Entropy, Specific heat at constant pressure (C_p), specific heat at constant volume (C_v), relation between C_p & C_v , characteristic gas equation, Universal gas constant, Definition of quasi-static process, flow work, Modes of Heat transfer - definition and types.		
Method of Assessment	Paper-Pen Test (Part of Prg 1)		
Learning Outcome 2	Solve given problems based on thermodynamic systems, properties and gas equation.	4	10
Contents	Numerical problems based on Thermodynamic System, Properties, gas equation.		
Method of Assessment	Theory Exam		
Learning Outcome 3	Solve given problems based on the laws of thermodynamics.	8	10
Contents	Laws of thermodynamics- Zeroth law, concept of work and heat, statement of first law- internal energy, enthalpy, relationship between heat transfer, work transfer and change in internal energy, Concept of conservation of mass and control volume, Steady and steady flow energy equation (without proof). Limitation of first law. Second law – Clausius and Kelvin-Planck Statements, concept of heat pump, refrigerator, heat engine, thermal efficiency, COP, reversible process, factors which make a process irreversible, Carnot cycle, its efficiency and limitation, Clausius inequality, entropy		
Method of Assessment	Theory Exam		

Course Outcome 3	Solve numerical problems based on thermodynamic processes, air standard cycles.	Teach.Hrs	Marks
Learning Outcome 1	Compare thermodynamic processes, air standard cycle using P-V and T-S diagram.	8	10
Contents	Thermodynamic processes- Definition, classification and representation on P-V and T-S diagram for Constant pressure, Constant volume, Constant Temperature, Adiabatic, Polytropic, throttling processes. Thermodynamic cycle – definition, classification- reversible and irreversible cycles, Air Standard Cycles: Carnot cycle, Otto Cycle, Diesel Cycle, Dual Cycle, their representation on P-V and T-S diagrams		
Method of Assessment	Paper-Pen Test (TW)		
Learning Outcome 2	Calculate mean effective pressure, work done, efficiency for a given Air Standard cycle.	7	10
Contents	Problems on calculation of work done, change in internal energy, heat transfer, change in entropy for thermodynamic processes. Problems on calculation of Mean Effective Pressure, work done, air standard efficiency for Air Standard cycle.		
Method of Assessment	Theory Exam		
Course Outcome 4	Explain steam generation processes, steam generators.	Teach. Hrs	Marks
Learning Outcome 1	Solve given problems based on thermodynamic properties of steam.	9	10
Contents	Two Phase System: Pure substance, steam as a two phase system, its representation on P-V, T-S plane for isobaric, isochoric, isothermal, isentropic, polytropic, throttling process, dryness fraction of steam, methods of determination of dryness fraction separating and throttling calorimeter. Steam tables, Mollier's diagram and its uses for calculation of changes in properties of steam such as enthalpy, internal energy, entropy; heat, work in various processes.		

Method of Assessment	Paper-Pen Test (Part of Prg 2)		
Learning Outcome 2	Determine dryness fraction using throttling, separating calorimeters.	6	12
Contents	Experimental determination of dryness fraction using separating, throttling calorimeter.		
Method of Assessment	Laboratory Test by Observation (Part of LW)		
Learning Outcome 3	Explain construction, working of a given steam generator.	9	10
Contents	Steam Generator- Definition, classification, construction, working, mountings and accessories of (a) low pressure boilers- Babcock and Wilcox boiler, Lancashire boiler (b) high pressure boilers - La-Mont, Velox boiler.		
Method of Assessment	Theory Exam		
Learning Outcome 4	Identify components, mountings, accessories of a given steam generator.	24	18
Contents	Demonstration of steam generator components, mountings and accessories.		
Method of Assessment	Laboratory Test by Observation (Part of Practical Exam)		
Course Outcome 5	Explain steam nozzles, steam turbines, steam condensers.	Teach.Hrs	Marks

Learning Outcome 1	Explain construction, working of steam nozzle, steam turbine, steam condenser.	10	10
Contents	Steam nozzle- construction, working Flow of steam through convergent-divergent nozzle Steam turbine –classification, construction, working principle with line diagram of a Impulse turbine-De Laval turbine, reaction turbine-Parsons turbine, velocity diagram of impulse, reaction turbine. Compounding of turbines. Pressure compounding, velocity compounding, pressure-velocity compounding Steam condenser- classification construction and working.		
Method of Assessment	Theory Exam		
Learning Outcome 2	Solve given problems based on discharge and area of nozzle.	4	10
Contents	Flow of steam through convergent-divergent nozzle, Friction in a nozzle, Discharge of steam through nozzles, Critical pressure ratio (no derivation), Calculation of cross sectional areas at throat and exit for maximum discharge.(simple problems)		
Method of Assessment	Theory Exam		
Learning Outcome 3	Identify components of D- Laval and Parsons Turbine.	6	12
Contents	Demonstration of the components of De-Laval and Parsons steam turbine.		
Method of Assessment	Laboratory Test by Observation (Part of Practical Exam)		

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME				Branch Code			Course Code			CO Code	LO Code	Format No. 4
						M	0	2	3	0	2	1	1	
COURSE NAME	Thermal Engineering													
CO Description	Explain renewable sources of energy													
LO Description	Classify renewable and non-renewable energy sources.													
SCHEME OF STUDY														
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks							
1	Definition and classification of energy sources- renewable and non-renewable, examples of renewable and non renewable sources.	Interactive classroom teachings, demonstration, quiz.	Teacher will explain the contents and provide handouts to students. Teacher will conduct a quiz to make students practice their knowledge.	2	0	Handouts, chalk board, PPT, text book, charts, video film.	NIL							
SCHEME OF ASSESSMENT														
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal									
1	Paper-pen test	Student will be asked to list renewable and non renewable energy sources.	03	Test paper + Rating scale	Internal									
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)														
Part of Progressive – 1														

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					M	0	2	3	0	2	1	2	
COURSE NAME	Thermal Engineering												
CO Description	Explain renewable sources of energy												
LO Description	Sketch the schematic diagram of solar, bio-gas, tidal, geothermal power generation.												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks						
1	Flat plate and concentrating solar collectors, their application. Photovoltaic cell, solar distillation system, solar cooker. Wind energy horizontal and vertical wind mill, site selection for wind energy power plants, introduction to tidal energy, geothermal energy, biogas energy, bio-gas plant.	Interactive classroom teachings, demonstration, quiz.	Teacher will explain the contents and provide handouts to students. Teacher will conduct a quiz to make students practice their knowledge.	8	0	Handouts, chalk board, PPT, text book, charts, video film.	NIL						
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required	External / Internal						
1	Theory exam	Student will be asked to describe and sketch schematic representation of any one of tidal energy, solar energy, geothermal energy, bio-gas plant.			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
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>2</i>	<i>1</i>	<i>3</i>	
COURSE NAME	Thermal Engineering												
CO Description	Explain renewable sources of energy												
LO Description	Identify components of solar 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	Demonstration of components of flat plate and concentrating solar collectors. Photovoltaic cell, solar distillation system, solar cooker.	Lab demonstration, hands on practice, lab assignments.	Teacher will explain the contents and provide handout to students. Teacher will demonstrate the components in lab. Students will learn through practice.	0	9	Handouts, chalk board, PPT, manual, charts, video film, models, virtual lab	NIL						
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required			External / Internal						
1	Laboratory test by observation	Student will be asked to identify components of solar systems.	8	Observation schedule/check-list /rating scales /rubrics			Internal						
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of Lab Work													

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

COURSE NAME	Thermal Engineering
CO Description	Solve simple numerical problems based on basic concepts of thermodynamics and its laws.
LO Description	Explain thermodynamic systems, properties, processes, cycles, gas equation and modes of heat transfer.

SCHEME OF STUDY

S. No	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
1	Concept of thermodynamic system– definition, classification and applications, state, processes, cycles, properties- intensive and extensive properties with examples, point and path function, concept of work and heat, definitions: enthalpy, internal energy, entropy, specific heat at constant pressure (c_p), specific heat at constant volume (c_v), relation between c_p and c_v , characteristic gas equation, universal gas constant, definition of quasi-static process, flow work, modes of heat transfer - definition and types.	Interactive classroom teachings, demonstration, quiz.	Teacher will explain the contents and provide handouts to students. Teacher will conduct a quiz to make students practice their knowledge	6	0	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper-pen test	Student will be asked to explain basic concepts of thermodynamics from the learning content.	7	Test paper + Rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of Progressive – 1

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>2</i>	<i>2</i>	<i>2</i>	
COURSE NAME		Thermal Engineering											
CO Description		Solve simple numerical problems based on basic concepts of thermodynamics and its laws.											
LO Description		Solve a numerical problem based on thermodynamic systems, properties and gas equation.											
SCHEME OF STUDY													
S.No	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark						
1	Numerical problems based on thermodynamic system, properties, gas equation.	Interactive classroom teaching, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct a quiz and give assignments to make students practice their knowledge.	4	0	Handouts, chalk board, PPT, text book, charts, video film.							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required	External / Internal						
1	Theory exam	Students will be asked to solve two numerical problems based on thermodynamic systems, properties and gas equation.			10	Question paper + Rating scale	External						
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Nil													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME				Branch Code			Course Code		CO Code	LO Code	Format No. 4
						M	0	2	3	0	2	2	
COURSE NAME		Thermal Engineering											
CO Description		Solve simple numerical problems based on basic concepts of thermodynamics and its laws											
LO Description		Solve a numerical problem based on the laws of thermodynamics.											
SCHEME OF STUDY													
S. No	Learning Content					Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark		
1	Laws of thermodynamics- Zeroth law, concept of work and heat, statement of first law- internal energy, enthalpy, relationship between heat transfer, work transfer and change in internal energy, Concept of conservation of mass and control volume, Steady and steady flow energy equation (without proof). Limitation of first law. Second law – Clausius and Kelvin-Planck Statements, concept of heat pump, refrigerator, heat engine, thermal efficiency , COP, reversible process, factors which make a process irreversible, Carnot cycle, its efficiency and limitation, Clausius inequality, entropy					Interactive classroom teaching, demonstration, quiz, assignments.	Teacher will explain the contents and provide handout to students. Teacher will conduct a quiz and give assignments to make students practice their knowledge.	8	0	Handouts, chalk board, PPT, text book, charts, video film.			
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required	External / Internal				
1	Theory exam	Student will be asked solve two numerical problems based on learning content.					10	Question paper+ Rating scale	External				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Nil													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME				Branch Code			Course Code			CO Code	LO Code	Format No. 4
						M	0	2	3	0	2	3	1	
COURSE NAME	Thermal Engineering													
CO Description	Solve numerical problems based on thermodynamic processes, air standard cycles.													
LO Description	Describe thermodynamic processes, air standard cycle using P-V and T-S diagram.													
SCHEME OF STUDY														
S. No.	Learning Content				Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark				
1	Thermodynamic processes- definition, classification and representation on P-V and T-S diagram for constant pressure, constant volume, constant temperature, adiabatic, polytropic, throttling processes. Thermodynamic cycle – definition, classification- reversible and irreversible cycles, Air standard cycles: Carnot cycle, Otto cycle, Diesel cycle, Dual cycle, their representation on P-V and T-S diagrams.				Interactive classroom teaching, demonstration, quiz, assignment.	Teacher will explain the contents and provide handouts to students. Teacher will conduct a quiz and give assignments to make students practice their knowledge	8	0	Handouts, chalk board, PPT, text book, charts, video film.					
SCHEME OF ASSESSMENT														
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required	External / Internal					
	Paper-pen Test	Student will be asked to describe two thermodynamic processes and one air standard cycle using P-V and T-S diagram.					10	Test paper + Rating scale	Internal					
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)														
Term Work														

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code		CO Code	LO Code	Format No. 4
					M	0	2	3	0	2	3	
COURSE NAME	Thermal Engineering											
CO Description	Solve numerical problems based on thermodynamic processes, air standard cycles.											
LO Description	Calculate mean effective pressure, work done, efficiency for a given air standard cycle.											
SCHEME OF STUDY												
S. No	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark					
1	Numerical problems on calculation of work done, change in internal energy, heat transfer, change in entropy for thermodynamic processes. Problems on calculation of mean effective pressure, work done, air standard efficiency for air standard cycle.	Interactive classroom teachings, demonstration, quiz.	Teacher will explain the contents and provide handouts to students. Teacher will conduct a quiz to make students practice their knowledge.	7	0	Handouts, chalk board, PPT, text book, charts, video film.						
SCHEME OF ASSESSMENT												
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal							
1	Theory exam	Student will be asked to solve one numerical problem to calculate mean effective pressure, work done, efficiency of any air standard cycle.	10	Question paper + Rating scale	External							
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)												
Nil												

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME				Branch Code			Course Code		CO Code	LO Code	Format No. 4
						M	0	2	3	0	2	4	
COURSE NAME	Thermal Engineering												
CO Description	Explain steam generation processes, steam generators.												
LO Description	Solve a given numerical problem based on thermodynamic properties of steam.												
SCHEME OF STUDY													
S. No.	Learning Content	T-L Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark						
	Two Phase System: Pure substance, steam as a two phase system, its representation on P-V, T-S plane for isobaric, isochoric, isothermal, isentropic, polytropic, throttling process, dryness fraction of steam, methods of determination of dryness fraction separating and throttling calorimeter. Steam tables, Mollier diagram and its uses for calculation of changes in properties of steam such as enthalpy, internal energy, entropy; heat, work in various processes.	Interactive classroom teaching, demonstration, quiz, assignment	Teacher will explain the contents and provide handouts to students. Teacher will conduct a quiz and give assignments to make students practice their knowledge.	9	0	Handouts, chalk board, PPT, text book, charts, video film.							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal								
	Paper-pen test	Student will be asked to solve a given numerical problem based on properties of steam.	10	Test paper + Rating scale	Internal								
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of Progressive – 2													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>2</i>	<i>4</i>	<i>2</i>	
COURSE NAME	Thermal Engineering												
CO Description	Explain steam generation processes, steam generators.												
LO Description	Determine dryness fraction using throttling, separating calorimeters.												
SCHEME OF STUDY													
S. No.	Learning Content	T-L Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark						
1	Experimental determination of dryness fraction using separating, throttling calorimeter.	Lab demonstration, hands on practice	Teacher will explain the contents and provide handout to students. Teacher will demonstrate the procedure of lab experiments. The students will learn through practice.	0	6	Handouts, chalk board, PPT, charts, video film, apparatus.							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required		External / Internal					
1	Laboratory test by observation	Student will be asked to find out dryness fraction of steam using any method.			12	Observation schedule/check-list /rating scales /rubrics		Internal					
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of Lab Work													

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code			Course Code			CO Code	LO Code	Format No. 4
		<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>2</i>	<i>4</i>	<i>3</i>	

COURSE NAME	Thermal Engineering
CO Description	Explain steam generation processes, steam generators.
LO Description	Explain construction, working of a steam generator.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
1	Steam generator- definition, classification, construction, working, mountings and accessories of (a) low pressure boilers- Babcock and Wilcox boiler, Lancashire boiler (b) high pressure boilers - La-Mont, Velox boiler.	Interactive classroom teachings, demonstration, quiz.	Teacher will explain the contents and provide handouts to students. Teacher will conduct a quiz to make students practice their knowledge.	9	0	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory exam	Student will be asked to classify boilers, explain construction, working of one boiler.	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
				<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>2</i>	<i>4</i>	<i>4</i>	
COURSE NAME	Thermal Engineering											
CO Description	Explain steam generation processes, steam generators.											
LO Description	Identify components, mountings, accessories of a given steam generator.											
SCHEME OF STUDY												
S. No.	Learning Content	T-L Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark					
1.	Demonstration of steam generator components, mountings and accessories.	Lab demonstration, hands on practice	Teacher will explain the contents and provide handout to students. Teacher will demonstrate the components in lab. The students will learn through practice.	0	24	Handouts, chalk board, PPT, text book, charts, video film, virtual lab, models.						
SCHEME OF ASSESSMENT												
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required		External / Internal				
1.	Laboratory test by observation	Student will be asked to identify components, mountings and accessories of a given boiler.			18	Observation schedule/check-list /rating scales /rubrics		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
		<i>M</i>	<i>0</i>	<i>2</i>	<i>3</i>	<i>0</i>	<i>2</i>	<i>5</i>	<i>1</i>	

COURSE NAME	Thermal Engineering
CO Description	Explain steam nozzles, steam turbines, steam condensers.
LO Description	Explain construction, working of steam nozzle, steam turbine and steam condenser.

SCHEME OF STUDY

S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark
	Steam nozzle- construction, working Flow of steam through convergent-divergent nozzle Steam turbine –classification, construction, working principle with line diagram of a Impulse turbine-De Laval turbine, reaction turbine-Parsons turbine, velocity diagram of impulse, reaction turbine. Compounding of turbines. Pressure compounding, velocity compounding, pressure-velocity compounding Steam condenser- classification construction and working.	Interactive Classroom teaching, demonstration, quiz	Teacher will explain the contents and provide handouts to students. Teacher will conduct a quiz to make students practice their knowledge	10	0	Handouts, chalk board, PPT, text book, charts, video film.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
	Theory exam	Student will be asked to explain construction, working of a steam nozzle or turbine or condenser.	10	Question paper + Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Suitably mix the content in assessment to justify maximum marks 10

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME				Branch Code			Course Code		CO Code	LO Code	Format No. 4
						M	0	2	3	0	2	5	
COURSE NAME		Thermal Engineering											
CO Description		Explain steam nozzles, steam turbines, steam condensers.											
LO Description		Solve a given numerical problem based on discharge and area of nozzle.											
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark						
1	Flow of steam through convergent-divergent nozzle, friction in a nozzle, discharge of steam through nozzles, critical pressure ratio (no derivation), calculation of cross sectional areas at throat and exit for maximum discharge.(simple problems).	Interactive classroom teachings, demonstration, quiz.	Teacher will explain the contents and provide handouts to students. Teacher will conduct a quiz to make students practice their knowledge.	4	0	Text book, charts, chalk board, PPT							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal								
1	Theory exam	Student will be asked to calculate discharge, cross sectional area and critical pressure ratio for flow through a given convergent-divergent nozzle.	10	Question paper + Rating scale	External								
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Nil													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME				Branch Code			Course Code		CO Code	LO Code	Format No. 4
						M	0	2	3	0	2	5	
COURSE NAME		Thermal Engineering											
CO Description		Explain steam nozzles, steam turbines, steam condensers.											
LO Description		Identify components of D- Laval and Parsons Turbine.											
SCHEME OF STUDY													
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark						
1	Demonstration of the components of De-Laval and Parsons steam turbine.	Lab demonstration, hands on practice.	Teacher will explain the contents and provide handouts to students. Teacher will demonstrate the components in lab. The students will learn through practice.	0	6	Handouts, chalk board, PPT, charts, video film, manual, virtual lab, models.							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal								
1	Laboratory test by observation	Student will be asked to identify components of De-Laval and Parsons Turbine	12	Observation schedule/check-list /rating scales /rubrics	External								
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Nil													

LIST OF EXPERIMENTS OF THERMAL ENGINEERING

S.No.	Name of Experiment	Duration
1	Identify components of solar systems.	3
2	Write a Report on visit to solar power/wind mill / biogas plant / hydraulic power plant to document the specifications of components and power generation capacity, draw schematic arrangement.	6
3	Determine dryness fraction of steam using Throttling calorimeter.	3
4	Determine dryness fraction of steam using separating calorimeter.	3
5	Identify components of Babcock and Wilcox, Lancashire boiler	6
6	Identify components of La-Mont and Velox Boilers	6
7	Draw the flue gas path and water steam circuit with the help of boiler model and write a report	3
8	Identify mountings and accessories in Boiler.	3
9	Write a Report on visit to Dairy / thermal power plant to document specifications of boiler, list mountings and accessories.	6
10	Identify components of Impulse turbine (De-Leval)	3
11	Identify components of Reaction Turbine (Parson's Turbine)	3