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

COURSE NAME	**BASICS OF HEAT TRANSFER**
CO 1 Description	**Explain Basic Concepts of Heat Transfer**
LO 1 Description	**Describe heat transfer process and its importance in Industries**

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 Heat, Energy, work, First law and second law of thermodynamics. Definition of heat transfer and its importance in process Industries.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	05	-----	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 Define heat transfer and its importance in Industries.	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**
		R	***0***	***1***	***4***	***0***	***4***	***1***	***2***	

COURSE NAME	**Basics of Heat Transfer**
CO 1 Description	**Explain Basic Concepts of Heat Transfer**
LO 2 Description	**Elaborates Various 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	Remarks
1	Basic definitions of heat transfer through Conduction, Convection and Radiation, thermal conductivity and effect of temperature on thermal conductivity of different solids, liquids and gases	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	07	------	Handouts, chalk board, PPT, text book.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Part of Progressive 1(internal)	Student will be asked to Classify Various Modes of Heat Transfer thermal conductivity and effect of temperature on thermal conductivity	10	Test paper + 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
		R	*0*	*1*	*4*	*0*	*4*	*2*	*1*	

COURSE NAME	**Basics of Heat Transfer**
CO 2 Description	**Calculate Rate of Heat Transfer in Solids Through Conduction**
LO 1 Description	**Explain the Fourier's Law of Heat 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	Fourier's law of heat conduction with Concepts of Heat transfer rate, Heat flux, Temperature gradient, thermal resistance, thermal conductivity	Interactive classroom teaching, demonstration, quiz,	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	07		Handouts, chalk board, charts, video film, virtual lab.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Theory exam	Student will be asked about Fourier's law of heat conduction with Concepts of Heat transfer rate, Heat flux, Temperature gradient, thermal resistance, thermal conductivity	10	Rubrics/Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

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

COURSE NAME	**Basics of Heat Transfer**
CO 2 Description	**Calculate Rate of Heat Transfer in Solids Through Conduction**
LO 2 Description	**Calculate The Overall Heat Transfer Coefficient for Different Materials Using Fourier's Law**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	One dimensional steady heat transfers through Conduction in plane walls, composite walls or slabs, Hollow Cylinders or tubes, Critical radius of insulation for pipes and Electrical analogy. Overall heat transfer coefficient U_{th}.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	07	-----	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 simple numerical using Fourier's law of heat 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**
		R	*0*	*1*	*4*	*0*	*4*	*2*	*3*	

COURSE NAME	**Basics of Heat Transfer**
CO2 Description	**Calculate Rate of Heat Transfer in Solids Through Conduction**
LO3 Description	**To Determine Thermal Conductivity of Given Metal Rod.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Fourier's law of heat conduction with Concepts of Heat transfer rate, Heat flux, Temperature gradient ,thermal resistance, thermal conductivity	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will demonstrate the procedure of lab experiments. The students will learn through practice.	05	10	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	Laboratory test by observation	Student will be asked To determine the thermal conductivity of given metal rod.	15	Observation schedule/ check-list / rating scale / rubrics	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of external practical

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

COURSE NAME	**Basics of Heat Transfer**
CO3 Description	**Calculate Rate of Heat Transfer for Given Process Through Convection**
LO1 Description	**Explain Newton's Law of Heat Transfer Through Convection**

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 of Convection heat transfer phenomenon, Free Convection and Forced Convection (definitions only),Newton's Law of Heat Transfer, convective heat transfer coefficient, Individual and Overall heat transfer coefficient	Interactive classroom teaching, demonstration, quiz, assignments, tutorial. .	Teacher will demonstrate the procedure of lab experiments. The students will learn through practice.	07		Handouts, chalk board, charts, video film, virtual lab.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Term work	Student will be asked to Describe Newton's law of heat transfer in convection..	10	Question paper + 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**
		R	***0***	***1***	***4***	***0***	***4***	***3***	***2***	

COURSE NAME	**Basics of Heat Transfer**
CO3 Description	**Calculate Rate of Heat Transfer for Given Process Through Convection**
LO2 Description	**Solve Simple Numerical Problem Related To Newton's Law 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	Remarks
1	Newton's Law of convective heat transfer, Individual and Overall heat transfer coefficient ..	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	07		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 simple numerical problem related to Newton's law of heat 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	Format No. **4**
		R	*0*	*1*	*4*	*0*	*4*	*3*	*3*	

COURSE NAME	**Basics of Heat Transfer**
CO3 Description	**Calculate Rate of Heat Transfer for Given Process Through Convection**
LO3 Description	**To Determine Heat Transfer Co-Efficient in Convection.**

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 of Convection heat transfer phenomenon, Free Convection and Forced Convection (definitions only),Newton's Law of Heat Transfer, convective heat transfer coefficient	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will demonstrate the procedure of lab experiments. The students will learn through practice.	05	07	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	Laboratory test by observation	Student will be asked To determine heat transfer co-efficient by Natural convection.	15	Observation schedule/ check-list / rating scale / rubrics	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Part of external practical

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

COURSE NAME	**Basics of Heat Transfer**
CO4 Description	**Calculate Rate Of Heat Transfer Through Radiation.**
LO1 Description	**Define Basic Terms Related to Radiation**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Concepts of radiation, Emission of radiation Wavelength of radiation, Emissive power, Black body, Gray body, White body Opaque body	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	05	------	Handouts, chalk board, PPT,text book, charts, video film, virtual lab.	

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 Define Radiation related terms.	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**
		R	*0*	*1*	*4*	*0*	*4*	*4*	*2*	

COURSE NAME	**Basics of Heat Transfer**
CO4 Description	**Calculate Rate Of Heat Transfer Through Radiation.**
LO2 Description	**Explain Various Laws of Radiations**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Absorptivity, reflectivity and transmissivity, black, white and grey body, emissive power, emissivity, Kirchhoff's law, Planck's law, Wien's displacement law, Stefan-Boltzmann law, intensity of radiation.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	08		Handouts, chalk board, PPT, text book, charts, video film, virtual lab.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Part of Progressive 2	Student will be asked to Explain Radiations related Laws	10	Test paper + 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**
		R	*0*	*1*	*4*	*0*	*4*	*4*	*2*	

COURSE NAME	**Basics of Heat Transfer**
CO4 Description	**Calculate the rate of heat transfer for the given process through Radiation**
LO3 Description	**Solve Simple Problems Related to Heat Transfer Through Radiation**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Intensity of radiation, radiation heat exchange between black bodies, shape factor, electrical analogy, radiation heat exchange between gray bodies, Radiosity, irradiation, radiation shields.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	06	-------	Handouts, chalk board, PPT, text book, charts, video film, virtual lab.	

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 simple problems related to heat transfer through Radiation.	10	Question paper + Rating scale	External

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**
		R	*0*	*1*	*4*	*0*	*4*	*5*	*1*	

COURSE NAME	**Basics of Heat Transfer**
CO5 Description	**Analyze Heat Exchangers**
LO1 Description	**Explain Different Types of 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	Types of heat exchanger based on flow pattern, function and construction ,Double pipe heat exchanger Counter flow, Parallel flow , Shell and tube heat exchanger 1-1 Pass , 1-2 Pass	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practicetheir knowledge.	05	----	Handouts, chalk board, PPT, text book, charts, video film, virtual lab.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Seminar Presentation	Student will be asked to Explain and Classify heat exchanger	10	Board or PPT Presentation	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**
		R	***0***	***1***	***4***	***0***	***4***	***5***	***2***	

COURSE NAME	**Basics of Heat Transfer**
CO5 Description	**Analyze Heat Exchangers**
LO2 Description	**Derive Equation and Calculate L.M.T.D.**

SCHEME OF STUDY

S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	L.M.T.D. derivation of equation Overall heat transfer co-efficient of heat exchangers and heat exchanger area	Interactive classroom teaching, demonstration, quiz, assignments, tutorial..	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	03	04	Handouts, chalk board, charts, video film, virtual lab.	

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Laboratory work	Student will be asked to Derive Equation and Calculate L.M.T.D..	10	Test Paper + Rating Scale	Internal

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

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

COURSE NAME	**Basics of Heat Transfer**
CO5 Description	**Analyze Heat Exchangers**
LO3 Description	**Solve Simple Numerical Problems 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	LMTD of Parallel flow and Counter flow heat exchangers, Overall heat transfer coefficient, No. of transfer Units(NTU)	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge..	07		Handouts, chalk board, charts, video film, virtual lab.	

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 simple numerical problems based on LMTD and Overall Heat transfer Coefficient and NTU	10	Question paper + Rating scale	External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Nil