

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 1/3
Branch	Cement Technology			Semester	V
Course Code	503	Course Name	Heat and Mass Transfer		
Course Outcome 1	Student will be able to describe the heat transfer by conduction			Teach Hrs	Marks
Learning Outcome 1	Student will be able to state the basic concepts of heat transfer by conduction.			10	10
Contents	Modes of heat transfer, Conduction, Fourier's law, thermal conductivity, thermal resistance and conductance, Fourier heat conduction equation, its form in rectangular, cylindrical and spherical coordinates. Analogy between flow of heat and electricity, combined heat transfer Process.				
Method of Assessment	Paper pen test				
Learning Outcome 2	Student will be able to solve the problems based on conduction.			08	10
Contents	Linear one-dimensional steady state conduction through a slab, tubes, spherical shells and composite structures, thermal insulation, critical insulation thickness for pipes. Effects of variable thermal conductivity, derivation of analogy between flow of heat and electricity.				
Method of Assessment	Theory exam				
Learning Outcome 3	Student will be able to perform the practical on thermal conductivity of different material and heat transfer through composite walls.			08	10
Contents	Thermal conductivity of different materials. Heat transfer through composite walls.				
Method of Assessment	Laboratory test by observation				
Course Outcome 2	Student will be able to describe the mechanism of heat flow in fluids (convection).			Teach Hrs	Marks
Learning Outcome 1	Student will be able to derive the equation for heat transfer coefficient and logarithmic mean temperature difference.			10	10
Contents	Heat transfer by convection, natural and forced convection, rate of heat transfer, logarithmic mean temperature difference (LMTD), counter current and parallel current flows, Energy balances, individual, film and overall heat transfer coefficient, resistance form of overall heat transfer coefficient.				
Method of Assessment	Theory exam				
Learning Outcome 2	Student will be able to describe the heat transfer with and without phase change.			08	10
Contents	Heat transfer with phase change, heat transfer without phase change, regimes of heat transfer in fluids, thermal boundary layer, drop-wise condensation, film-wise condensation, heat transfer to boiling liquids, pool boiling of saturated liquid.				

Method of Assessment	Quiz		
Learning Outcome 3	Student will be able to solve the problems based on heat flow in fluids.	08	10
Contents	Find out the rate of heat transfer, area of heat transfer, logarithmic mean temperature difference. Counter current and parallel current flows, calculation of overall heat transfer coefficient.		
Method of Assessment	Theory exam		
Course Outcome 3	Student will be able to explain the fundamental concepts of radiation and heat exchangers.	Teach Hrs	Marks
Learning Outcome 1	Student will be able to specify the fundamental concepts of radiation.	08	10
Contents	Radiant heat transfer, absorptivity, reflectivity and transmissivity, Laws of black body radiation, Kirchhoff's law, Stefan Boltzmann law, Weins displacement law, radiation between surfaces, view factors, heat transfer coefficient, numerical based on radiation.		
Method of Assessment	Theory exam		
Learning Outcome 2	Student will be able to categorize the heat exchangers according to the flow of fluids.	08	10
Contents	Heat exchangers, double pipe heat exchanger, shell and tube heat exchanger, heat transfers coefficient, Fouling factors, method of heat exchanger analysis, Evaporator and Condensers, effectiveness of heat exchanger, Finned tube heat exchanger.		
Method of Assessment	Theory exam		
Learning Outcome 3	Student will be able to perform the experiment on heat exchangers.	06	10
Contents	Double pipe heat exchanger, shell and tube heat exchanger, heat transfers coefficient, Fouling factors.		
Method of Assessment	Laboratory test by observation		
Course Outcome 4	Student will be able to identify the role of diffusion and absorption in mass transfer operation.	Teach Hrs	Marks
Learning Outcome 1	Student will be able to state the theory of diffusion, absorption and analogy between heat and mass transfer.	08	10
Contents	Diffusion and mass transfer between phases, Diffusivity, mass transfer coefficient, film theory, Molecular and turbulent diffusion, diffusion coefficient, Fick's Law, Diffusivity, Analogy between heat and mass transfer, Absorption, theory of absorption.		
Method of Assessment	Theory exam		
Learning Outcome 2	Student will be able to perform the experiment on emissivity of solids, diffusivity of gases.	06	10
Contents	Emissivity of solids. Diffusivity of gases.		
Method of Assessment	Laboratory test by observation		

Learning Outcome 3	Student will be able to prepare a report on different equipments used for absorption and follow the safety precautions during experiments.	08	10
Contents	Equipment for gas-liquid operations, Bubble columns, tray towers, packed towers. Instructions related with maintenance of cleanliness during experiments.		
Method of Assessment	Laboratory test by observation		
Course Outcome 5	Student will be able to describe the mass transfer by distillation and drying.	Teach Hrs	Marks
Learning Outcome 1	Student will be able to draw vapour-liquid equilibrium diagram and explain the mass transfer by distillation.	08	10
Contents	Distillation, concept of distillation, vapour phase equilibrium, vapour-liquid equilibrium diagram, batch distillation, continuous distillation, material balance, problems on the same.		
Method of Assessment	Theory exam		
Learning Outcome 2	Student will be able to understand the general principle of humidification and de-humidification.	08	10
Contents	Purpose of drying, humidification and de-humidification, general principle, properties of air-moisture mixture, problems on the same.		
Method of Assessment	Paper pen test		
Learning Outcome 3	Student will be able to prepare a report on cooling towers and driers.	08	10
Contents	Study of:- Cooling towers. Tray drier. Rotary drier. Fluidized bed drier.		
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
					<i>C</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>3</i>	<i>1</i>	<i>1</i>			
COURSE NAME		Heat and Mass transfer													
CO Description		Student will be able to describe the heat transfer by conduction.													
LO Description		Student will be able to state the basic concepts of heat transfer by conduction.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching Method	–Learning	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks							
1.	Modes of heat transfer, Conduction, Fourier's law, thermal conductivity, thermal resistance and conductance, Fourier heat conduction equation, its form in rectangular, cylindrical and spherical coordinates. Analogy between flow of heat and electricity, combined heat transfer Process.	Interactive teaching, demonstration, quiz, assignments.	classroom	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz to make students practice their knowledge.	10	NIL	Handouts, chalk board, PPT, text book, charts.	NIL							
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required		External / Internal							
1.	Paper pen test	Student will be asked to describe the basic concepts of conduction.			10	Test paper + rating scale		Internal							
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
Part of Progressive – I															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No. 4
					<i>C</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>3</i>	<i>1</i>	<i>2</i>			
COURSE NAME		Heat and Mass transfer													
CO Description		Student will be able to describe the heat transfer by conduction.													
LO Description		Student will be able to solve the problems based on conduction.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks								
1.	Linear one-dimensional steady state conduction through a slab, tubes, spherical shells and composite structures, thermal insulation, critical insulation thickness for pipes. Effects of variable thermal conductivity, derivation of analogy between flow of heat and electricity.	Interactive classroom teaching, demonstration, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz to make students practice their knowledge.	08	NIL	Handouts, chalk board, PPT, text book, charts.	NIL								
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required		External / Internal							
1.	Theory exam	Students will be asked to solve the numerical problems based on conduction.			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>C</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>3</i>	<i>1</i>	<i>3</i>			
COURSE NAME		Heat and Mass transfer													
CO Description		Student will be able to describe the heat transfer by conduction.													
LO Description		Student will be able to perform the practical on thermal conductivity of different material and heat transfer through composite walls.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks								
1.	Thermal conductivity of different materials. Heat transfer through composite walls.	Lab demonstration, hands on practice, lab assignments, quiz, assignments,	Teacher will demonstrate the procedure of lab experiments. The students will learn through practice.	02	06	Handout/ lab manual, text book, charts, video film.	NIL								
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal										
1.	Laboratory test by observation	Students will be asked to study about the thermal conductivity of different material and heat transfer through composite walls.	10	Observation schedule/check-list /rating scales /rubrics	External										
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
Part of End practical exam															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No. 4
					<i>C</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>3</i>	<i>2</i>	<i>1</i>			
COURSE NAME		Heat and Mass transfer													
CO Description		Student will be able to describe the mechanism of heat flow in fluids (convection).													
LO Description		Student will be able to derive the equation for heat transfer coefficient and logarithmic mean temperature difference.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks								
1.	Heat transfer by convection, natural and forced convection, rate of heat transfer, logarithmic mean temperature difference (LMTD), counter current and parallel current flows, Energy balances, individual, film and overall heat transfer coefficient, resistance form of overall heat transfer coefficient.	Interactive classroom teaching, tutorial, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz to make students practice their knowledge.	10	NIL	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	Students will be asked to derive the equation for heat transfer coefficient and logarithmic mean temperature difference and explain the convection.			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>C</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>3</i>	<i>2</i>	<i>2</i>			
COURSE NAME		Heat and Mass transfer													
CO Description		Student will be able to describe the mechanism of heat flow in fluids (convection).													
LO Description		Student will be able to describe the heat transfer with and without phase change.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching Method	-Learning	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks							
1.	Heat transfer with phase change, heat transfer without phase change, regimes of heat transfer in fluids, thermal boundary layer, drop-wise condensation, film-wise condensation, heat transfer to boiling liquids, pool boiling of saturated liquid.	Interactive teaching, assignments.	classroom tutorial, quiz,	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz to make students practice their knowledge.	08	NIL	Handouts, chalk board, PPT, text book	NIL							
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required		External / Internal							
1.	Quiz	Students will be asked to describe the heat transfer with and without phase change.			10	Rubrics/rating scales		Internal							
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
Part of Term Work															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No. 4
					<i>C</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>3</i>	<i>2</i>	<i>3</i>			
COURSE NAME		Heat and Mass transfer													
CO Description		Student will be able to describe the mechanism of heat flow in fluids (convection).													
LO Description		Student will be able to solve the problems based on heat flow in fluids.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks								
1.	Find out the rate of heat transfer, area of heat transfer, logarithmic mean temperature difference. Counter current and parallel current flows, calculation of overall heat transfer coefficient.	Interactive classroom teaching, tutorial, quiz, assignments.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz to make students practice their knowledge.	08	NIL	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	Students will be asked to solve the problems based on heat flow in fluids.			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>C</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>3</i>	<i>3</i>		<i>1</i>		
COURSE NAME		Heat and Mass transfer													
CO Description		Student will be able to explain the fundamental concepts of radiation and heat exchangers.													
LO Description		Student will be able to specify the fundamental concepts of radiation.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching Method	–Learning	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks							
1.	Radiant heat transfer, absorptivity, reflectivity and transmissivity, Laws of black body radiation, Kirchhoff's law, Stefan Boltzmann law, Weins displacement law, radiation between surfaces, view factors, heat transfer coefficient, numerical based on radiation.	Interactive teaching, assignments.	classroom quiz,	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz to make students practice their knowledge.	08	NIL	Handouts, chalk board, PPT, text book and video films.	NIL							
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required		External / Internal							
1.	Theory exam	Students will be asked to specify the fundamental concepts of radiation.			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>C</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>3</i>	<i>3</i>		<i>2</i>		
COURSE NAME		Heat and Mass transfer													
CO Description		Student will be able to explain the fundamental concepts of radiation and heat exchangers.													
LO Description		Student will be able to categorize the heat exchangers according to the flow of fluids.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching Method	-Learning	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks							
1.	Heat exchangers, double pipe heat exchanger, shell and tube heat exchanger, heat transfers coefficient, Fouling factors, method of heat exchanger analysis, Evaporator and Condensers, effectiveness of heat exchanger, Finned tube heat exchanger.	Interactive teaching, lab demonstration, quiz, assignments.	classroom	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz to make students practice their knowledge.	08	NIL	Handouts, chalk board, PPT, text book, charts, video film, Models.	NIL							
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required		External / Internal							
1.	Theory exam	Students will be asked to categorize the heat exchangers according to the flow of fluids, evaporators and condensers.			10	Test 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>C</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>3</i>	<i>3</i>		<i>3</i>		
COURSE NAME		Heat and Mass transfer													
CO Description		Student will be able to specify the fundamental concepts of radiation and heat exchangers.													
LO Description		Student will be able to perform the experiment on heat exchangers.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required						Remarks			
1.	Double pipe heat exchanger, shell and tube heat exchanger, heat transfers coefficient, Fouling factors.	Lab demonstration, hands on practice, lab assignments, quiz, assignments,	Teacher will demonstrate the procedure of lab experiments. The students will learn through practice.	NIL	06	Handout/ lab manual, text book, charts, video film.						NIL			
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment			Maximum Marks	Resources Required						External / Internal			
1.	Laboratory test by observation	Students will be asked to perform the experiment on heat exchangers.			10	Observation schedule/check-list /rating scales /rubrics						External			
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															
Part of end practical exam															

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code		LO Code		Format No. 4
					<i>C</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>0</i>	<i>3</i>	<i>4</i>		<i>1</i>		
COURSE NAME		Heat and Mass transfer													
CO Description		Student will be able to identify the role of diffusion and absorption in mass transfer operation.													
LO Description		Student will be able to state the theory of diffusion, absorption and analogy between heat and mass transfer.													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching Method	-Learning	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks							
1.	Diffusion and mass transfer between phases, Diffusivity, mass transfer coefficient, film theory, Molecular and turbulent diffusion, diffusion coefficient, Fick's Law, Diffusivity, Analogy between heat and mass transfer, Absorption, theory of absorption.	Interactive teaching, demonstration, assignments.	classroom lab quiz,	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz to make students practice their knowledge.	08	NIL	Handouts, chalk board, PPT, text book, charts, video film, Models.	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 explain the theory of diffusion, absorption and analogy between heat and mass transfer.			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	
-----------------------------------	------------------------------------	--------------------	--------------------	----------------	----------------	--

		<i>C 0 1 5 0 3</i>					<i>4</i>	<i>2</i>	Format No. 4
COURSE NAME	Heat and Mass transfer								
CO Description	Student will be able to identify the role of diffusion and absorption in mass transfer operation.								
LO Description	Student will be able to perform the experiment on emissivity of solids, diffusivity of gases.								
SCHEME OF STUDY									
S. No.	Learning Content	Teaching Method	–Learning	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks	
1.	Emissivity of solids. Diffusivity of gases.	Lab demonstration, hands on practice, lab assignments, quiz, assignments,		Teacher will demonstrate the procedure of lab experiments. The students will learn through practice.	NIL	06	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.	Laboratory test by observation	Students will be asked to perform experiment on emissivity of solids, diffusivity of gases.			10	Observation schedule/check-list /rating scales /rubrics		External	
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)									
Part of end practical exam									

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

COURSE NAME	Heat and Mass transfer
CO Description	Student will be able to identify the role of diffusion and absorption in mass transfer operation.
LO Description	Student will be able to prepare a report on different equipments used for absorption and follow the safety precautions during experiments.

SCHEME OF STUDY								
S. No.	Learning Content	Teaching Method	-Learning	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Equipment for gas-liquid operations, Bubble columns, tray towers, packed towers. Instructions related with maintenance of cleanliness during experiments.	Interactive teaching, demonstration, assignments.	classroom lab quiz,	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz to make students practice their knowledge.	02	06	Handouts, chalk board, PPT, text book, charts, video film, Models.	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 prepare a report on different equipments used for absorption and follow the safety precautions during experiments.	10	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
----------------------------	-----------------------------	-------------	-------------	---------	---------	--------------

COURSE NAME	Heat and Mass transfer
CO Description	Student will be able to describe the mass transfer by distillation and drying.
LO Description	Student will be able to understand the general principle of humidification and de-humidification.

SCHEME OF STUDY

S. No.	Learning Content	Teaching Method	–Learning	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1.	Purpose of drying, humidification and de-humidification, general principle, properties of air-moisture mixture, problems on the same.	Interactive teaching, lab demonstration, quiz, assignments.	classroom	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz to make students practice their knowledge.	08	NIL	Handouts, chalk board, PPT, text book, charts, video film, Models.	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 explain the general principle of humidification and de-humidification.	10	Question paper + rating scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of Progressive – II

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code	Course Code	CO Code	LO Code	
-----------------------------------	------------------------------------	--------------------	--------------------	----------------	----------------	--

		<i>C 0 1 5 0 3</i>					<i>5</i>	<i>3</i>	Format No. 4
COURSE NAME	Heat and Mass transfer								
CO Description	Student will be able to describe the mass transfer by distillation and drying.								
LO Description	Student will be able to prepare a report on cooling towers and driers.								
SCHEME OF STUDY									
S. No.	Learning Content	Teaching Method	–Learning	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks	
1.	Study of:- Cooling towers. Tray drier. Rotary drier. Fluidized bed drier.	Lab demonstration, hands on practice, lab assignments, quiz, assignments,		Teacher will demonstrate the procedure of lab experiments. The students will learn through practice.	02	06	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.	Laboratory test by observation	Students will be asked to prepare a report on cooling towers and driers.			10	Observation schedule/check-list /rating scales /rubrics		Internal	
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)									
Part of Lab Work									

REFERENCE BOOKS:

- Heat Transfer, J. P. Holman, Ge, Tata McGraw-Hill Pub Co. Ltd.
- Heat Transfer P.K. Nag Tata McGraw-Hill Pub Co. Ltd.
- Heat and Mass Transfer S.P. Sukhatme
- Fundamentals of Engineering Heat and Mass Transfer R.C. Sachdeva.
- Engineering Heat Transfer Gupta & Prakash
- Unit Operations-II (Heat and Mass Transfer Operations) K. A. Gavhane