AR20

CODE: 20CET205 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, March-2022

FLUID MECHANICS AND HYDRAULIC MACHINES

(Civil Engineering)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Explain Newton's law of viscosity. A plate of negligible thickness is kept centrally in a horizontal gap of thickness 20 mm and the gap is filled with oil of viscosity 2 centi-poise. Find the drag force required to act on the plate having contact area 10 m^2 when it is moving with a velocity of 2 m/s .	5 M	CO1	Analyse
	b)	Prove that intensity of pressure at any point in a fluid at rest is same in all directions.	5 M	CO1	Apply
		(OR)			
2.	a)	Explain the following fluid properties i) Capillarity ii) Surface tension iii) vapour pressure	3 M	CO1	Remember
	b)	A cubical tank has sides of 2.4m. It contains water for the lower 0.6m depth. The upper remaining part is filled with oil of specific gravity 0.9. Calculate total pressure and centre of pressure acting on one vertical side of the tank.	7 M	CO1	Analyse
		UNIT-II	Marks	CO	Blooms Level
3.	a)	A wooden log of specific gravity 0.6 and dimensions length 6m X breadth 2m X depth 4 m is floating in water. Find the Metacentric height and type of equilibrium.	5 M	CO2	Apply
	b)	Derive the continuity equation for three dimensional flows.	5 M	CO2	Create
		(OR)			
4.	a)	Derive the expression for analytical approach for determining the metacentric height	6 M	CO2	Understand
	b)	The stream function Ψ=8xy. Calculate the velocity at the point p(4,5). Find the velocity potential function $\varnothing$.	4M	CO2	Analyse
		UNIT-III	Marks	CO	Blooms Level
5.	a)	Derive Bernoulli's equation and also mention the assumptions made while derivation.	5 M	CO3	Create
	b)	A Venturimeter has its axis horizontal, the inlet and throat diameters being 150 mm and 75 mm respectively. Coefficient of discharge is equal to 0.96. Petrol of specific gravity 0.78 flows up through the meter at a rate of 0.03 m^3/s. Find the pressure difference between the inlet and the throat.	5 M	CO3	Apply
		(OR)			
6.	a)	Derive the expression for rate of flow through venturimeter.	4 M	CO3	Create
	b)	A 300 mm diameter pipe carries water under a head of 20 m with a velocity of 3.5 m/s. If the axis of the pipe turns through 45^0, find the magnitude and direction of resultant force at the bend.	6 M	CO3	Apply

			Marks	CO	Blooms Level
		UNIT-IV			
7.	a)	Derive the condition for maximum velocity in a circular open channel.	4 M	CO4	Create
	b)	Derive the expression for head loss due to hydraulic jump in a rectangular channel of horizontal slope.	6 M	CO4	Apply
		(OR)			
8.	a)	Derive the relation between alternate depths and critical depth for a given specific energy and discharge intensity in a rectangular open channel.	4 M	CO4	Create
	b)	A rectangular channel is 20 m wide and carries a discharge of 60 m^3/s. It is laid at a slope of 0.0001. At a certain section along the channel length, the depth of flow is 2 m. Name the water surface profile. How far upstream/downstream will the depth be 2.5 m? Take Manning's n as 0.02.	6 M	CO4	Apply
		UNIT-V	Marks	CO	Blooms Level
9.	a)	Find an expression for the efficiency of a series of moving flat plates when a jet of water strikes the vanes at one of its tips. Prove that maximum efficiency is 50 %.	5 M	CO5	Understand
	b)	A pelton wheel has a mean bucket speed of 35 m/s with a jet of water flown at the rate of 1 m^3/s under a head of 270 m. The buckets deflect the jet through an angle of 170°. Calculate the power delivered to the runner and hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98.	5 M	CO5	Apply
		(OR)			
10.	a)	Water is flowing through a pipe at the end of which a nozzle is fitted. The diameter of the nozzle is 100mm and the head of water at the centre nozzle is 100m. Find the force exerted by the jet of water on a fixed vertical plate. The coefficient of velocity is given as 0.95.	5 M	CO5	Analyse
	b)	Explain various component parts of hydro power plant with a neat sketch.	5 M	CO5	Understand
		UNIT-VI	Marks	CO	Blooms Level
11.	a)	Define specific speed of a centrifugal pump. Also derive the expression for the same.	4 M	CO6	Create
	b)	A three stage centrifugal pump has impeller has 50 cm in diameter and 2.5 cm wide at outlet. The vanes are curved back at outlet at 30^0 and reduce circumferential area by 15%. The manometric efficiency is 85% and overall efficiency is 80%. Determine the head generated by the pump when running at 1200 rpm and discharge is 0.05 m^3/sec. Also find the shaft power.	6 M	CO6	Apply
		(OR)			
12.	a)	Define and derive expression for minimum starting speed of a centrifugal pump.	5 M	CO6	Create
	b)	A centrifugal pump is to discharge 0.25 m^3/s at a speed of 1500 rpm against a head of 25m. The impeller is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at the outer periphery of the impeller.	5 M	CO6	Apply

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CODE: 20EET205 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, March-2022

ELECTRICAL POWER GENERATION & DISTRIBUTION

(Electrical And Electronics Engineering)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.		With a neat schematic diagram explain briefly about coal fired thermal power plant.	10M	1	Remembering
		(OR)			
2.	a)	Compare between Fire tube and Water tube boilers	5M	1	Understanding
	b)	Draw and label all the parts of a Hydel power plant	5M	1	
		UNIT-II	Marks	CO	Blooms Level
3.		With a neat sketch explain different process involved in Nuclear Power Station	10M	2	
		(OR)			
4.	a)	Draw and explain briefly about the line diagram of Solar Energy Storage	5M	2	Understanding
	b)	Draw the block diagram of Gas Power Station and explain briefly	5M	2	
		UNIT-III	Marks	CO	Blooms Level
5.		Explain about the radial and ring main distribution systems with their characteristics and the design features.	10M	3	
		(OR)			
6.	a)	A D.C ring main system ABCDA fed from point A with 250 V supply and the loop resistances of various sections are AB = 0.09 ohms; BC = 0.4 ohms; CD = 0.3 ohms and DA = 0.08 ohms. The main supplies 110 A at B, 160A at C and 220 A at D. Calculate the voltages at each load point. If the points A and C are interconnected through a link of 0.08 ohm. Determine the voltages at the load points.	5M	3	Analysing
	b)	What is the power factor? What is the importance of load p.f. in AC distribution?	5M	3	Remembering
		UNIT-IV	Marks	CO	Blooms Level
7.		With a neat single line diagram explain about the GIS	10M	4	Understanding
		(OR)			
8.	a)	What is the difference between indoor and outdoor substations?	5M	4	Understanding
	b)	What are the factors which are to be considered for a selection of a site of a substation?	5M	4	
		UNIT-V	Marks	CO	Blooms Level
9.		Explain the following terms in connection with the Power supply system: i)Maximum Demand ii)Load Factor iii) Plant Use factor iv)Station demand Factor v)Effect of load factor on the cost of generation in a power system	10M	5	Applying
		(OR)			
10.		The yearly duration curve of a certain plant can be considered as a straight line from150MW to 40MW. Power is supplied with one generating unit of 100MW capacity and two units of 50MW capacity each. Determine (i) installed capacity, (ii) load factor, (iii) plant factor and (iv) utilization factor.	10M	5	Analysing
		UNIT-VI	Marks	CO	Blooms Level
11.	a)	Explain the desirable characteristics of Tariff methods	5M	6	Understanding
	b)	Explain about two part and three part tariff	5M	6	
		(OR)			
12.		Explain briefly about the costs of generation and their classification	10M	6	

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CODE: 20MET204 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, March-2022

APPLIED THERMO FLUIDS - I

(Mechanical Engineering)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Distinguish between two stroke and four stroke engines.	7m	CO1	Understanding
	b)	Classify IC engines based on various considerations.	3m	CO1	Understanding
		(OR)			
2.	a)	Discuss the relative advantages and disadvantages of 2 stroke engines over 4 stroke engines.	5m	CO1	Understanding
	b)	List out the specific applications of 4 stroke and 2 stroke SI and CI engines.	5m	CO1	Understanding
		UNIT-II	Marks	CO	Blooms Level
3.	a)	Illustrate the classification of various fuels with their examples	7m	CO2	Understanding
	b)	What is meant by stoichiometric air fuel ratio?	3m	CO2	Applying
		(OR)			
4.		The following details were noted in a test on a four cylinder four stroke engine, diameter = 100mm, speed of the engine = 1600rpm, stroke= 120mm, fuel consumption = 0.2kg/min, calorific value= 44000kJ/kg, difference in tension on either side of the brake pulley= 40kgf, brake circumference is 300cm. If the mechanical efficiency is 80%. Calculate (i) Brake thermal efficiency (ii) Indicated thermal efficiency (iii) Indicated mean effective pressure (iv) Brake specific fuel consumption.	10m	CO2	Applying
		UNIT-III	Marks	CO	Blooms Level
5.	a)	Explain the phenomena of normal combustion in SI engine by explaining various stages.	5m	CO3	Understanding
	b)	What is meant by flame speed and discuss the factors affecting flame speed.	5m	CO3	Understanding
		(OR)			
6.	a)	What is meant by Ignition delay as applied to CI engines? Explain how leads to detonation in diesel engines.	5m	CO3	Understanding
	b)	What is Pre-ignition? In which engine it occurs? Discuss its effects on the working of SI engine.	5m	CO3	Understanding

			Marks	CO	Blooms Level
		UNIT-IV			
7.	a)	Derive an expression for force exerted on the curved plate when the jet of water strikes the plate centrally and the plate is moving in the direction of jet.	5m	CO4	Understanding
	b)	A jet of water of diameter 75 mm moving with a velocity of 25 m/s strikes a fixed plate in such a way that the angle between the jet and plate is 60^0. Find the force exerted by the jet on the plate (i) in the direction normal to the plate and (ii) in the direction of the jet.	5m	CO4	Applying
		(OR)			
8.	a)	Classify Hydraulic turbines based on various considerations.	5m	CO4	Understanding
	b)	A Pelton wheel has a mean bucket speed of 10 metres per second with a jet of water flowing at the rate of 700 litres/s under a head of 30 metres. The buckets deflect the jet through and angle of 160^0. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.98	5m	CO4	Applying
		UNIT-V	Marks	CO	Blooms Level
9.	a)	Explain the working of a Centrifugal pump with the help of a simplified sketch.	5m	CO5	Understanding
	b)	Define the following terms i) pumps in parallel ii) Pumps in series .	5m	CO5	Applying
		(OR)			
10.	a)	Define the following efficiencies as applied to Centrifugal pump (i) Manometric efficiency (ii) Mechanical efficiency and write the expressions for the same	5m	CO5	Understanding
	b)	The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 rpm. The vane angles of the impeller at inlet and outlet are 20^0 and 30^0 respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water.	5m	CO5	Applying
		UNIT-VI	Marks	CO	Blooms Level
11.	a)	Define volumetric efficiency of a reciprocating compressor and derive the expression for it.	5m	CO6	Understanding
	b)	What is meant by multistage compression and discuss its advantages.	5m	CO6	Understanding
		(OR)			
12.		A single acting reciprocating pump running at 50 rpm delivers 0.01 m^3/s of water. The diameter of the piston is 200 mm and stroke length 400 rpm. Determine: (i) The theoretical discharge of the pump , (ii) Co-efficient of discharge, and (iii) Slip and percentage slip of the pump.	10m	CO6	Applying

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CODE: 20ECT204 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, March-2022

DIGITAL ELECTRONICS

(Electronics and Communication Engineering)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Convert the following number $(4021.25)_{10} = (\quad)_2$	5	CO1	Apply
	b)	Find the 1's compliment of the binary number 101100 and also add the following i. 1011 and 110 ii. 11110 and 11	5	CO1	Apply
		(OR)			
2.	a)	Find the hexadecimal value for the following octal values? i) 537.32 ii) 63 Find the decimal value for the following octal values? i)426.71 ii) 57	5	CO1	Apply
	b)	Given the two binary numbers X = 1010100 and Y = 1000011, perform the subtraction (i) X - Y and (ii) Y - X by using 1's complement and 2's complement	5	CO1	Apply
		UNIT-II	Marks	CO	Blooms Level
3.	a)	Simplify the following logical expression using Boolean algebra			
		i) $f = A\bar{B}\bar{C} + \bar{A}\bar{B} + BC\bar{D} + \bar{A}B + B\bar{C}$	5	CO2	Analyse
		ii) $Y = \bar{A}BC + \bar{A}B\bar{C} + A\bar{B}\bar{C} + \bar{A}\,\bar{B}\,\bar{C} + ABC$			
	b)	Determine the simplified logic expression for the sequence $Y = \sum m(0,2,3,5,7,12,15) + d(1,4,8,11)$	5	CO2	Evaluate
		(OR)			
4.	a)	Simplify the following logical expression using Boolean algebra			
		i) $f = \overline{XY} + \bar{X} + XY$	5	CO2	Analyse
		ii) $Y = AB + A\bar{B}.(\bar{A}\bar{C})$			
	b)	Determine the simplified logic expression for the sequence $\prod m(1,2,3,7,13,14,15)$	5	CO2	Evaluate
		UNIT-III	Marks	CO	Blooms Level
5.	a)	Compare carry look ahead adder with 4-bit binary adder	5	CO3	Apply
	b)	Design a 4 bit binary to gray code converter	5	CO3	Create
		(OR)			
6.	a)	Design full adder circuit using two half adder circuits	5	CO3	Apply
	b)	Design BCD adder and explain its significance	5	CO3	Apply

			Marks	CO	Blooms Level
		UNIT-IV			
7.	a)	f(A, B, C)=$\sum m(0,1,4,6,7)$ Develop the above SOP function using multiplexer?	5	CO4	Apply
	b)	Design a magnitude comparator to compare two 2 bit numbers: A = A_1A_0 and B = B_1B_0	5	CO4	Create
		(OR)			
8.	a)	Design and explain the 16x1 MUX using 4x1 MUX	5	CO4	Create
	b)	Develop logic diagram and explain working of 4-input priority encoder?	5	CO4	Apply
		UNIT-V	Marks	CO	Blooms Level
9.	a)	Construct SR Flip-Flop from JK Flip-Flop	5	CO5	Apply
	b)	The contents of a four□bit register are initially 0110. The register is shifted six times to the right with the serial input being 1011100. What is the content of the register after each shift?	5	CO5	Remembering
		(OR)			
10.	a)	Develop 4-bit universal shift register and explain its working?	5	CO5	Apply
	b)	Convert JK Flip-Flop to T Flip-Flop	5	CO5	Create
		UNIT-VI	Marks	CO	Blooms Level
11.	a)	Write the VHDL code for the universal gates	5	CO6	Understanding
	b)	Write the VHDL Structural code to realise the full adder	5	CO6	Understanding
		(OR)			
12.	a)	VHDL code to realise 16x1 MUX in behavioural model	5	CO6	Understanding
	b)	VHDL code to realise decoder in any one of the modelling	5	CO6	Understanding

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CODE: 20CST204 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Regular Examinations, March-2022

OBJECT ORIENTED PROGRAMMING

(Common to CSE & IT)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Explain different types of control statements used in java.	5	CO1	K2
	b)	Explain any five object-oriented features supported by java with examples	5	CO1	K3
		(OR)			
2.	a)	Describe the structure of a typical Java program with an example.	5	CO1	K2
	b)	Write the significance of Java Virtual Machine.	5	CO1	K1
			Marks	CO	Blooms Level
		UNIT-II			
3.	a)	Discuss the various parameter passing methods in Java. Illustrate with examples	5	CO2	K2
	b)	What is the accessibility of a public method or field inside a non-public class or interface? Explain.	5	CO2	K2
		(OR)			
4.	a)	Explain about Class, Objects and Methods in Java with an example program	5	CO2	K3
	b)	Define the use of static keyword. Write any four String methods used in java with example.	5	CO2	K2
			Marks	CO	Blooms Level
		UNIT-III			
5.	a)	What is inheritance and how does it help to create new classes quickly.	5	CO3	K3
	b)	Write a short notes on the following key words i) final ii) this	5	CO3	K2
		(OR)			
6.	a)	How to design and implement an interface in Java? Give an example.	5	CO3	K4
	b)	Give an example where interface can be used to support multiple inheritance.	5	CO3	K3
			Marks	CO	Blooms Level
		UNIT-IV			
7.	a)	Define a package write a java program for packages.	5	CO4	K3
	b)	Describe different levels of access protection available in Java	5	CO4	K3
		(OR)			
8.	a)	What is an Exception? How is an Exception handled in JAVA?	5	CO4	K2
	b)	Write a java program that illustrates the application of multiple catch statements.	5	CO4	K4
			Marks	CO	Blooms Level
		UNIT-V			
9.	a)	What are the different ways that are possible to create multiple threaded programs in java? Discuss the differences between them.	5	CO5	K3
	b)	Write a program to create four threads using Runnable interface.	5	CO5	K2
		(OR)			
10.	a)	Differentiate between multiprocessing and multithreading. What is to be done to implement these in a program?	5	CO5	K4
	b)	Write a program that creates two threads. Fist thread prints the numbers from 1 to 100 and the other thread prints the numbers from 100 to 1.	5	CO5	K3
			Marks	CO	Blooms Level
		UNIT-VI			
11.	a)	What is the difference between init( ) and start ( ) methods in an Applet? When will each be executed?	5	CO6	K2
	b)	Write the applets to draw the Cube and Circle shapes.	5	CO6	K3
		(OR)			
12.	a)	Write the step wise procedure to create and run an applet.	5	CO6	K3
	b)	Define applet. Draw and explain the life cycle of applet.	5	CO6	K2

AR18

CODE: 18CET202 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March,2022

FLUID MECHANICS-I

(Civil Engineering)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	State and explain Newton's law of viscocity	6M
	b)	Enumerate the classification of fluids with the help of a neat sketch	6M
		(OR)	
2.	a)	What do you infer by gauge pressure and vacuum pressure	6M
	b)	Give a brief about the pressure at a point	6M

UNIT-II

3.	a)	Explain terms Total Pressure and Center of Pressure	6M
	b)	Find the total pressure and Center of pressure of a triangular plate with base 2m and height 4m is immersed in water and the plane makes an angle 30^0 with free surface of water the base is parallel to water surface at a depth 2m below the free surface.	6M
		(OR)	
4.	a)	Deduce an expression for center of pressure	6M
	b)	Briefly explain about buoyancy of force.	6M

UNIT-III

5.	a)	Calculate the third component of velocity in a continuous flow if $u = x^2 + y^2 + z^2$ & $v = xy^2 - yz^2 + xy$	6M
	b)	Deduce an equation of continuity for three dimensional flow	6M
		(OR)	
6.	a)	Explain about the classification of flows.	6M
	b)	Explain about stream and velocity potential functions	6M

UNIT-IV

7.	a)	Deduce an equation for Euler's equation for flow along a stream line.	6M
	b)	Find the direction of flow if a water pipe changes in diameter 400mm at section A to 800mm at section B which is 7m above. The pressure at A and B are 100KPa and 75 KPa respectively the discharge is 400m/sec.	6M
		(OR)	
8.	a)	Explain about forces on pipe bend	6M
	b)	Deduce an equation for Bernoulli's equation for flow along a stream line.	6M

UNIT-V

9.	a)	Briefly explain about laws of fluid friction	6M
	b)	Explain about major and minor losses	6M
		(OR)	
10.	a)	Explain about Pitot tube	6M
	b)	Deduce an expression about the flow over a rectangular notch.	6M

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AR18

CODE: 18EET206 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March,2022

ELECTRICAL MACHINES-I

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Explain the operation of DC generator with neat diagram	6M
	b)	A 4 pole Lap wound shunt generator supplies to 50 lamps of 100 watts, 200 V each, The field and armature resistances are 50 ohm and 0.2 ohm respectively. Allowing a brush drop of 1 V each brush, Calculate (i) armature current (ii) current per path (iii) E.M.F generated (iv) power output.	6M
		(OR)	
2.	a)	Define armature reaction and explain effect of armature reaction on DC machine?	6M
	b)	Explain different methods of improving commutation	6M

UNIT-II

3.	a)	Draw and explain no-load characteristics of DC shunt generator and DC series generator.	6M
	b)	A shunt generator has full load current of 196 A at 220 V. The stray losses are 750 W and shunt field coil resistance is 55 ohm. If it has a full load efficiency of 87%, compute the armature resistance in ohms and find the load current corresponding to maximum efficiency.	6M
		(OR)	
4.	a)	Derive the expression for torque developed in armature of a DC motor.	6M
	b)	The armature winding of a 4-pole, 250-V DC shunt motor is lap connected. There are 120 slots, each slot containing 8conductors. The flux per pole is 20 mWb and current taken by the motor is 25A. The resistance of armature and field resistance are 0.1 ohm and 125 ohm respectively. If the rotational losses amount to be 810 W find , a) Gross torque b) useful torque and c) efficiency	6M

UNIT-III

5.	a)	Explain three point starter method of starting with neat sketch.	6M
	b)	A 440 V D.C motor takes 5 A at no-load from Swinburne's test at rated speed. Its armature and field resistance are 0.4 ohm and 220 ohm respectively. Estimate the KW output and efficiency when motor takes 20 A on full load.	6M
		(OR)	
6.	a)	Explain the methods of speed control of DC shunt motor	6M
	b)	Define efficiency of a DC motor and derive condition for maximum efficiency.	6M

UNIT-IV

7. a) Explain single phase transformer on loaded condition with relevant circuit diagrams and equations. 6M

   b) A single phase 150-KVA, transformer has efficiency 96% at full-load at 0.8 p.f and on half load at 0.8 p.f lagging. Find the following (i) iron losse (ii) full load copper loss (iii) The load KVA at which maximum efficiency occurs (iv) The maximum efficiency of the transformer at 0.8power factor lagging. 6M

(OR)

8. a) Explain construction and working of core type and shell type transformers. 6M

   b) Find all day efficiency of a transformer having maximum efficiency 98% at 15KVA at unity power factor and loaded as follows. 6M

12 Hours	2 KW at 0.5 p.f lag
6 Hours	12KW at 0.8 p.f. lag
6 Hours	No-load

UNIT-V

9. a) Show that saving of copper of auto-transformer =K x (Wt. of cu.in two winding transformer) 6M

   b) In a test for the determination of the losses of a 440 V, 50 Hz transformer, the total iron losses were found to be 2500 W at normal voltage and frequency. When the applied voltage and frequency were 220 V and 25 Hz, the iron losses were found to be 850 W. Calculate the eddy current loss at normal voltage and frequency. 6M

(OR)

10. a) What are the advantages of three-phase transformer over three single-phase transformer bank of same KVA rating? 6M

    b) Two 1-phase transformers A and B rated at 250 KVA each operated in parallel on both sides. The impedances for A and B are (1 + j6) ohm and (1.2 + j 4.8) ohm respectively. Compute the load shared by each when the load is 500 KVA at 0.8 p,f lagging 6M

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AR18

CODE: 18MET201 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March,2022

THERMODYNAMICS

(Mechanical Engineering)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) What are intensive and extensive properties. Show that work is a path function, and not a property 6M
   b) 680 kg of fish at 5^0C are to be frozen and stored at -12^0C. The specific heat of fish above freezing point is 3.182, and below freezing point is 1.717 kJ/kg K. The freezing point is -2^OC, and the latent heat of fusion is 234.5 KJ/kg. How much heat must be removed to cool the fish? 6M

(OR)

2. a) What is the concept of continuum? How will you define density using this concept? 6M
   b) A mass of 1.5 kg of air is compressed in a quasi-static process from 0.1 MPa to 0.7 MPa for which pv = constant. The initial density of air is 1.16 kg/m^3. Find the work done by the piston to compress the air. 6M

UNIT-II

3. a) Explain Clausius and Kelvin Planck Statement. 5M
   b) A heat pump working on the Carnot cycle takes in heat from a reservoir at 5°C and delivers heat to a reservoir at 60°C. The heat pump is driven by a reversible heat engine which takes in heat from a reservoir at 840°C and rejects heat to a reservoir at 60°C. The reversible heat engine also drives a machine that absorbs 30 kW. If the heat pump extracts 17 kJ/s from the 5°C reservoir, determine(a) The rate of heat supply from the 840°C source (b) The rate of heat rejection to the 60°C sink 7M

(OR)

4. a) Derive the steady flow energy equation and also list the assumptions made in the analysis. 6M
   b) Show that COP of a heat pump is greater than the COP of a refrigerator by unity. 6M

UNIT-III

5. a) Derive Maxwell's Equations 7M
   b) Why do the isobars on Mollier diagram diverge from one another? 5M

(OR)

6. a) Draw the phase equilibrium diagram for a pure substance on h-s plot with relevant constant property lines. 5M
   b) One kg of ice at -50^0C is exposed to the atmosphere which is at 20^0C. The ice melts and comes into thermal equilibrium with the atmosphere. i) Determine the entropy increase of the universe. ii) What is the minimum amount of work necessary to convert the water back into ice at -5 ^{0}C? Cp of ice is 2.093 kJ/kg K and the latent heat of fusion of ice is 333.3 kJ/kg. 7M

UNIT-IV

a) Derive the expression for work and heat transfer for an ideal gas during a polytropic process 6M

b) One kg-mole of oxygen undergoes a reversible non-flow isothermal compression and the volume decreases from 0.2 m3 /kg to 0.08 m3 /kg and the initial temperature is 60°C. If the gas obeys Van der Waals' equation find (i) the work done during the process (ii) the final pressure. 6M

(OR)

8. a) State Dalton's law of partial pressures 6M

b) A cylindrical tank containing 4kg of carbon monoxide gas at -50^{O}C has an inner diameter of 0.2m and a length of 1m. Determine the pressure exerted by the gas using i) the generalised compressibility chart, ii) the ideal gas equation of state and iii)the vander walls equation. 6M

UNIT-V

9. a) Write about compression ratio, pressure ratio, percentage of clearance and cut-off ratio. 4M

b) Derive an expression for the air standard efficiency of an Diesel cycle. 8M

(OR)

10. a) Explain Stirling cycle and Lenoir cycle with the help of p-V and T-s diagrams. 6M

b) A Brayton cycle operates with air entering the compressor at 1bar and 25^{o}C. The pressure ratio across the compressor is 3 to 1, and the maximum temperature in the cycle is 650^{o}C. Determine the compressor work, turbine work, thermal efficiency and work ratio 6M

AR18

CODE: 18ECT205 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

ELECTRONIC CIRCUITS ANALYSIS

(Electronics and Communication Engineering)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Derive an expression for frequency of oscillations of a wien bridge oscillator using transistor.	6M
	b)	Explain RC Phase shift oscillator	6M
		(OR)	
2.	a)	Derive the basic conditions for oscillations and classify oscillators.	6M
	b)	In a Colpitts oscillator, if C_1=0.2μF, C_2=0.02 μF. If the frequency of oscillator is 10kHz, find the value of the inductor.	6M

UNIT-II

3.	a)	State Millers Theorem and its duality?	6M
	b)	Derive A_i A_v , R_i R_o of CE amplifier by using h-parameters	6M
		(OR)	
4.	a)	Draw the circuit diagram and equivalent circuit of an emitter follower amplifier and derive the expression for A_v, A_i and input impedance.	6M
	b)	A CE amplifier is drawn by a voltage source of internal resistance of 500 Ω and load impedance of 800 Ω. The h parameters h_{ie} = 2k Ω, h_{re} = 2X10-4, h_{fe} = 50, h_{oe} = 25μA/V and compute A_I, R_I, A_V and R_O using exact analysis.	6M

UNIT-III

5.	a)	Draw the circuit for RC coupled Amplifier. Explain its working.	10
	b)	Mention different coupling methods of multi stage amplifiers	2M
		(OR)	
6.	a)	Draw the circuit diagram, equivalent circuit of a Darlington pair and derive expressions for overall voltage gain.	6M
	b)	In the common-source amplifier, let R_D = 5 kΩ, R_G = 10 MΩ, μ = 50 and r_d = 35 kΩ. Evaluate the voltage gain, input impedance and output impedance.	6M

UNIT-IV

7.	a)	Explain various hybrid-π capacitances and conductance's of a BJT.	6M
	b)	Find the voltage gain, input and output resistances of an emitter follower at high frequencies.	6M
		(OR)	
8.	a)	Derive the expression for the high frequency parameters in terms of low frequency parameters of a BJT.	6M
	b)	A high frequency amplifier uses a transistor which is driven from a source with R_S = 0. Calculate value of f_H, if R_L = 0 and R_L = 1KΩ. Typical values are $r_{b'e}$ = 1000Ω, Ce = 100 pf, Cc = 3 pf.	6M

UNIT-V

9.	a)	Write short notes on Thermal stability and Heat sinks.	6M
	b)	$V_{CE(max)}$=15V,$V_{CE(min)}$=1V,find the overall efficiency for (i) series –fed load (ii) transformer-coupled load	6M
		(OR)	
10.	a)	What is a stagger tuned amplifier? Explain its advantages and disadvantages.	6M
	b)	Explain the operation of doubled-tuned amplifier with a neat circuit diagram.	6M

AR18

CODE: 18CST203 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

OBJECT ORIENTED PROGRAMMING

(Common to CSE & IT)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Explain Features and Buzzwords of java.	6M
	b)	What is meant by byte code? Briefly explain how Java is platform independent.	6M
		(OR)	
2.	a)	Discuss various primitive data types in Java in detail. Explain how they are different from reference data types.	6M
	b)	What are the two control structures used in java for making decisions? Explain with an example program.	6M

UNIT-II

3.	a)	Elaborate the use of static members in Java with suitable examples	6M
	b)	Write syntax for defining a class and how to access members of class through object explain with suitable example.	6M
		(OR)	
4.	a)	How to assign the values to the variables in the class during the time of creation of an object to that class? Explain with an example.	6M
	b)	Can we use constructors with parameters? What type of parameters can be passed for this? Explain the same with an example.	6M

UNIT-III

5.	a)	What is an interface? What are the similarities between interfaces and classes?	6M
	b)	Define inheritance. Explain member access rules in java**?**	6M
		(OR)	
6.	a)	Illustrate the use of 'super' and 'final' key words in java. Write the importance of abstract classes.	6M
	b)	How do we implement polymorphism in JAVA? Explain briefly.	6M

UNIT-IV

7.	a)	Give the list of mostly used java API packages and also explain adding more classes to a package.	6M
	b)	Demonstrate nested try statements and finally statements.	6M
		(OR)	
8.	a)	Give the syntax of exception handling and how to handle exception occurred during the execution of divide by zero	6M
	b)	With sample program explain the creation of packages. Accessing a package and hiding classes with packages.	6M

UNIT-V

9.	a)	Explain multi threading. Write the purpose of is Alive() and join() functions in java. Explain the same with an example.	6M
	b)	How can you perform thread scheduling by setting priorities to threads? Explain the same with an example.	6M
		(OR)	
10.	a)	Discuss various states in the life cycle of an applet in detail.	6M
	b)	Write the difference between applet and application.	6M

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AR16

CODE: 16CE2003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March, 2022

FLUID MECHANICS
(Civil Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	State and Explain Newton's law of viscocity	7M
	b)	Enumerate the classification of fluids with the help of a neat sketch	7M
		(OR)	
2.	a)	State and explain the Newton's law of viscosity. Deduce the expression for the dynamic viscosity.	7M
	b)	Derive and Explain Pascal Law	7M

UNIT-II

3.	a)	Explain terms Total Pressure and Center of Pressure	14M
	b)	Find the total pressure and Center of pressure of a triangular plate with base 2m and height 4m is immersed in water and the plane makes an angle 30^0 with free surface of water the base is parallel to water surface at a depth 2m below the free surface.	
		(OR)	
4.		Derive the expressions to determine the horizontal and vertical components of the resultant pressure on a submerged curved surface.	14M

UNIT-III

5.	a)	Define the equation of continuity. Obtain the expression for continuity equation in three dimensions?	7M
	b)	Explain about velocity potential function and steam function?	7M
		(OR)	
6.	a)	Explain flow net analysis.	7M
	b)	What are the methods of describing fluid flow?	7M

UNIT-IV

7.	a)	Develop the Euler equation of motion along a stream line and list out limitations of Euler equation?	7M
	b)	Find the direction of flow if a water pipe changes in diameter 400mm at section A to 800mm at section B which is 7m above. The pressure at A and B are 100KPa and 75 KPa respectively the discharge is 400m/sec.	7M
		(OR)	
8.		Derive and explain Momentum equation and its application on forces on pipe bend	14M

UNIT-V

9.		Explain Minor and Major Losses	14M
		(OR)	
10.	a)	Derive an expression for discharge over a rectangular notch or weir?	7M
	b)	A rectangular notch 400 mm long is used for measuring a discharge of 0.003m3/s. An error of 1.5 mm was made, while measuring the head over the notch. Calculate the percentage error in the discharge. Assume Cd = 0.6	7M

AR16

CODE: 16EE2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March,2022

ELECTRICAL MACHINES-I

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Explain the various effects of armature reaction and write the remedies for reducing armature reaction.	7M
	b)	Differentiate Lap winding and Wave windings.	7M
		(OR)	
2.	a)	Brief about various methods of Excitation of DC machines with necessary diagrams.	7M
	b)	A 4-pole long shunt lap wound generator supplies 25KW at a terminal voltage of 500V, armature resistance is 0.03Ω, series field resistance is 0.04 Ω and shunt field resistance is 200 Ω. The brush drop may be taken as 1V. Determine the e.m.f generated.	7M

UNIT-II

3.	a)	Explain the concept of residual magnetism with the help of OCC. Also discuss how the residual magnetism is helpful in DC generator.	7M
	b)	Brief about various losses in a DC machine.	7M
		(OR)	
4.	a)	A separately excited dc motor is operating at an armature voltage of 300 V. Its no-load speed is 1200 rpm. When fully loaded, it delivers a motor torque of 350 Nm and its speed drops to 1100 rpm. What is the full-load current and power? What is the armature resistance of the motor?	7M
	b)	Brief the speed torque characteristics of various types of DC motors.	7M

UNIT-III

5.	a)	Explain the reason of high starting currents in a DC motor. With neat sketch explain 3 point starter.	7M
	b)	Derive the condition for maximum efficiency of a DC machine.	7M
		(OR)	
6.	a)	With neat diagram explain Swinburne's test on DC machine and list its advantages.	7M
	b)	In a Hopkinson's test on two 220-V, 100-kW generators, the circulating current is equal to the full-load current and, in addition, 90 A are taken from the supply. Obtain the efficiency of each machine.	7M

UNIT-IV

7. a) With neat diagram, explain the principle of operation of a transformer. 7M
   b) Explain the constructional details of a transformer and brief about its various parts. 7M

(OR)

8. a) Define efficiency and discuss various losses in a transformer. 7M
   b) A 100 kVA transformer has primary and secondary turns of 400 and 100 respectively. Its primary and secondary resistance and reactances are 7M
   r1 = 0.3 Ω r2 = 0.015 Ω
   x1 = 1.1 Ω x2 = 0.055 Ω
   The supply voltage is 2400 V.
   Calculate
   (a) Equivalent resistance and reactance on the primary side
   (b) Voltage regulation and secondary voltage at a power factor of (i) 0.8 lagging
   (c) The power factor for zero voltage regulation.

UNIT-V

9. a) With neat circuit diagram, explain the procedure for obtaining full load copper losses in a transformer without actual loading. 7M
   b) A 100 kVA,3-phase, 50 Hz, 3,300/400 V transformer is Δ -connected on HV side and Y-connected on LV side. The resistance of the HV winding is 3.5 Ω per phase and that of the LV winding 0.02 Ω per phase. Calculate the iron losses of the transformer at normal voltage and frequency if its full-load efficiency be 95.8 % at 0.8 pf lagging 7M

(OR)

10. a) Explain Scott Connection of three phase transformers. List its applications. 7M
    b) Explain the test procedure for separation of core losses in a transformer. 7M

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AR16

CODE: 16CS2004 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2022

OBJECT ORIENTED PROGRAMMING

(Common to CSE &IT)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	State the important features of object-oriented programming. Compare object-oriented programming with procedure-oriented programming.	8M
	b)	What is an object? How is it different from an ordinary variable and a class? Explain with an example.	6M
		(OR)	
2.	a)	What is procedure-oriented programming? What are its main characteristics? Discuss an approach to the development of procedure-oriented programs.	8M
	b)	Write a program to read a number of any lengths. Perform the addition and subtraction on largest and smallest digits of it.	6M

UNIT-II

3.	a)	What is Overloading? Explain method overloading with an example.	7M
	b)	State and explain various types of constructors.	7M
		(OR)	
4.	a)	Write C++ program to overload + operator to add two matrices.	7M
	b)	What is the use of a destructor? Write a program to illustrate the implementation of destructors?	7M

UNIT-III

5.	a)	Explain the visibility of base class members for the access specifiers: private, protected and public while creating the derived class and also explain the syntax for creating derived class.	7M
	b)	Write a C++ program to illustrate multiple and multilevel inheritance.	7M
		(OR)	
6.	a)	Discuss about different types of inheritance in C++ with suitable example.	7M
	b)	What is abstract class? Explain with a suitable example.	7M

UNIT-IV

7.	a)	With an example explain how late binding can be achieved in C++.	7M
	b)	What is polymorphism? How it is achieved at compile time and runtime? Explain both with the help of example.	7M
		(OR)	
8.	a)	Describe the mechanism of creating virtual functions in C++ with an example.	7M
	b)	Explain the usage of pointers in C++ with a suitable example	7M

UNIT-V

9.	a)	Write a C++ program to add two integers, two floating point numbers and two complex numbers using class templates.	7M
	b)	Write a program to create a template function for bubble sort and demonstrate the sorting of integers and characters.	7M
		(OR)	
10.	a)	Write a function template for finding the minimum value in an array.	7M
	b)	Write and explain the procedure to catch multiple exceptions thrown from a single try block.	7M

AR13

CODE: 13EE2005 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March-2022
ELECTRICAL MACHINES-I
(Electrical & Electronics Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) What is function of commutator in DC Machine?
   b) Define the term critical field resistance?
   c) What are the conditions for parallel operation of DC Generators?
   d) How to minimize the iron loss in DC Machine?
   e) Define field energy.
   f) State the energy balance equation in the energy conversion process.
   g) What are fringing fields?
   h) How do you minimize iron losses in a D.C Machine?
   i) Why a series resistance is added with no-voltage release in a four point starter?
   j) What is the important precaution is to be taken while conducting HOPKINSON's test?

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a Show that the torque developed in a doubly excited magnetic system is equal to the rate of increase of field energy with respective to the displacement at constant currents. **5M**

   b Two coupled coils have self and mutual inductance of $L_{11}=2+0.5x, L_{22}=1+1/2x, L_{12}=L_{21}=1/2x$ over excitation range of linear displacement 'x'. The first coil is excited by a constant current of linear displacement 'x'. The first coil is excited by a constant current of 20A and second by the constant current of 10A.Find i)Mechanical work done if 'x' changes from 0.5 to 1mm ii)Energy supplied for the above change. **7M**

(OR)

3. a Derive the EMF equation of D.C Generator from the first principles. **5M**

   b A 4pole D.C Shunt generator with shunt field resistance of 100 Ωand armature resistance of 1 Ω has 378 wave connected conductors in its armature flux/pole is 0.02wb.If the load resistance of 10 Ω is connected across the armature and generator is driven at 1000RPM.Calculate power absorbed by the load. **7M**

UNIT-II

4. a Derive expressions for De-magnetising, cross magnetising ampere turns/pole. **5M**

   b A 4-pole wave-wound motor armature has 880 conductors and delivers 120A. The brushes have been displaced through 3 angular degrees from the geometrical axis. Calculate (i) demagnetising amp-turns/pole (ii) cross-magnetising amp-turns/pole (iii) the additional field current for neutralizing the demagnetisation of the field winding has 1100 turns/pole. **7M**

(OR)

5. a Write short notes on effect of armature reaction. **6M**
   b What are the improving methods of commutation? **6M**

UNIT-III

6. a Explain the necessity of parallel operation and state the conditions to be fulfilled for parallel operation. **4M**
   b Two shunt generators with straight line characteristics are operated in parallel their no load voltages being 240V and 245V respectively. The rating of above generators are 500KW at 230V and 250KW at 220V.If the total load supplied is 650KW.Calculate i)the terminal voltage and ii)Power supplied by each machine in KW. **8M**

(OR)

7. Six DC generators are running in parallel in a sub station, each having an armature resistance of 0.15Ω, running at the same speed and excited to give equal induced emfs. Each generator supplies an equal share of load of 360 KW at a terminal voltage of 500V into a load of fixed resistance. If the field current of one generator is raised by 5 percent, the others remaining unchanged, assuming the flux is proportional to field current and the speeds remains constant. Calculate new terminal voltage and output of each machine. **12M**

UNIT-IV

8. a Derive torque equation of a D.C motor from first principles. **5M**
   b A 6KW ,230V,4pole wave connected D.C motor has an efficiency of 80% and 400 armature conductors. A full load, the usefull flux/pole is 0.02wb and rotational losses are 100w.Find the full load speed and also shaft torque. **7M**

(OR)

9. a Compare the Speed-Current, Torque-Current and Speed-Torque characteristics of a D.C shunt and series motors. **6M**
   b A 230V shunt motor has an R_a =0.15 Ω and R_{sh} = 250 Ω.The motor draws 50A at 800rpm.Find the resistance to be added to the field circuit to increase the speed to1000 rpm at an armature current of 80A.Assume flux proportional to the field current. **6M**

UNIT-V

10. Explain Hopkinson's test in detail with the help of neat circuit .In the above test the following are the readings obtained. Line voltage 230V, line current excluding field currents 50A.Motor armature current 380A.Field currents are 5A&4.2A.Calculate the efficiency of each machine. The armature resistance of each machine is0.02Ω. **12M**

(OR)

11. a Explain the Swinburne's test to determine efficiency of D.C machine and what the limitations of the test are. **6M**
   b In a brake test on D.C shunt motor the load on one side of the brake drum was3Kgs and the other side is 5Kgs.The motor was running at a speed of 1350rpm.Input current is70A at 420VD.C.The pulley diameter is 1mt.Determine the torque, output power and efficiency. **6M**

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AR13

CODE: 13ME2007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.TECH I SEM SUPPL. EXAMINATIONS, MARCH-2022
THERMODYNAMICS
(Mechanical Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Write the first law of thermodynamics for a non-flow process
   b) Explain the Throttling process
   c) List any four limitations of first law of thermodynamics
   d) Define the PPM II
   e) Define exceergy and Anergy
   f) Formulate a relation for change in entropy for constant volume process
   g) How gravimetric analysis is different from volumetric analysis.
   h) Define mole and mass fraction
   i) For the same compression ratio and heat addition which cycle is efficient among Otto and diesel cycle? Justify
   j) Draw the T-S diagram for the dual cycle.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a) Illustrate the intensive and extensive properties 6M
   b) An engine is tested by means of a water brake at 1000 rpm. The measured torque of the engine is 10000 mN and the water consumption of the brake is 0.5 m^3/s, its inlet temperature being 20°C. Calculate the water temperature at exit, assuming that the whole of the engine power is ultimately transformed into heat which is absorbed by the cooling water. 6M

(OR)

3. a) Explain the quasi-static process 6M
   b) A system composed of 2 kg of the above fluid expands in a frictionless piston and cylinder machine from an initial state of 1 MPa, 100°C to a final temperature of 30°C. If there is no heat transfer, find the net work for the process. 6M

UNIT-II

4. A turbo compressor delivers 2.33 m^3/s at 0.276 MPa, 43°C which is heated at this pressure to 430°C and finally expanded in a turbine which delivers 1860 kW. During the expansion, there is a heat transfer of 0.09 MJ/s to the surroundings. Calculate the turbine exhaust temperature if changes in kinetic and potential energy are negligible. 12 M

(OR)

5. a) Prove $COP_{Heat\ pump} = COP_{Refregerator} + 1$ 4M
   b) Two reversible heat engines A and B are arranged in series, A rejecting heat directly to B. Engine A receives 200 kJ at a temperature of 421°Cfrom a hot source, while engine B is in communication with a cold sink at a temperature of 4.4°C. If the work output of A is twice that of B, find 8M
   (a) The intermediate temperature between A and B
   (b) The efficiency of each engine
   (c) The heat rejected to the cold sink

AR13

CODE: 13ME2007 SET-2

UNIT-III

6. Formulate the Maxwell's relations 12M

(OR)

7. a) Explain the phase transformation in detail 6M

b) Ten kg of water at 45°C is heated at a constant pressure of 10 bar until it becomes superheated vapour at 300°C. Find the change in volume, enthalpy, internal energy and entropy. 6M

UNIT-IV

8. a) A rigid tank of volume $1.2m^3$ is divided into two equal parts by partion. One compartment contains Neon gas at 20˚C and 110 kPa and other contain Argon gas at 47˚C and 225 kPa. Now partition is removed and the two gases are allowed to mix. If 10 kJ of heat is lost to the surroundings at 20˚C during the mixing process. Determine the temperature and pressure of the mixture 12M

(OR)

9. a) A room of dimensions 5m x 3m x 3m contains air water vapour mixture at 1 bar, 30C and 70% relative humidity. Calculate :
(i) Mass of the air ,
(ii) Mass of water vapour and
(iii) Degree of saturation. The universal gas constant is 8.143 kJ/kg-mole K and molecular mass of air and water vapour is 29 and 18 respectively. 6M

b) Explain the psychometric chart 6M

UNIT-V

10. a) What is Cycle? What is the difference between an Ideal and actual cycle 4M

b) Discuss Otto-Cycle with neat sketch (PV & TS diagrams) and obtain expression for efficiency 8M

(OR)

11. An engine with 200 mm cylinder diameter and 300 mm stroke works on theoretical Diesel cycle. The initial pressure and temperature of air used are 1 bar and 27°C. The cut-off is 8% of the stroke. Determine :
(i) Pressures and temperatures at all salient points.
(ii) Theoretical air standard efficiency. 12M
(iii) Mean effective pressure.
(iv) Power of the engine if the working cycles per minute are 380. Assume that compression ratio is 15 and working fluid is air. Consider all conditions to be ideal.

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