RGPV (DIPLOMA WING) BHOPAL	OBE CURRICULUM FOR THE COURSE	FORMAT-3	Sheet No. 1/4
Branch	Refrigeration and Air-conditioning	Semester	III
Course Code	302	Course Name	Fundamental of thermodynamics

Course Outcome 1	**CO-** Apply basic concepts, laws and principles of thermodynamics to use and select thermodynamic devices working on these basics**.**	Teaching Hrs	Marks
Learning Outcome 1	LO-1 Explain fundamental concepts and properties relevant to thermodynamics.	4	10
Contents	Introduction and scope of thermodynamics, Basic properties and their units classification of system, various systems and their boundary energy, state of a system		
Method of Assessment	Paper-Pen Test (Part of Prg 1)		
Learning Outcome 2	Explain the Zeroth law of thermodynamics and their applications	8	8
Contents	Zeroth law of thermodynamics and its applications, thermodynamic equilibrium Quasi-Static Process, Cyclic And Non-Cyclic Processes, Reversible And Irreversible Process, Point Function and Path Functions, various temperature measuring device		
Method of Assessment	Theory Exam		
Learning Outcome 3	Calculate the work and Heat transfer in thermodynamics systems	7	10
Contents	Concept of Energy, work and heat, sign sign convention, thermodynamic Heat transfer by path function pdv work or moving boundary Work transfer: isobaric ,isochoric, isothermal, adiabatic and isentropic processes.		
Method of Assessment	Paper-Pen Test (Part of TW)		
Learning Outcome 4	Using ideal gas equations calculate the amount of heat transfer, work transfer & internal energy associated with the process	12	10
Contents	Various ideal gas laws, Characteristic gas equation, and Universal Gas, Heat and their relationship. Different thermodynamics process their representations on P-V and T-S diagram, equations for PVT relationship work transfer, heat transfer internal energy (without derivations)		
Method of Assessment	Paper-Pen Test (Part of Prg 1)		
Course Outcome 2	Solve the Numerical problem of first law of thermodynamics	Teaching Hrs	Marks
Learning Outcome 1	Explain the first law of thermodynamics	7	8
Contents	Law of Conservation of Energy. Joule's experiment-set up & significance. First law of thermodynamics for close system, System undergoing a change of state and open system. Perpetual Motion Machine of the First Kind-PMM1 solve simple numerical problem		
Method of Assessment	Theory Exam		
Learning Outcome 2	Apply first law of thermodynamics	8	8
Contents	Mass and energy balance equation in a simple steady flow process . Application of first law of thermodynamic Steady Flow Energy Equation,Limitations of first law of thermodynamics. Control volume .Simple numerical examples based on above.		

Method of Assessment	Theory Exam				
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Branch	**Refrigeration and Air-conditioning**		**Semester**	**III**	
Course Code	**302**	**Course Name**	**Fundamental of thermodynamics**		
Course Outcome 3	Solve simple numerical problems of second law of thermodynamics		Teaching Hrs	Marks	
Learning Outcome 1	Explain second law of thermodynamics		12	8	
Contents	Concept and real life examples of heat source, heat sink (reservoir), heat engine, heat pump and refrigerator. Statements of Second Law of Thermodynamics, Kelvin-Planck Statement and Clausius statement, Equivalence Of Clausius Statement to the Kelvin-Planck Statement, Perpetual motion Machine of the Second Kind PMM2,				
Method of Assessment	Theory Exam				
Learning Outcome 2	Solve simple numerical problem related to Efficiency & COP		7	10	
Contents	Efficiency and COP for Heat engine, refrigerator and pump and its Temperature limitations of increase efficiency, Concept and important example of entropy , reversibility and irreversibility processes Clausius inequality, Carnot cycle, simple numerical problem				
Method of Assessment	Paper-Pen Test (Part of Prg 2)				
Course Outcome 4	Explain steam generation processes, steam generators		Teaching Hrs	Marks	
Learning Outcome 1	solve simple problems to find out the properties of steam using steam table and Mollier diagram.		10	10	
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Branch	**Refrigeration and Air-conditioning**		**Semester**	**III**	
Course Code	**302**	**Course Name**	**Fundamental of thermodynamics**		
Contents	Definition of the Pure Substance Phase Change representation of a Pure Substance on P-T, P-V and T-S Diagram. Critical point and triple point and triple line, Formation of Steam, Use of steam tables and Mollier's diagram for calculation of changes in properties of steam such as enthalpy, internal energy, entropy, heat transfer. Calculate work in the various thermodynamics process				
Method of Assessment	Paper-Pen Test (Part of Prg 2)				
Learning Outcome 2	Determine dryness fraction of steam with the help of calorimeter		6	18	

Contents	Dryness fraction of steam, methods of determination of dryness fraction separation and throttling calorimeter		
Method of Assessment	Laboratory Test by Observation (Part of LW)		
Learning Outcome 3	Explain the elements, processes of Lancashire, Babcock & Wilcox, La-Mont, Velox boilers.	7	12
Contents	**Steam Generator-** Definition, classification, Working of Low pressure boiler, Babcock and Wilcox Boiler and Lancashire Boiler, Working of High pressure boiler- La-Mont, Velox Boiler, Boiler Mountings and accessories.		
Method of Assessment	Practical Exam		
Course Outcome 5	Solve simple problems based on air standard cycles	Teaching Hrs	Marks
Learning Outcome 1	Explaine the thermodynamic processes of air standard cycle using P-V and T-S diagram	10	12
Contents	Concept of air standard efficiency, Classification of thermodynamic cycle, Concept of power cycle Power producing cycles, Carnot cycle, Otto cycle, Diesel cycle Dual combustion cycle, Brayton cycle		

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Course Code	**302**	**Course Name**	**Fundamental of thermodynamics**

Method of Assessment	Theory Exam		
Learning Outcome 2	Limitations , application and comparison of power producing cycles based on different parameters	8	10
Contents	Limitations, Applications and comparison of Otto cycle, Diesel cycle Dual combustion cycle, Brayton cycle		
Method of Assessment	Theory Exam		
Learning Outcome 3	Derive expression for efficiency	6	6
Contents	Reversed Carnot cycle, Reversed Brayton cycle: Rankine cycle, Otto Cycle, Diesel Cycle, with their representation on P-V and T-S diagrams.		
Method of Assessment	Theory Exam		
Learning Outcome 4	Solve simple numerical problem o of Calculation of work done, air standard efficiency, mep of air standard cycle	8	10
Contents	– – Calculation of work done, Air standard Efficiency, Mean Effective Pressure. Simple numerical Problems for different cycles		
Method of Assessment	Theory Exam		