

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT - 3		Sheet No. 1/4	
Branch	REFRIGERATION AND AIR CONDITIONING ENGINEERING			Semester	VI		
Course Code	601	Course Name	HVAC LOAD ESTIMATION				
Course Outcome 1	Site selection for a given air conditioning system				Teaching Hrs	Marks	
Learning Outcome 1	Identify suitable inside and outside design conditions for comfort air conditioning				4 hrs	5	
Contents	Classification of Climate Zone, Climate zones of India, outside design data at different latitude and months, weather data, Selection of inside and outside design conditions for winter and summer, ASHRAE recommended summer design conditions, table for major Indian cities. Corrections to outdoor design Conditions for time of day and Time of year, Inside industrial design conditions						
Method of Assessment	Progressive Test - I			Internal			
Learning Outcome 2	Explain management of Indoor Air Quality				7hrs	10	
Contents	Meaning and need of Indoor Air Quality (IAQ). Source of Indore Air Pollutant, Sick Building Syndromes, Building System Maintenance, Renovation Activity, Air Cleaning, Factors Affecting Attributes Of Indore Air, Improve IAQ, Building Ventilation, Air Change, Air Velocity, controls of IAQ.						
Method of Assessment	Theory Exam			External			
Learning Outcome 3	Determine the overall Heat transfer coefficient U for given for walls, roofs, partitions, Ceilings, Floors, Doors, and Windows for given materials				4hrs	5	
Contents	Planning of work, Basic Information, Building Location, Orientation of building, Use of space Physical dimensions of space, Building Structures, Specification of building Construction materials, Climate conditions. Define Occupancy load, Thermal conductivity, Transmission Coefficients U for Walls, Roofs, Partitions, Ceilings, Floors, Doors, and Windows Cooling Load Component, External and Internal heat gains sensible heat, latent heat						
Method of Assessment	Progressive Test - I			Internal			
Course Outcome 2	Estimation of the solar heat gain through glass				Teaching Hrs	Marks	
Learning Outcome 4	Describe fenestration, needs , effect on air conditioning				8hrs	10	
Contents	Distribution of Solar radiation, solar time, Solar radiation through fenestration, solar heat gain through ordinary glass, effect of tilt of glass on solar gain, effect of orientation of glass opening, effect of shading device, effect of sky haziness. Shading from Reveals, Overhangs, Fins and Adjacent Buildings, Space heat gain and space cooling load, Cooling Load Temperature Difference(CLTD)/ Solar Cooling Load(SCL)/ Cooling Load Factor(CLF) method,						

Method of Assessment		Theory Exam		External	
RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT - 3	Sheet No. 2/4
Branch	REFRIGERATION AND AIR CONDITIONING ENGINEERING			Semester	VI
Course Code	601	Course Name	HVAC LOAD ESTIMATION		
Learning Outcome 5		Calculate heat transfer rate due to fenestration		7hrs	10
Contents		Calculation of Transmission heat gain through glass, and by direct penetration of solar radiation - maximum Solar Heat Gain Factor (SHGF) and Cooling Load Factor (CLF). Solar Heat Gain Factor (SHGF) for windows glass with indoor shading devices. Different types of shading device and their coefficients, Over all factors for solar heat gain through glass with and without shading devices, Cooling load factor (CLF) for windows glass with indoor shading device using ASHRAE Fundamentals.			
Method of Assessment		Theory Exam		External	
Course Outcome 3		Estimate heat transfer rate for opaque surface using CLTD/ETD method		Teaching Hrs	Marks
Learning Outcome 6		Explain the general aspects of heat transfer through buildings		7hrs	5
Contents		One-dimensional, steady and unsteady state heat transfer through buildings, walls and roof Homogeneous wall, Non-homogeneous walls, Overall heat transfer coefficient, Thermo-physical properties of some common building and insulating materials, Surface or film conductance for air film, Thermal conductance of air space, Sol-air temperature			
Method of Assessment		Term Work		Internal	
Learning Outcome 7		Calculate Sensible Heat Gain through Opaque Surface		8hrs	10
Contents		Calculation of Overall heat transfer coefficient, Cooling Load Temperature Difference (CLTD) for walls and roofs. Equivalent CLTDs for D type of walls, Variation of time lag and decrement factor with wall thickness and density, Variation of heat transfer rate with time for thick and thin walls of building. (The CLTD values for all other wall groups referred in the 1997 ASHRAE Fundamentals Handbook)			
Method of Assessment		Theory Exam		External	

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE			FORMAT - 3	Sheet No. 3/4
Branch	REFRIGERATION AND AIR CONDITIONING ENGINEERING			Semester	VI	
Course Code	601	Course Name	HVAC LOAD ESTIMATION			
Course Outcome 4	Estimate Heat Load Gain through Internal Heat Source			Teaching Hrs	Marks	
Learning Outcome 8	Explain procedure for estimating occupancy load			7hrs	10	
Contents	Heat load gain from occupants, Sensible and Latent heat gain from occupants, rate of heat gain from occupants at different activity level based on 24°C room dry bulb temperature. Rate of heat gain from occupant at conditioned space (W), Sensible heat cooling load factor (CLF) for people, Total heat gain, sensible heat gain fraction from occupants					
Method of Assessment	Theory Exam			External		
Learning Outcome 9	Estimate the Heat load gain from lightening, appliances and equipment			7hrs	10	
Contents	Show The value of wattage of light is given according to the type of use in room, Heat gain through lights, Heat gain from electric equipments, Heat gain from office equipments General office equipments such as computers, printers, fax machines and copiers consume energy even when these are not in use, heat gain from product, Use Heat gain rate for office equipments (Watts) 2001 ASHRAE Fundamentals Hand Book					
Method of Assessment	Theory Exam			External		
Learning Outcome10	Estimate Heat gain from system heat load			3hrs	5	
Contents	Product load, process load, system heat gain, supply air duct heat gain and leakage loss, return air duct heat gain and leakage loss, heat gain from air conditioning fan, heat gain from dehumidifier pump and piping					
Method of Assessment	Progressive Test - II			Internal		
Learning Outcome 11	Calculate heat gain due to Ventilation, Infiltration			3hrs	5	
Contents	Infiltration, Stack effect, Wind action, crack method and air change method, infiltration due to door opening, value of Required Ventilation rate per Person and per unit Area, Number of air changes per hour, Ventilation for Acceptable Indoor Air Quality Regulation and Standards					

Method of Assessment		Progressive Test - II		Internal	
RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT - 3	Sheet No. 4/4
Branch	REFRIGERATION AND AIR CONDITIONING ENGINEERING			Semester	VI
Course Code	601	Course Name	HVAC LOAD ESTIMATION		
Course Outcome 5	Estimate total capacity of plant			Teaching Hrs	Marks
Learning Outcome 12	Calculations of Grand Total Heat (GTH), Total Refrigeration Tonnage			6hrs	6
Contents	The assumptions behind design cooling load, equation of Dehumidified air quantity of supply air, Supply air temperature (Ts), method of calculate Dehumidified air quantity of supply air for actual coil, Quantity of Air Using fresh air for ventilation, Leaving air dry bulb temperature (supply), Quantity of Recalculated Air, Entering Air DBT (Mixing)-, Grand Total Heat (GTH), Total tonnage, Analysis of calculated ventilation rates v/s ASHRAE /ANSI Standards for various occupancy zones, Size of air conditioner, sq.-ft/TR, CFM per person for various applications				
Method of Assessment	Theory Exam		External		
Learning Outcome 13	To Optimize of Thermal load of plant			4hrs	4
Contents	Minimization of solar gain, shading of the building air locks, building design features and thermal properties of construction material, minimization infiltration and ventilation load, use of natural ventilation for cooling, use of thermal storage, plant selection ,plant maintenance, use of automatic controls, Artificial Intelligence (AI)/ Internet of things)IOT				
Method of Assessment	Term Work		Internal		

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					<i>R</i>	<i>0</i>	<i>1</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>1</i>	
COURSE NAME	HVAC LOAD ESTIMATION												
CO Description	CO-1 Site selection for a given air conditioning system												
LO Description	LO-1 Identify suitable inside and outside design conditions for comfort air conditioning												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks						
1	Classification of Climate Zone, Climate zones of India, outside design data at different latitude and months, weather data, Selection of inside and outside design conditions for winter and summer, ASHRAE recommended summer design conditions, table for major Indian cities. Corrections to outdoor design Conditions for time of day and Time of year, Inside industrial design conditions	Interactive Classroom method, Handout, PPTs, Charts and Videos.	Teacher will explain the contents and provide ASHRAE thermal comfort Standards 55.handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge	4	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos, Climate data for given cities	NIL						
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required	External / Internal				
1	Progressive Test I	Student will be asked to (and/or) 1. Select suitable Inside/Outside design conditions for comfort air conditioning in given situation (Identify the Climate Zone/Criteria/Corrections)					5	Pen paper	Internal				
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code		Course Code			CO Co de	LO Code	Format No. 4
					R	0	1	6	0	1	1	
COURSE NAME	HVAC LOAD ESTIMATION											
CO Description	CO-1 Site selection for a given air conditioning system											
LO Description	LO-2 Explain management of Indoor Air Quality											
SCHEME OF STUDY												
S. No.	Learning Content			Teaching – Learning Method	Description of T-L Process			Teach Hrs.	Pract. /Tut Hrs.	LRs Required		Remarks
1	Meaning and need of Indoor Air Quality (IAQ). Source of Indoor Air Pollutant, Sick Building Syndromes, Building System Maintenance, Renovation Activity, Air Cleaning, Factors Affecting Attributes Of Indoor Air, Improve IAQ, Building Ventilation, Air Change, Air Velocity, controls of IAQ			Interactive Classroom method, Handout, PPTs, Charts and Videos.	Teacher will explain the contents and provide ASHRAE thermal comfort Standards 55.handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge			7	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos		
SCHEME OF ASSESSMENT												
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required	External / Internal			
1	Theory	Students will be asked (and/or) 1. Explain Indoor Air Quality (IAQ) and Need of IAQ 2. Explain Source Of Indoor Air Pollutant 3. Explain Sick Building Syndromes 4. Explain Building System Maintenance 5. Describe Factors Affecting Attributes Of Indoor Air 6. Explain given controls of Indoor Air Quality (IAQ)					10	Paper Pen	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	6	0	1	1	3	
COURSE NAME	HVAC LOAD ESTIMATION														
CO Description	CO-1 Site selection for a given air conditioning system with special reference to major Indian cities.														
LO Description	LO 3 Determine the overall Heat transfer coefficient U for given for walls, roofs, partitions, Ceilings, Floors, Doors, and Windows for given materials														
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks								
1	Planning of work, Basic Information, Building Location, Orientation of building, Use of space Physical dimensions of space, Building Structures, Specification of building Construction materials, Climate conditions. Define Occupancy load, Thermal conductivity, Transmission Coefficients U for Walls, Roofs, Partitions, Ceilings, Floors, Doors, and Windows Cooling Load Component, External and Internal heat gains sensible heat, latent heat	Interactive Classroom method, Handout, PPTs, Charts and Videos	Teacher will explain the contents and provide ASHRAE. Handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge	4	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos	NIL								
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal										
1	Progressive Test I	Students will be asked (and/or) <ul style="list-style-type: none"> 1. Enlist Steps followed for building survey 2. Make chart to Show the Space Characteristics And Heat Load Sources 3. List the thermal conductivity of given construction materials 4. Enlist guidelines for selection for location of equipment and service 5. Determine the U coefficient for walls, roofs, partitions, Ceilings, Floors, Doors, and Windows for given materials 	5	Pen Paper	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
					<i>R</i>	<i>0</i>	<i>1</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>4</i>	
COURSE NAME	HVAC LOAD ESTIMATION												
CO Description	CO 2: Estimation of the solar heat gain through glass												
LO Description	LO-4 : Describe fenestration, needs , effect on air conditioning												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark						
1	Distribution of Solar radiation, solar time, Solar radiation through fenestration, solar heat gain through ordinary glass, effect of tilt of glass on solar gain, effect of orientation of glass opening, effect of shading device, effect of sky haziness. Shading from Reveals, Overhangs, Fins and Adjacent Buildings, Space heat gain and space cooling load, Cooling Load Temperature Difference(CLTD)/ Solar Cooling Load(SCL)/ Cooling Load Factor(CLF) method,	Interactive Classroom method, Handout, PPTs, Charts and Videos.	Teacher will explain the contents and provide ASHRAE Teacher will conduct Quiz/visit to make students practice their knowledge	8	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment						Maximum Marks	Resources Required	External / Internal			
1	Theory Exam	Students will be asked (and/or) 1. Explain Need for fenestration in buildings 2. Describe Radiation properties of clear glass 3. Explain effect of external shading / tilt of glass/ sky haziness /solar time on solar gain 4. Describe CLTD/SCL/CLF method for space heat gain and space cooling load						10	Test Paper	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
					<i>R</i>	<i>0</i>	<i>1</i>	<i>6</i>	<i>0</i>	<i>1</i>	2	5	
COURSE NAME	HVAC LOAD ESTIMATION												
CO Description	CO-2 Estimation of the solar heat gain through glass												
LO Description	LO5- Calculate heat transfer rate due to fenestration												
SCHEME OF STUDY													
S. No	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark						
1	Calculation of Transmission heat gain through glass, and by direct penetration of solar radiation - maximum Solar Heat Gain Factor (SHGF) and Cooling Load Factor (CLF). Solar Heat Gain Factor (SHGF) for windows glass with indoor shading devices. Different types of shading device and their coefficients, Over all factors for solar heat gain through glass with and without shading devices, Cooling load factor (CLF) for windows glass with indoor shading device using ASHRAE Fundamentals.	Interactive Classroom method, Handout, PPTs, Charts and Videos.	Teacher will explain the contents and provide ASHRAE Teacher will conduct Quiz/visit to make students practice their knowledge	7	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment						Maximum Marks	Resources Required	External / Internal			
1	Theory Exam	Students will be asked (and/or) 1. Explain Solar Heat Gain Factor (SHGF), Cooling Load Factor (CLF) and Shading Coefficient (SC). 2. Calculate heat transfer rate due to fenestration using Cooling load factor (CLF), SHGF tables and shading coefficients						10	Test Paper	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	6	0	1	3	6	
COURSE NAME	HVAC LOAD ESTIMATION														
CO Description	CO-3 - Estimate heat transfer rate for opaque surface using CLTD/ETD method														
LO Description	LO- 6- Explain the general aspects of heat transfer through buildings														
SCHEME OF STUDY															
S. No.	Learning Content				Teaching –Learning Method			Description of T-L Process			Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark	
1	One-dimensional, steady and unsteady state heat transfer through buildings, walls and roof Homogeneous wall, Non-homogeneous walls, Overall heat transfer coefficient, Thermo-physical properties of some common building and insulating materials, Surface or film conductance for air film, Thermal conductance of air space, Sol-air temperature				Interactive Classroom method, Handout, PPTs, Charts and Videos.			Teacher will explain the contents and provide ASHRAE. Handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge			7	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos		
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment								Maximum Marks	Resources Required	External / Internal			
1	Term Work (TW)	Students will be asked (and/or) 1. Explain One-dimensional, steady and unsteady state heat transfer through buildings 2. Explain Overall heat transfer coefficient for given material 3. Enlist the Thermo-physical properties of some common building and insulating materials 4. Explain Surface or film conductance for air film, Thermal conductance of air space, Sol-air temperature								5	Pen Paper	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	6	0	1	3	7	
COURSE NAME	HVAC LOAD ESTIMATION														
CO Description	CO3- Estimate heat transfer rate for opaque surface using CLTD/ETD method														
LO Description	LO 7 - Calculate Sensible Heat Gain through Opaque Surface														
SCHEME OF STUDY															
S. No	Learning Content					Teaching –Learning Method		Description of T-L Process		Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark		
1	Calculation of Overall heat transfer coefficient, Cooling Load Temperature Difference (CLTD) for walls and roofs. Equivalent CLTDs for D type of walls, Variation of time lag and decrement factor with wall thickness and density, Variation of heat transfer rate with time for thick and thin walls of building. (The CLTD values for all other wall groups referred in the 1997 ASHRAE Fundamentals Handbook)					Interactive Classroom method, Handout, PPTs, Charts and Videos.		Teacher will explain the contents and provide ASHRAE. Teacher will conduct Quiz/visit to make students practice their knowledge		8	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos			
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment							Maximum Marks	Resources Required	External / Internal				
1	Theory Exam	Students will be asked (and/or) 1. Explain Cooling load temperature difference (CLTD)/Equivalent CLTDs for D type of walls for difference facing 2. Describe factors affecting Variation of time lag /decrement factor with wall thickness/ density. 3. Determine the Overall heat transfer coefficient for given Opaque Surfaces.							10	Test Paper	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
					<i>R</i>	<i>0</i>	<i>1</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>4</i>	<i>8</i>	
COURSE NAME	HVAC LOAD ESTIMATION												
CO Description	CO-4 Estimate Heat Load Gain through Internal Heat Source												
LO Description	LO-8 Explain procedure for estimating occupancy load												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark						
1	Heat load gain from occupants, Sensible and Latent heat gain from occupants, rate of heat gain from occupants at different activity level based on 24°C room dry bulb temperature. Rate of heat gain from occupant at conditioned space (W), Sensible heat cooling load factor (CLF) for people, Total heat gain, sensible heat gain fraction from occupants	Interactive Classroom method, Handout, PPTs, Charts and Videos.	Teacher will explain the contents and provide ASHRAE. Handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge	7	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment						Maximum Marks	Resources Required	External / Internal			
1	Theory Exam	Students will be asked (and/or) 1. Explain Heat load gain from occupants with equations. 2. Enlist the rate of heat gain from occupants at given activities level based on 24°C room dry bulb temperature. 3. Explain sensible heat Cooling Load Factor (CLF) for people at different time spending hours. 4. Explain Total heat gain, Sensible heat gain fraction from occupants.						10	Test paper	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	6	0	1	4	9	
COURSE NAME	HVAC LOAD ESTIMATION													
CO Description	CO-4 Estimate Heat Load Gain through Internal Heat Source													
LO Description	LO 9 Estimate the Heat load gain from lightening, appliances and equipment													
SCHEME OF STUDY														
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark							
1	Show The value of wattage of light is given according to the type of use in room, Heat gain through lights, Heat gain from electric equipments, Heat gain from office equipments General office equipments such as computers, printers, fax machines and copiers consume energy even when these are not in use, heat gain from product, Use Heat gain rate for office equipments (Watts) 2001 ASHRAE Fundamentals Hand Book	Interactive Classroom method, Handout, PPTs, Charts and Videos.	Teacher will explain the contents and provide ASHRAE. Handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge	7	0	2001 ASHRAE fundamentals handbook, Carrier Handbook Handouts, Charts, Videos								
SCHEME OF ASSESSMENT														
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal									
1	Theory	Students will be asked (and/or) <ul style="list-style-type: none"> 1. Estimate Heat gain through given lighting equipments 2. Estimate Heat gain from given electric equipments 3. Estimate Heat gain from given office equipments 4. Estimate Heat gain from given product 	10	Test Paper	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.	
					<i>R</i>	<i>0</i>	<i>1</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>4</i>	<i>10</i>	4
COURSE NAME		HVAC LOAD ESTIMATION											
CO Description		CO-4 Estimate Heat Load Gain through Internal Heat Source											
LO Description		LO-10 Estimate Heat gain from system heat load											
SCHEME OF STUDY													
S. No.	Learning Content	T-L Method	Description of T-L Process					Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark		
1	Product load, process load, system heat gain, supply air duct heat gain and leakage loss, return air duct heat gain and leakage loss, heat gain from air conditioning fan, heat gain from dehumidifier pump and piping	Interactive Classroom method, Handout PPTs, Charts and Videos, Models	Teacher will explain the contents and provide ASHRAE thermal comfort Standards 55.handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge					3	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos			
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required	External / Internal				
1	Progressive Test 2	Students will be asked (and/or) 1. Describe Product load/ Process load 2. Explain System heat gain/ Supply air duct heat gain / Return air duct heat gain / Leakage loss 3. Estimate Heat gain from air conditioning fan / Heat gain from dehumidifier pump and piping					5	Pen Paper	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
							<i>R</i>	<i>0</i>	<i>1</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>4</i>	<i>11</i>	
COURSE NAME		HVAC LOAD ESTIMATION													
CO Description		CO-4 Estimate Heat Load Gain through Internal Heat Source													
LO Description		LO- 11 Calculate heat gain due to Ventilation, Infiltration													
SCHEME OF STUDY															
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark								
1	Infiltration, Stack effect, Wind action, crack method and air change method, infiltration due to door opening, value of Required Ventilation rate per Person and per unit Area, Number of air changes per hour, Ventilation for Acceptable Indoor Air Quality Regulation and Standards	Interactive Classroom method, Handout, PPTs, Charts and Videos.	Teacher will explain the contents and provide ASHRAE. Handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge	3	0	ANSI, ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos									
SCHEME OF ASSESSMENT															
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal										
1	Progressive Test 2	Students will be asked (and/or) 1. Explain Infiltration, Stack effect, Wind action. 2. Describe Crack method and air change method 3. Calculate Number of air changes per hour for given conditions 4. Enlist Ventilation standards for Acceptable Indoor Air Quality	5	Pen Paper	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	6	0	1	5	12	
COURSE NAME	HVAC LOAD ESTIMATION												
CO Description	CO- 5 Estimate total capacity of plant												
LO Description	LO- 12 Calculations of Grand Total Heat (GTH), Total Refrigeration Tonnage												
SCHEME OF STUDY													
S. No.	Learning Content				Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Rem ark			
1	The assumptions behind design cooling load, equation of Dehumidified air quantity of supply air, Supply air temperature (Ts), method of calculate Dehumidified air quantity of supply air for actual coil, Quantity of Air Using fresh air for ventilation, Leaving air dry bulb temperature (supply), Quantity of Recalculated Air, Entering Air DBT (Mixing)-, Grand Total Heat (GTH), Total tonnage, Analysis of calculated ventilation rates v/s ASHRAE /ANSI Standards for various occupancy zones, Size of air conditioner, sq.-ft/TR, CFM per person for various applications				Interactive Classroom method, Handout PPTs, Charts and Videos.	Teacher will explain the contents and provide ASHRAE. Handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge	6	0	ASHRAE handbook, Carrier Handbook, Psychometric Charts/Tables Handouts, Charts, Videos				
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment					Maximum Marks	Resources Required	External / Internal				
1	Theory	Students will be asked (and/or) <ol style="list-style-type: none"> 1. Calculate Dehumidified air quantity/ temperature (Ts) of Supply air with/ without bypass 2. Calculate Quantity of Air Using fresh air for ventilation 3. Calculate Dry bulb temperature of Leaving air (re circulating air) 4. Calculate Quantity/Temperature of Air before mixing/ after mixing 5. Calculate Grand Total heat (GTH), Total tonnage 6. Calculate Size of air conditioner, sq.-ft/TR, CFM per person for given applications 					10	Test Paper	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	6	0	1	5	13	
COURSE NAME	HVAC LOAD ESTIMATION												
CO Description	CO-5 Estimate total capacity of plant												
LO Description	LO-13 To Optimize of Thermal load of plant												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark						
1	Minimization of solar gain, shading of the building air locks, building design features and thermal properties of construction material, minimization infiltration and ventilation load, use of natural ventilation for cooling, use of thermal storage, plant selection ,plant maintenance, use of automatic controls, Artificial Intelligence (AI)/ Internet of things)IOT	Interactive Classroom method, Handout, PPTs, Charts and Videos, Models	Teacher will explain the contents and provide ASHRAE. Handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge	4	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos,							
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 (and/or) <ul style="list-style-type: none"> 1. Describe Optimization of building load 2. Explain minimizing solar gain/ shading of the building/ air locks 3. Explain building design features / thermal properties of construction material 4. Enlist Steps of minimization infiltration and ventilation load 5. Explain the use of thermal storage/ Natural ventilation. 6. Describe automatic controls, Artificial Intelligence (AI)/ Internet of things)IOT 	5	Test Paper	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
		<i>R</i>		<i>0 1</i>		<i>6 0 1</i>		<i>5</i>	<i>14</i>			
COURSE NAME	HVAC LOAD ESTIMATION											
CO Description	CO3 Estimation heat transfer rate for opaque surface using CLTD/ETD method											
LO Description	LO- 14 Describe Cooling load estimation for Cold storages											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remark					
1	insulating material selection, Cooling load calculation of refrigeration load, Product storage temperatures, Design input data, respiration load, pull down time, infiltration, daily loading, internal loads, U – factors for thermal envelope	Interactive Classroom method, Handout PPTs, Charts and Videos.	Teacher will explain the contents and provide ASHRAE. Handout to students. Teacher will conduct Quiz/visit to make students practice their knowledge	3	0	ASHRAE handbook, Carrier Handbook Handouts, Charts, Videos						
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 <ul style="list-style-type: none"> Criteria of site selection of cold storage, insulating material selection Cooling load calculation for cold storages Variety of Product storage, temperatures, requirement of design input data Respiration load, pull down time, infiltration, daily loading, internal loads 	5	Pen Paper	Internal							

		<ul style="list-style-type: none">• U – factors for thermal envelope			
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ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

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