



# Maharashtra Institute of Technology

## Chhatrapati Sambhajnagar

**An Autonomous Institute Affiliated to  
Dr. Babasaheb Ambedkar Marathwada University,  
Chhatrapati Sambhajnagar, Maharashtra (India)**

### **Third Year B. Voc. Syllabus (Refrigeration and Air Conditioning)**

**Under Choice Based Credit System (CBCS)**

**Under Faculty of Science and Technology**

**(Effective from 2022-23 and onwards)**

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# Maharashtra Institute of Technology

Chhatrapati Sambhajanagar  
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Curriculum for B. Voc Refrigeration and Air Conditioning

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NSQF Level -5										
Sr. No.	Course Code	Course Title	Credit	Contact Hr per Week		Evaluation Scheme				ESE Hour
				L	P	MSE	TA	ESE	Total	
<b>Theory</b>										
1.	VRA101	Basics of Refrigeration	3	3	-	10	15	25	50	1.5
2.	VRA102	Basics of Air Conditioning	3	3	-	10	15	25	50	1.5
3.	VRA103	Engineering Material	3	3	-	10	15	25	50	1.5
4.	VRA104	Soldering & De-Soldering of Components and Emergency Actions	3	3	-	10	15	25	50	1.5
<b>Lab/Practical</b>										
5.	VRA121	Metrology and Measuring Instruments Lab	1.5	-	2	-	25	25	50	-
6.	VRA122	Heat Transfer Lab	1.5	-	2	-	25	25	50	-
<b>On Job Training (OJT)/Qualification Packs*</b>										
7.	VRA131	Field Technician-AC (ELE/Q3102)	15	-	7-8 weeks	--	50	150	200	-
	VRA132	Field Technician-Refrigeration (ELE/Q3103)								
	VRA133	Field Engineer-RACW (ELE/Q3105)								
<b>Total</b>			<b>30</b>	<b>12</b>	<b>4+</b>	<b>40</b>	<b>160</b>	<b>300</b>	<b>500</b>	

\*Any one On-Job-Training as per guidelines of AICTE & SSC for the given skill sets for 150 Marks External Assessment by NSDC/SSC

NSQF Level -5										
Semester -II										
Sr. No.	Course Code	Course Title	Credit	Contact Hr per Week		Evaluation Scheme				ESE Hour
				L	P	MSE	TA	ESE	Total	
<b>Theory</b>										
1.	VRA151	Industrial Management	3	3	-	10	15	25	50	1.5
2.	VRA152	Total Quality Management	3	3	-	10	15	25	50	1.5
3.	VRA153	Entrepreneurship	3	3	-	10	15	25	50	1.5
4.	VRA154	Refrigeration & Air Conditioning Applications	3	3	-	10	15	25	50	1.5
<b>Lab/Practical</b>										
5.	VRA171	Basic Electrical and Electronics Lab	1.5	-	2	-	25	25	50	-
6.	VRA172	Refrigeration and Air-conditioning Lab	1.5	-	2	-	25	25	50	-
<b>On Job Training (OJT)/Qualification Packs*</b>										
7.	VRA181	One more QP to be opted from QPs mentioned in the level 5 first semester	15	-	7-8 weeks	--	50	150	200	-
<b>Total</b>			<b>30</b>	<b>12</b>	<b>4+</b>	<b>40</b>	<b>160</b>	<b>300</b>	<b>500</b>	

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Curriculum for B. Voc Refrigeration and Air Conditioning

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NSQF Level -6											Semester -I
Sr. No.	Course Code	Course Title	Credit	Contact Hr per Week		Evaluation Scheme				ESE Hour	
				L	P	MSE	TA	ESE	Total		
<b>Theory</b>											
1.	VRA201	RAC Piping Systems- I	3	3	-	10	15	25	50	1.5	
2.	VRA202	Refrigeration & Air-conditioning Material -I	3	3	-	10	15	25	50	1.5	
3.	VRA203	Refrigerants	3	3	-	10	15	25	50	1.5	
4.	VRA204	RAC Standards	3	3	-	10	15	25	50	1.5	
<b>Lab/Practical</b>											
5.	VRA221	RAC Material Lab	1.5	-	2	-	25	25	50	-	
6.	VRA222	RAC Systems Installation and its Maintenance Lab-I	1.5	-	2	-	25	25	50	-	
<b>On Job Training (OJT) Qualification Packs*</b>											
	VRA231	Safety Tester -RACWO (ELE Q3605)									
7.	VRA232	Field Engineer-RACW (ELE Q3105)	15	-	7-8 weeks	-	50	150	200	-	
	VRA233	Cold Storage Technician (FIC Q7004)									
<b>Total</b>			<b>30</b>	<b>12</b>	<b>4+</b>	<b>40</b>	<b>160</b>	<b>300</b>	<b>500</b>		

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NSQF Level -6											Semester -II
Sr. No.	Course Code	Course Title	Credit	Contact Hr per Week		Evaluation Scheme				ESE Hour	
				L	P	MSE	TA	ESE	Total		
<b>Theory</b>											
1.	VRA251	RAC Piping Systems-II	3	3	-	10	15	25	50	1.5	
2.	VRA252	Refrigeration & Air-Conditioning Material-II	3	3	-	10	15	25	50	1.5	
3.	VRA253	RAC Maintenance-I	3	3	-	10	15	25	50	1.5	
4.	VRA254	RAC Installation Techniques -I	3	3	-	10	15	25	50	1.5	
<b>Lab/Practical</b>											
5.	VRA271	RAC Systems Installation and its Maintenance Lab -II	1.5	-	2	-	25	25	50	-	
6.	VRA272	RAC Piping Systems Lab	1.5	-	2	-	25	25	50	-	
<b>On Job Training (OJT) Qualification Packs*</b>											
7.	VRA281	One more QP to be opted from QPs mentioned in the level 6 first sem	15	-	7-8 weeks	-	50	150	200	-	
<b>Total</b>			<b>30</b>	<b>12</b>	<b>4+</b>	<b>40</b>	<b>160</b>	<b>300</b>	<b>500</b>		

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## Curriculum for B. Voc Refrigeration and Air Conditioning

NSQF Level -7						Semester -I				
Sr. No.	Course Code	Course Title	Credit	Contact Hr per Week		Evaluation Scheme				ESE Hour
				L	P	MSE	TA	ESE	Total	
<b>Theory</b>										
1.	VRA301	RAC Maintenance-II	3	3	-	10	15	25	50	1.5
2.	VRA302	RAC Installation Techniques-II	3	3	-	10	15	25	50	1.5
3.	VRA303	Automobile Air-Conditioning	3	3	-	10	15	25	50	1.5
4.	VRA304	Non-conventional Refrigerating System	3	3	-	10	15	25	50	1.5
<b>Lab/Practical</b>										
5.	VRA321	Automobile AC Lab	1.5	-	2	-	25	25	50	-
6.	VRA322	AC components and Assembly Laboratory	1.5	-	2	-	25	25	50	-
<b>On Job Training (OJT)/Qualification Packs*</b>										
7.	VRA331	AC Specialist- Automobile (ASC/Q1416)	15	-	7-8 weeks	-	50	150	200	-
	VRA332	Assembly Operator (ELE/Q3501)								
<b>Total</b>			<b>30</b>	<b>12</b>	<b>4+</b>	<b>40</b>	<b>160</b>	<b>300</b>	<b>500</b>	

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NSQF Level -7						Semester -II				
Sr. No.	Course Code	Course Title	Credit	Contact Hr per Week		Evaluation Scheme				ESE Hour
				L	P	MSE	TA	ESE	Total	
<b>Theory</b>										
1.	VRA351	RAC Safety	3	3	-	10	15	25	50	1.5
2.	VRA352	Process Planning and Cost Estimation	3	3	-	10	15	25	50	1.5
<b>Lab/Practical</b>										
3.	VRA371	Project	9	-	4	-	100	100	200	-
<b>On Job Training (OJT)/Qualification Packs*</b>										
4.	VRA381	One more QP to be opted from QPs mentioned in the level 7 first semester	15	-	7-8 weeks	-	50	150	200	-
<b>Total</b>			<b>30</b>	<b>6</b>	<b>4+</b>	<b>20</b>	<b>180</b>	<b>300</b>	<b>500</b>	

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# **Semester-V**

## **(NSQF Level 7, Semester-I)**

### **Detail Course Curriculum**

**Third Year B. Voc. Syllabus**  
**(Refrigeration and Air Conditioning)**

**(Effective from 2022-23 and onwards)**

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Syllabus of Third Year B. Voc. (Refrigeration and Air Conditioning) (2022-23 Autonomous Pattern)

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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level-7		VRA301: RAC Maintenance-II		Semester-I	
Teaching Scheme		Examination Scheme			
Lectures	03 hrs/Week	MSE	10 Marks		
Practical	-	TA	15 Marks		
Credits	03	ESE	25 Marks		
		Duration of ESE	1.5 hours		
<b>Course Outcomes (CO)</b>					
Students will be able to					
1.	Master diagnosis, servicing, and maintenance of refrigeration systems.				
2.	Apply effective techniques for servicing and repairing refrigeration systems.				
3.	Troubleshoot and resolve electrical and mechanical faults in refrigeration systems.				
Unit	Course Content				Hours
Unit 1	<b>Introduction:</b> Checking the charge, electrical circuits (servicing), evacuation of the system, installation, and location of main components, leak detection methods				(02)
Unit 2	<b>Servicing Techniques:</b> Piping and Joining Work, Burn out repair, capillary tube cleaning				(08)
Unit 3	<b>Charging the system:</b> compressor work expansion valve (thermostatic), servicing, hermetic compressor motors (stating problems) repairing leaks, sealed system connections.				(09)
Unit 4	<b>Electrical Fault Finding:</b> Compressor motor fails to start, compressor motors tries to start but does not run, compressor motor starts but does not reach running speed, thermostat failure type, pressure cut-out failure, wiring and collection faults				(09)
Unit 5	<b>Mechanical Fault Finding:</b> Fault analysis by temperature and pressure, methods of confirming the fault, finding the fault when the compressor is not running, abnormal noise problem, domestic system faults				(08)
<b>Text/Reference Books</b>					
Sr. No.	Book	Author	Publisher		
1.	A course in Refrigeration and Air Conditioning	S.C. Arora and S. Domkundwar	Dhanpatrai and sons, Delhi		
2.	Refrigeration and Air Conditioning	Manohar Prasad	New age International (P) Limited, New Delhi		
3.	Electric controls for Refrigeration and Air Conditioning	Shan K Wang,	McGraw-hill International Edition, Singapore		

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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level-7		VRA302: RAC Installation Techniques-II		Semester-I	
Teaching Scheme				Examination Scheme	
Lectures	03 hrs/Week			MSE	10 Marks
Practical	-			TA	15 Marks
Credits	03			ESE	25 Marks
				Duration of ESE	1.5 hours

### Course Outcomes (CO)

Students will be able to

1. Master air conditioning installation, operation, and testing techniques.
2. Execute evacuation and dehydration procedures effectively
3. Demonstrate proficiency in installing room and split air conditioners with proper ventilation.

Unit	Course Content	Hours
Unit 1	<b>Introduction:</b> Installation operation, adding oil, testing for leak detection	(02)
Unit 2	<b>Evacuation and dehydration:</b> Removing air, charging of the system, through suction valve, through discharge valve.	(09)
Unit 3	<b>Installation of Room Air-Conditioner:</b> Selection of proper location, providing proper slope and provision for to drain water	(08)
Unit 4	<b>Ventilation:</b> Arrangement for window air conditioner, wiring diagram for installation for room air, conditioner	(09)
Unit 5	<b>Installation of split air conditioner, providing arrangement for pipes and pipe, pipe insulations</b>	(08)

### Text/Reference Books

Sr. No.	Book	Author	Publisher
1.	A course in Refrigeration and Air Conditioning	S.C. Arora and S. Domkundwar	Dhanpatrai and sons, Delhi
2.	Refrigeration and Air Conditioning	Manohar Prasad	New age International (P) Limited, New Delhi
3.	Electric controls for Refrigeration and Air Conditioning	Shan K Wang,	McGraw-hill International Edition, Singapore

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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level-7		VRA303: Automobile Air Conditioning	Semester-I		
Teaching Scheme			Examination Scheme		
Lectures	03 hrs/Week		MSE	10 Marks	
Practical	--		TA	15 Marks	
Credits	03		ESE	25 Marks	
		Duration of ESE	1.5 hours		
<b>Course Outcomes (CO)</b>					
Students will be able to					
1.	Acquire mastery in refrigeration methods, designing AC systems, and performing maintenance services.				
2.	Demonstrate proficiency in designing automobile AC systems and controlling temperature effectively.				
3.	Develop expertise in servicing and controlling AC systems, including diagnostics and troubleshooting.				
Unit	Course Content			Hours	
Unit 1	<b>Introduction:</b> Methods of refrigeration. Vapour compression refrigeration system, vapour absorption refrigeration system, applications of refrigeration & air conditioning, Automobile air conditioning, air conditioning for passengers, isolated vehicles, Refrigerated transport vehicles, applications related with very low temperatures, Study of Psychometric charts: Psychometric properties, tables/charts, psychometric processes, comfort charts, factors affecting comfort, effective temperature, ventilation requirements			(08)	
Unit 2	<b>Refrigerants &amp; AC Systems:</b> Importance of Refrigerant- Classification, properties, selection criteria, commonly used refrigerants, alternative refrigerants, eco-friendly refrigerants; applications of refrigerants, refrigerants used in automobile air conditioning, Air Conditioning Systems- Classification, layouts, central / unitary air conditioning systems, System components, Switch and electrical wiring circuit.			(07)	
Unit 3	<b>Design Automobile AC system: Load Calculations &amp; Analysis-</b> Design considerations for achieving desired inside/room conditions with respect to prevailing outside/environment conditions. Factors affecting/contributing towards the load on refrigeration & air conditioning systems, Cooling & heating load calculations, Load calculations for automobiles, Effect of air conditioning load on engine			(07)	
Unit 4	<b>Air Distribution:</b> Air Distribution Systems- Distribution ducting, sizing, supply / return ducts, type of grills, diffusers, ventilation, air noise level, layout of duct systems for automobiles and their impact on load calculations, Air Routing & Temperature Control -Objectives of the dashboard re-circulating unit, automatic temperature control, controlling flow, control of air handling systems & air flow through - evaporator care			(07)	





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<b>Unit 5</b>	<b>AC Service &amp; Control: Air Conditioning Service-</b> Air conditioner maintenance & service - removing & replacing Components. Compressor service, Testing, Diagnosis & trouble shooting of air conditioning system. Refrigerant gas charging procedure &. Servicing of heater system. Air Conditioning Control - Common controls such as thermostats, humidistat, control dampers, pressure cut outs, relays.	(07)	
<b>Reference Book</b>			
Sr. No.	Book	Author	Publisher
1.	A course in Refrigeration and Air Conditioning	S.C. Arora and S. Domkundwar	Dhanpatrai and sons, Delhi
2.	Hand book of Air conditioning and refrigeration	Shan K Wang	McGraw-hill International Edition, Singapore

  
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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level-7		VRA304:Non-conventional Refrigerating System		Semester-I	
Teaching Scheme		Examination Scheme			
Lectures	03 hrs/Week	MSE	10 Marks		
Practical	--	TA	15 Marks		
Credits	03	ESE	25 Marks		
		Duration of ESE	1.5 hours		
<b>Course Outcomes (CO) –</b> Students will be able to					
1.	Master absorption refrigeration principles and analyze design effectively.				
2.	Explore alternative refrigeration technologies through analysis of absorption systems.				
3.	Understand steam jet refrigeration systems and thermo-electric effects for potential applications				
Unit	Course Content				Hours
<b>Unit 1</b>	<b>Vapour Absorption Refrigeration System:</b> Principle of absorption system, comparison between vapour compression system and vapor absorption system, theory of binary mixtures,				(07)
<b>Unit 2</b>	Aqua-ammonia vapour absorption system, theory of mixtures, temperature concentration diagram and enthalpy concentration diagram, processes used in Aqua-ammonia absorption system, adiabatic mixing, separation, throttling process.				(08)
<b>Unit 3</b>	Vapour absorption system its components, working principle and mathematical analysis, Lithium-bromide- water absorption system its components, working principle, and mathematical analysis				(07)
<b>Unit 4</b>	<b>Steam Jet Refrigeration System:</b> Introduction, steam jet refrigeration system, components of steam jet refrigeration system, advantage and limitation of steam jet refrigeration system, performance of steam jet refrigeration system				(07)
<b>Unit 5</b>	<b>Thermo-Electric Refrigeration System:</b> Introduction, thermo-electric effects, Seebeck effect, Peltier effect, Thomson effect				(07)
<b>Reference Book</b>					
Sr. No.	Book	Author	Publisher		
1	A course in Refrigeration and Air Conditioning	S.C. Arora and S. Domkundwar	Dhanpatrai and sons, Delhi		
2.	Refrigeration and Air Conditioning	Manohar Prasad	New age International (P) Limited, New Delhi		
3.	Handbook of Air Conditioning and Refrigeration	Shan K Wang	McGraw-hill International Edition, Singapore		

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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level-7	VRA321: Automobile AC Lab	Semester-I	
Teaching Scheme		Examination Scheme	
Practical	2 Hours/week	TA	25 Marks
Credits	1.5	ESE/PE	25 Marks
Sr. No.	List of Experiments		
	Any <b>six</b> of the following practical should be performed and recorded in laboratory book		
	1. To study the load requirement of AC in the vehicle.		
	2. To design the AC System for the automobile according to the use.		
	3. To select the components for Automobile AC System		
	4. To install the AC System in automobile		
	5. To diagnose the fault in Automobile AC System		
	6. To conduct the mechanical repair in the Automobile AC System		
	7. To charge the Refrigerant in the Automobile AC System		
	8. To test the Automobile AC System.		

The assessment of term work shall be done based on the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above.

  
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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level-7	VRA322: AC Components and Assembly Laboratory	Semester-I	
Teaching Scheme		Examination Scheme	
Practical	2 Hours/week	TA	25 Marks
Credits	1.5	ESE/PE	25 Marks
Sr. No.	List of Experiments		
	Any five of the following practical should be performed and recorded in laboratory book		
	1. To study hermetically sealed compressor, condensing units, performance, volumetric efficiency, performance of the ideal compressor and power requirement		
	2. To study different types of condensers and condenser design		
	3. To study different types of evaporators and evaporator performance, pressure drop in tubes, frost.		
	4. To study selection of expansion valves, and capillaries for various refrigeration and air conditioning applications		
	5. Find out the heat rejection factor of condenser, condenser capacity, efficiency and effect of fouling factor		
	6. Capillary bore checking, performance test conducted by test rig (consisting of capillary tube and thermostatic expansion valve) for finding C.O.P.		
	Familiarization of capillary selection guide		

The assessment of term work shall be done based on the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above.

  
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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level -7	On Job Training/Qualification Packs*		Semester-I
Teaching Scheme		Examination Scheme	
Practical	7-8 weeks	TA	50 Marks
Credits	15	ESE/PE	150 Marks
VRA331	AC Specialist – Automobile (ASC/Q 1416)		
VRA332	Assembly Operator (ELE/Q3501)		
*Any one On-Job-Training as per guidelines of AICTE & SSC for the given skill sets for 150 Marks External Assessment by NSDC/SSC			

  
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**Semester-VI**  
**(NSQF Level 7, Semester-II)**  
**Detail Course Curriculum**

**Third Year B. Voc. Syllabus**  
**(Refrigeration and Air Conditioning)**

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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level-7		VRA351:RAC Safety		Semester-II	
Teaching Scheme		Examination Scheme			
Lectures	03 hrs/Week	MSE	10 Marks		
Practical	-	TA	15 Marks		
Credits	03	ESE	25 Marks		
		Duration of ESE	1.5 hours		
<b>Course Outcomes (CO)</b>					
Students will be able to					
1.	Master industrial safety principles and accident prevention techniques..				
2.	Implement safety measures specific to RAC engineering.				
3.	Identify and mitigate potential hazards in RAC engineering.				
Unit	Course Content				Hours
Unit 1	<b>Introduction to Industrial Safety:</b> History and development of safety movement, need for safety, safety legislation: acts and rules, safety standards and codes, safety policy: safety organization and responsibilities and authorities of different levels, accident sequence theory, causes of accidents, accident prevention and control techniques, plant safety inspections, job safety analysis and investigation of accidents, first aid.				(08)
Unit 2	<b>Overview of Standard:</b> ANSI/ASHRAE Standard, ANSI/ASME boiler and pressure vessel code, refrigeration, piping code, boiler and pressure vessel code, safety for refrigerant-containing components and accessories, nonelectrical, uniform mechanical code, basic national mechanical code				(07)
Unit 3	<b>Safety for RAC Engineers:</b> Safety on the Job: Personal safety, protective clothing and equipment, harmful substances, safe work, practices, safety when working with electricity, refrigeration safety.				(07)
Unit 4	<b>Safety for RAC Engineers:</b> Types of accident, physical injuries from mechanical causes, use of tools and handling precautions, electrical injuries, electrical safety rules				(07)
Unit 5	<b>Injuries in RAC and Precaution:</b> Refrigerant cylinder, corrosion, burn and other scalds, refrigerants and other gases Construction materials, fire fighting precautions, breathing, toxic gases, asphyxiation and precaution for the same.				(07)

### Reference Book

Sr. No.	Book	Author	Publisher
1	Air Conditioning Systems Principles, Equipment and Services	Joseph Moravek	Prentice Hall
2.	HVAC Handbook, Part I and II,	---	ISHRAE
3.	Industrial Refrigeration Hand Book	Wilbert F. Stoecker	-----



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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level-7		VRA352: Process Planning and Cost Estimation		Semester-II	
Teaching Scheme		Examination Scheme			
Lectures	03 hrs/Week	MSE	10 Marks		
Practical	--	TA	15 Marks		
Credits	03	ESE	25 Marks		
		Duration of ESE	1.5 hours		
<b>Course Outcomes (CO)</b>					
Students will be able to					
1.	Master process planning and cost estimation for RAC systems.				
2.	Develop skills in advanced cost estimation techniques.				
3.	Calculate assembly and installation time for RAC systems				
Unit	Course Content				Hours
Unit 1	<b>Introduction to Process Planning:</b> Process Planning Definition, Purpose & Concept of Process Planning, Objectives & Scope of Process Planning, and Operation Planning Sheet				(07)
Unit 2	<b>Process Planning activities:</b> Process Planning Procedure & Approaches & Manual Process Planning, Computer Aided Process Planning, Factors Affecting Selection Process, Machine Capacity, Determination of Man, Machine and Material Requirements, Factors Influencing Choice of Machinery				(07)
Unit 3	<b>Introduction to Cost Estimation:</b> Reasons for doing Estimates, Importance & objectives of Estimating, Functions of Estimating, Importance of Costing, Aims of Cost Accounting, Difference Between Cost Estimating and Accounting, Cost of Product (Ladder of Cost) Estimation of Production Cost & Material Cost, Mensuration				(07)
Unit 4	<b>Advanced Cost Estimation Techniques:</b> In advanced cost estimation, the focus shifts towards precise production cost estimation, incorporating mensuration techniques to accurately assess material requirements. Understanding the importance of costing and the aims of cost accounting becomes paramount to ensure efficient cost estimation practices.				(07)
Unit 5	<b>Assembly &amp; Installation Time Calculation:</b> Calculating assembly and installation time, requirements for the Refrigeration and Air Conditioning (RAC) system. Design and selection of components and materials. Steps involve the fabrication, installation, and rigorous testing of the RAC system to ensure its functionality and efficiency.				(08)
<b>Reference Book</b>					
Sr. No.	Book	Author	Publisher		
1	Process Planning and Cost Estimation	B. Venkatachalam	PHI Learning Pvt. Ltd		
2.	Heating, Ventilating and Air Conditioning: Analysis and Design	Faye C. McQuiston, Jerald D. Parker, Jeffrey D. Spitler	Wiley India		

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Syllabus of Third Year B. Voc. (Refrigeration and Air Conditioning) (2022-23 Autonomous Pattern)

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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level-7		VRA371:Project		Semester-II	
Teaching Scheme				Examination Scheme	
Practical	4 Hours/wk			TA	100 Marks
Credits	9			ESE/PE	100 Marks
<b>Course Outcomes (CO)</b>					
Students will be able to					
1.	Execute a vocational project demonstrating proficiency in skills learned from B.Voc. Level 5 to Level 7.				
2.	Apply theoretical knowledge to practical scenarios, enhancing vocational competencies				
3.	Demonstrate mastery in vocational skills through project completion and implementation.				
On the basis of learning in the B. Voc. Programme, i.e. Level 5 to Level 7, a project to be taken up by the student strengthening his/ her vocational skills and prepare a report in following format:					
<b>Formatting:</b>					
<ul style="list-style-type: none"><li>• The font for chapter number should be in Calibri 16 and chapter title should be in upper case with Bold Calibri 20. Use after paragraph spacing should be 6 pts.</li><li>• The font for sub-title like (1.1) should be in Bold Calibri 14 and chapter title should be in upper case with Calibri 20. Use text font as Calibri 12 for a text with 1.5 line spacing. The text should be aligned with justify setting.</li></ul>					
<b>Report:</b>					
<ul style="list-style-type: none"><li>• Student has to submit a detailed report in two copies which shall be used for evaluation.</li></ul>					
<b>Evaluation:</b>					
Teachers Assessment will be based on the presentation of project in periodic reviews (like Review 1 and Review 2) during the semester.					

  
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# Maharashtra Institute of Technology

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## Syllabus for Third Year B. Voc. (Refrigeration and Air Conditioning)

NSQF Level -7	VRA381:On Job Training/Qualification Packs*	Semester-II	
Teaching Scheme		Examination Scheme	
Practical	7-8 weeks	TA	50 Marks
Credits	15	ESE/PE	150 Marks
VRA381	One more QP to be opted from QPs mentioned in the level 7 first semester		
*Any one On-Job-Training as per guidelines of AICTE & SSC for the given skill sets for 150 Marks External Assessment by NSDC/SSC			

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