

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT- 3	Sheet No. 1/2
Branch	REFRIGERATION AND AIR CONDITIONING ENGINEERING			Semester	VI
Course Code		Course Name	INSTALLATION, TESTING AND COMMISSIONING OF HVAC&R SYSTEMS		
Course Outcome 1	Application of Basic tools, procedures for maintenance of RAC systems			Teach Hrs	Marks
Learning Outcome 1	Describe tools, operations for copper tubing of RAC systems			5	10
Contents	Constructional details and use of tools used in refrigeration and air conditioning practices. Classification and types of joints, connections used in refrigeration and air conditioning systems. Procedure of Tube cutting, flaring, swaging, bending, pinching and brazing for copper tubes.				
Method of Assessment	Theory Exam		External		
Learning Outcome 2	Explain the procedure of using copper tubing tools for RAC systems			5	10
Contents	Constructional details and use of tools used in refrigeration and air conditioning practices. Classification and types of joints, connections used in refrigeration and air conditioning systems. Procedure of Tube cutting, flaring, swaging, bending, pinching and brazing for copper tubes.				
Method of Assessment	LW		External		
Learning Outcome 3	Describe procedure for refrigerant charging in RAC system			6	10
Contents	System Evacuations, System Pump Down, Leak testing methods- by soap solution, Halide torch, Electronic detector, Typical methods. Refrigerant charging. System Lubricants, Properties, Lubrication types- Splash, Pressure.				
Method of Assessment	Theory Exam		External		
Learning Outcome 4	Explain working with Sheet metal for making ducts			4	5
Contents	Explain sheet metal tools and equipments, procedures for Sheet metal cutting, bending, riveting and soldering. Application of insulation and protection materials on ducts				
Method of Assessment	PG I		Internal		
Learning Outcome 5	Describe tube joining for refrigeration and air conditioning plants			3	5
Contents	Welding/ Brazing practices for different materials used in refrigeration and air conditioning plants. Types of rods, filler materials and Safety in welding/Brazing.				
Method of Assessment	PG I		Internal		

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 1/2
Branch	REFRIGERATION AND AIR CONDITIONING ENGINEERING			Semester	VI
Course Code		Course Name	INSTALLATION, TESTING AND COMMISSIONING OF HVAC&R SYSTEMS		
Learning Outcome 6	Analyze Basic Electrical and Electronics circuits of RAC plants			10	10
Contents	Electrical safety, different wire joints. Measurement of current, volts, power, and earth resistance. Single phase connection of motors. Identification of the terminals of sealed compressor and their windings, use of DOL starter with different types of motors. Testing and connection of relays used in sealed motors. Identification of the electronic components. Testing of resistors, transistor, capacitor, diode, amplifier, IC PCB Soldering and de soldering				
Method of Assessment	LW		Internal		
Course Outcome 2	Commissioning of given RAC Plants			Teach Hrs	Marks
Learning Outcome 7	Plan RAC projects			8	10
Contents	RAC plant layout, Parameters Affecting the location. Organizational approach. Erection methodology. Foundation, padding, network analysis: CPM & PERT, safety precautions, air handling equipment's locations in the systems, corrosion control. HVAC System balancing: Capacity control of Compressor, Condenser, Evaporator. Water Balancing Procedures Using Flow Meters, Analog And Digital Controls				
Method of Assessment	PG II		Internal		
Learning Outcome 8	Testing of given RAC plants			10	10
Contents	Codes And Standards Related To HVAC&R Projects, Instruments Required for – Pressure, Temperature, Flow, Air Quality, Power, Harmonics Etc. General And Specific Testing And Its Procedures For Constant Air Volume Systems, Variable Air Volume Systems, Return Air Systems, Cooling Towers And Performance, Fans And Fan Performance				
Method of Assessment	LW		External		
Learning Outcome 9	Execute RAC plant Commissioning			6	10
Contents	Introduction to Commissioning, Objectives of Commissioning, Benefits of Commissioning. Cost Benefit Analysis. Levels of commissioning. Selection Of Commissioning Provider, The HVAC Commissioning Team, Comprehensive HVAC Commissioning. Construction HVAC Commissioning. HVAC Commissioning In Existing Buildings				
Method of assessment	Theory Exam		External		

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 1/2
Branch	REFRIGERATION AND AIR CONDITIONING ENGINEERING			Semester	VI
Course Code		Course Name	INSTALLATION, TESTING AND COMMISSIONING OF HVAC&R SYSTEMS		
Course Outcome 3	Describe Project Management of HVAC&R			Teach Hrs	Marks
Learning Outcome 10	Explain HVAC&R Project reports			8	10
Contents	Objective of project report, need of Technical Communication: Interpersonal Skills, Report preparation skills, Professional Ethics. Reading and Working on CAD Drawings. Preparation of project demand, project details, diversity assuming, air stratification, comparison of various systems for optimized performance, Bill of Quantities, Payable period of system				
Method of Assessment	Theory Exam		External		
Learning Outcome 11	Prepare Tender Estimation document for given project			8	10
Contents	Preparation of project demand, project details, diversity assuming, air stratification, comparison of various systems for optimized performance, Bill of Quantities, Payback period of system				
Method of Assessment	LW		External		
Learning Outcome 12	Present project plan, tender document for given project			10	10
Contents	Presentation skills, seminar : preparation of PPTs, preparation of Multimedia – Case Studies Of Critical Projects, Highlighting Design Challenges/ Commissioning Tasks				
Method of Assessment	TW		Internal		
Course Outcome 4	Describe RAC Plant Operations			Teach Hrs	Marks
Learning Outcome 13	Describe manual operation of RAC plants			8	10
Contents	Control panels, Different parameters to observe and maintain, Reading gauges and their interpretations, log book management, Limitations of manually operated plants				
Method of Assessment	LW		Internal		

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3		Sheet No. 1/2	
Branch	REFRIGERATION AND AIR CONDITIONING ENGINEERING				Semester	VI	
Course Code		Course Name	INSTALLATION, TESTING AND COMMISSIONING OF HVAC&R SYSTEMS				
Learning Outcome 14		Explain IBMS in HVAC systems			7	10	
Contents		Introduction to IBMS, Functions of IBMS, benefits of IBMS, system architecture, interaction with other building systems(Lighting, Fire safety, CCTV etc.), Introduction To LONWORKS, BACnet, MODBUS and Internet standards. Controlling methods of HVAC Components in IBMS					
Method of Assessment		Theory Exam			External		
Course Outcome 5		Explain the procedure to repair for given RAC systems			Teach Hrs	Marks	
Learning Outcome 15		Explain the procedure to resolve possible faults for Refrigeration systems			10	10	
Contents		Step by step procedure for trouble shooting of Refrigeration system with reference to Possible faults- diagnosis- solution with the help of Trouble shooting charts : a. System not starting b. System starts but no cooling c. Less cooling then indicated d. Frequent tripping/ short cycle e. Frosting in evaporator/ at expansion device f. System making noise g. System runs continuously without stopping					
Method of Assessment		Theory Exam			External		
Learning Outcome 16		Explain the procedure to resolve possible faults for Air conditioning systems			10	10	
Contents		Step by step procedure for trouble shooting of Air conditioning system with reference to Possible defects- diagnosis- solution with the help of Trouble shooting charts : a. System not starting b. System starts but no air cooling c. Less air cooling then indicated d. Frequent tripping/ short cycle e. Frosting in evaporator/ at expansion device f. System making noise g. System runs continuously without stopping					
Method of Assessment		Theory Exam			External		

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>2</i>	<i>1</i>	<i>1</i>	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS												
CO Description	CO-1 Application of Basic tools, procedures for maintenance of RAC systems												
LO Description	LO-1 Describe tools, operations for copper tubing of RAC systems												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Remarks						
1	Constructional details and use of tools used in refrigeration and air conditioning practices. Classification and types of joints, connections used in refrigeration and air conditioning systems. Procedure of Tube cutting, flaring, swaging, bending, pinching and brazing for copper tubes.	Interactive Classroom method, Handout, PPTs, Charts and Videos. Laboratory/Workshop demonstration	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	5		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	Theory exam	Students will be asked (and/or) <ol style="list-style-type: none"> 1. Explain the procedure for Tube cutting/ Tube flaring/ Tube swaging/ Tube bending/ Tube pinching/ Tube brazing for copper tubing 2. Enlist the tools used in refrigeration and air conditioning practices 3. Enlist the joints/connections used in refrigeration and air conditioning systems 						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>2</i>	<i>1</i>	<i>2</i>	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS												
CO Description	CO-1 Application of Basic tools, procedures for maintenance of RAC systems												
LO Description	LO-2 Explain the procedure of using copper tubing tools for RAC systems												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Remarks						
1	Constructional details and use of tools used in refrigeration and air conditioning practices. Classification and types of joints, connections used in refrigeration and air conditioning systems. Procedure of Tube cutting, flaring, swaging, bending, pinching and brazing for copper tubes.	Interactive Classroom method, Handout, PPTs, Charts and Videos. Laboratory/Workshop demonstration	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	1	4	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	Laboratory work	Student will prepare a given job (and/or) 1. Tube cutting/ Tube flaring/ Tube swaging/ Tube bending/ Tube pinching/ Tube brazing						10	Tools	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>2</i>		<i>1</i>
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS											
CO Description	CO-1 Application of Basic tools, procedures for maintenance of RAC systems											
LO Description	LO-3 Describe procedure for refrigerant charging in RAC system											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Rem arks					
1	System Evacuations, System Pump Down, Leak testing methods- by soap solution, Halide torch, Electronic detector, Typical methods. Refrigerant charging. System Lubricants, Properties, Lubrication types- Splash, Pressure.	Interactive Classroom method, Handout, PPTs, Charts and Videos. Laboratory/Workshop demonstration	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	6		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	Theory Exam	Student will be asked about (and/ or) 1. Describe System Evacuation / System Pump Down/ Leak testing methods/ Refrigerant gas charging/ Lubricants and System Lubrication in RAC systems				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>2</i>		<i>1</i>
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS											
CO Description	CO-1 Application of Basic tools, procedures for maintenance of RAC systems											
LO Description	LO-4 Explain working with Sheet metal for making ducts											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Rem arks					
1	Explain sheet metal tools and equipments, procedures for Sheet metal cutting, bending, riveting and soldering. Application of insulation and protection materials on ducts	Interactive Classroom method, Handout, PPTs, Charts and Videos. Laboratory/Workshop demonstration	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar 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	Student will be asked to (and/or) 1. Explain sheet metal tools, equipments and their handling 2. Explain the process of Sheet metal cutting/ Sheet metal bending/ Sheet metal riveting /Sheet metal soldering				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>2</i>		<i>1</i>
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS											
CO Description	CO-1 Application of Basic tools, procedures for maintenance of RAC systems											
LO Description	LO-5 Describe tube joining for refrigeration and air conditioning plants											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Rem arks					
1	Welding/ Brazing practices for different materials used in refrigeration and air conditioning plants. Types of rods, filler materials and Safety in welding/Brazing.	Interactive Classroom method, Handout, PPTs, Charts and Videos. Laboratory/Workshop demonstration	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	5		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	Student will be asked (and/ or) 1. Describe welding/Brazing procedures for given materials used in refrigeration and air conditioning plants 2. Enlist types of welding rods/ types of filler materials 3. Explain safety measures for welding/brazing procedure					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	2	1	6	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS												
CO Description	CO -1 Application of Basic tools, procedures for maintenance of RAC systems												
LO Description	LO-6 Analyze Basic Electrical and Electronics circuits of RAC plants												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Remarks						
1	Electrical safety, different wire joints. Measurement of current, volts, power, and earth resistance. Single phase connection of motors. Identification of the terminals of sealed compressor and their windings, use of DOL starter with different types of motors. Testing and connection of relays used in sealed motors. Identification of the electronic components. Testing of resistors, transistor, capacitor, diode, amplifier, IC PCB Soldering and de soldering	Interactive Classroom method, Handout, PPTs, Charts and Videos. Laboratory/Workshop demonstration	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	2	8	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	Laboratory test by observation	Student will be asked (and/ or) <ol style="list-style-type: none"> 1. Explain electrical safety and different wire joints/ Measurement of current, volts, power, and earth resistance/ Single phase connection of motors 2. How to identify terminals of sealed compressor and their windings/ Use DOL starter with different types of motors / Test and connect relays used in sealed motors 3. Describe the testing of electronic components - resistors, transistor, capacitor, diode, amplifier, IC 4. Describe the procedure for PCB Soldering and de soldering 						10	Tools and Electrical and electronics meters	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>2</i>		<i>2</i>
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS											
CO Description	CO-2 Commissioning of given RAC Plants											
LO Description	LO-7 Plan RAC projects											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Rem arks					
1	RAC plant layout, Parameters Affecting the location. Organizational approach. Erection methodology. Foundation, padding, network analysis: CPM & PERT, safety precautions, air handling equipment’s locations in the systems, corrosion control. HVAC System balancing: Capacity control of Compressor, Condenser, Evaporator. Water Balancing Procedures Using Flow Meters, Analog And Digital Controls	Interactive Classroom method, Handout, PPTs, Charts and Videos.	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	8	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 II	Students will be asked (and/or) <ol style="list-style-type: none"> 1. Explain the working on a Refrigeration/ Air-conditioning plant layout and Parameters Affecting the location of a plant. 2. Describe the Erection methodology for RAC plants. 3. Explain the terms Foundation/ Padding/ CPM/ PERT/ Safety precautions/ Air handling equipment’s locations in the systems/ Corrosion control 4. Describe the terms HVAC System balancing/ System Capacity control (Compressor, Condenser, Evaporator)/ Analog And Digital Controls/ Water Balancing Procedures Using Flow Meters 				10	Project report	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	2	2	8	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS												
CO Description	CO-2 Commissioning of given RAC Plants												
LO Description	LO-8 Testing of given RAC plants												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Remarks						
1	Codes And Standards Related To HVAC&R Projects, Instruments Required for – Pressure, Temperature, Flow, Air Quality, Power, Harmonics Etc. General And Specific Testing And Its Procedures For Constant Air Volume Systems, Variable Air Volume Systems, Return Air Systems, Cooling Towers And Performance, Fans And Fan Performance	Interactive Classroom method, Handout, PPTs, Charts and Videos	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	4	6	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	Laboratory Work	Students will be asked (and/or) <ol style="list-style-type: none"> 1. Enlist Codes And Standards Related To HVAC&R Projects/ Instruments Required for – Pressure, Temperature, Flow, Air Quality, Power, Harmonics Etc. 2. Describe general/specific testing and its Procedures For Constant Air Volume Systems/ Variable Air Volume Systems/ Return Air Systems 3. Explain working/testing performance of cooling towers 4. Testing of fan’s performance 	10	Pen Paper/ Viva	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	2	2	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS											
CO Description	CO-2 Commissioning of given RAC Plants											
LO Description	LO-9 Execute RAC plant Commissioning											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Remarks					
1	Introduction to Commissioning, Objectives of Commissioning, Benefits of Commissioning. Cost Benefit Analysis. Levels of commissioning. Selection Of Commissioning Provider, The HVAC Commissioning Team, Comprehensive HVAC Commissioning. Construction HVAC Commissioning. HVAC Commissioning In Existing Buildings	Interactive Classroom method, Handout, PPTs, Charts and Videos	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	6	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	Theory Exam	Students will be asked (and/ or) 1. Explain the Objectives/ Benefits / procedure of Commissioning. 2. Describe Cost Benefit Analysis/ Levels of commissioning/ Selection Of Commissioning Provider/ The HVAC Commissioning Team/ Comprehensive HVAC Commissioning/ Construction HVAC Commissioning/ HVAC Commissioning In Existing Buildings					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>2</i>	<i>3</i>	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS											
CO Description	CO-3 Describe Project Management of HVAC&R											
LO Description	LO-10 Explain HVAC&R Project reports											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Remarks					
1	Objective of project report, need of Technical Communication: Interpersonal Skills, Report preparation skills, Professional Ethics. Reading and Working on CAD Drawings. Preparation of project demand, project details, diversity assuming, air stratification, comparison of various systems for optimized performance, Bill of Quantities, Payable period of system	Interactive Classroom method, Handout, PPTs, Charts and Videos	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	8	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	Theory Exam	Students will be asked (and/or) <ol style="list-style-type: none"> 1. Describe the Objectives of project report/ Need of Technical Communication/ Report preparation skills/ Professional ethics/ The procedure and steps for Reading and Working on CAD Drawings 2. Explain how to prepare project demand/ Project details/ Diversity assumption/ Air stratification 3. Explain how to calculate Bill of Quantities/ Payable period of system 					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>2</i>	3	11	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS												
CO Description	CO-3 Describe Project Management of HVAC&R												
LO Description	LO-11 Prepare Tender Estimation document for given project												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Rem arks						
1	Preparation of project demand, project details, diversity assuming, air stratification, comparison of various systems for optimized performance, Bill of Quantities, Payback period of system	Interactive Classroom method, Handout, PPTs, Charts and Videos	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	2	6	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	Laboratory Work	Students will be asked (and/or) 1. Prepare Tender Estimation document for given project 2. Prepare Bill of Quantities for given RAC project 3. Calculate Payback period of system of given RAC project						10	Pen paper/ Viva	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>2</i>	3	12	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS												
CO Description	CO-3 Describe Project Management of HVAC&R												
LO Description	LO-12 Present project plan, tender document for given project												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Remarks						
1	Presentation skills, seminar : preparation of PPTs, preparation of Multimedia – Case Studies Of Critical Projects, Highlighting Design Challenges/ Commissioning Tasks	Interactive Classroom method, Handout, PPTs, Charts and Videos	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	10	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	Term Work	Students will have to give Presentation and seminar on the project given: (any one) 1. Case Studies Of Critical Projects 2. Highlighting Design Challenges 3. Commissioning Tasks						10	Project report / Seminar Hall	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>2</i>	4	13	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS												
CO Description	CO-4 Describe RAC Plant Operations												
LO Description	LO-13 Describe manual operation of RAC plants												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Rem arks						
1	Control panels layout and reading, RAC system parameters to observe and maintain: Pressure, Temperature, flow. Reading gauges and their interpretations. log book management, Limitations of manually operated plants	Interactive Classroom method, Handout, PPTs, Charts and Videos	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	2	5	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	Laboratory Work By observation	Students will be asked (and/or) 1. Describe Control panels and different parameters to observe and maintain 2. Explain how to read gauges, their interpretations. 3. Explain procedure to maintain log book of RAC Plants 4. Explain limitations of manually operated plants						10	Industrial Visit	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	2	4	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS											
CO Description	CO-4 Describe RAC Plant Operations											
LO Description	LO-14 Explain IBMS in HVAC systems											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Rem arks					
1	Introduction to IBMS, Functions of IBMS, benefits of IBMS, system architecture, interaction with other building systems(Lighting, Fire safety, CCTV etc.), Introduction To LONWORKS, BACnet, MODBUS and Internet standards. Controlling methods of HVAC Components in IBMS	Interactive Classroom method, Handout, PPTs, Charts and Videos	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	8	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	Theory Exam	Students will be asked (and/or) 1. Explain IBMS/ Functions of IBMS/ benefits of IBMS/ System architecture/ interaction with other building systems (Lighting, Fire safety, CCTV etc.) 2. Describe the term LONWORKS/ BACnet/ MODBUS/ Internet standards 3. Explain the controlling methods of HVAC Components in IBMS					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	2	5	15	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS														
CO Description	CO-5 Explain the procedure to repair for given RAC systems														
LO Description	LO-15 Explain the procedure to resolve possible faults for Refrigeration systems														
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Remarks								
1	Step by step procedure for trouble shooting of Refrigeration system with reference to Possible faults- diagnosis- solution with the help of Trouble shooting charts : a. System not starting b. System starts but no cooling c. Less cooling then indicated d. Frequent tripping/ short cycle e. Frosting in evaporator/ at expansion device f. System making noise g. System runs continuously without stopping	Interactive Classroom method, Handout, PPTs, Charts and Videos	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	10	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	Theory Exam	Students will be asked 1. Explain the step by step procedure for trouble shooting of a Refrigeration system with reference to Possible faults- diagnosis- solution for (and/or) a. System not starting b. System starts but no cooling c. Less cooling then indicated d. Frequent tripping/ short cycle e. Frosting in evaporator/ at expansion device f. System making noise g. System runs continuously without stopping	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	2	5	16	
COURSE NAME	INSTALLATION, TESTING AND COMMISSIONING OF RAC SYSTEMS														
CO Description	CO-5 Explain the procedure to repair for given RAC systems														
LO Description	LO-16 Explain the procedure to resolve possible faults for Air conditioning systems														
SCHEME OF STUDY															
S. No.	Learning Content	Teaching –Learning (T-L) Method	Description of T-L Process	Teach Hrs.	Pract. / Tut Hrs.	LRs Required	Remarks								
1	Step by step procedure for trouble shooting of Air conditioning system with reference to Possible defects- diagnosis- solution with the help of Trouble shooting charts : a. System not starting b. System starts but no air cooling c. Less air cooling then indicated d. Frequent tripping/ short cycle e. Frosting in evaporator/ at expansion device f. System making noise g. System runs continuously without stopping	Interactive Classroom method, Handout, PPTs, Charts and Videos	Teacher will explain the contents and provide ASHRAE. Handouts to students. Teacher will conduct Quiz/Visit/Seminar to make students practice their knowledge	10		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	Theory Exam	Students will be asked 1. Explain the step by step procedure for trouble shooting of a Air conditioning system with reference to Possible faults- diagnosis- solution for (and/or) a. System not starting b. System starts but no air cooling c. Less air cooling then indicated d. Frequent tripping/ short cycle e. Frosting in evaporator/ at expansion device f. System making noise g. System runs continuously without stopping	10	Test Paper	External										
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)															

