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11004 : Applied Thermodynamics 3 CT 04

P.P

P. Pages : 2 Time : Three Hours			s AW - 30 Max. Marks	AW - 3003 Max. Marks : 80	
	Note	s: 1. 2. 3. 4. 5. 6. 7.	Answer three question from Section A and three question from Section B. Due credit will be given to neatness and adequate dimensions. Assume suitable data wherever necessary. Retain the construction lines. Illustrate your answer necessary with the help of neat sketches. Use of slide rule logarithmic tables, Steam tables, Mollier's Chart, Drawing instrument, Thermodynamic table for moist air, Psychrometric Charts and Refrigeration charts is permitted. Use of pen Blue/Black ink/refill only for writing the answer book.		
1.	- >	NU	SECTION - A		
	a)	isothern	an isothermal process? Derive an expression for the work done during an nal process.	0	
	b)	State th energy	e first law of thermodynamics and prove that for non-flow process, it leads to the equation $Q = \Delta \mu + W$.	7	
			OR		
2.	a)	What a thermos	re the limitations of first law thermodynamics ? Explain the second law of dynamics.	5	
	b)	A fluid	system undergoes a non-flow frictionless process following the pressure volume	8	
		relation	$p = \frac{5}{v} + 1.5$, where 'p' is in bar and v is in m ³ . During the process volume changes		
		from 0. i) Ch	15 m ³ to 0.05 m ³ and system rejects 45 kJ of heat, determine, nange in internal energy ii) Change in enthalpy		
3.	a)	Lay do combus	wn the procedure for determination of minimum air required for complete stion of coal.	6	
	b)	Describ	be with the help of neat sketch 'Bomb Calorimeter'.	7	
			OR		
4.	a)	A stean as recei Excess Calcula coal bu	a boiler uses pulverized coal in the furnace. The ultimate analysis of coal (by mass) ved is : C 78%, H ₂ 3%, O ₂ 3%, S 1%, ash 10% and moisture 5%. air supplied is 30%. It the mass of air to be supplied and mass of gaseous product formed per kg of rnt.	13	
5.	a)	What a	re the advantages and disadvantages of mechanical draught ?	7	
	b)	Explair	the working with neat sketch of "High Steam low water safety valve".	7	

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6.

a) Differentiate water tube boiler with fire tube boiler.

b) Calculate the mass of the flue gases flowing through the chimney when the draught produced is equal to 1.9 cm of water. Temperature of flue gases is 290°C and ambient temperature is 20°C, the flue gases formed per kg of fuel burnt are 23 kg. Neglect the losses and take the diameter of the chimney as 1.8 m.

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SECTION - B

- 7. a) Explain with neat sketch :
 i) Cut-off governing
 ii) Ejector condenser
 - b) How and why does the hypothetical indicator diagram differ from actual indicator diagram? 5

OR

- 8. a) State the advantages of compound steam engine.
 - b) Calculate the indicated power and steam consumption in kg/hr of a double acting steam engine from the following data : Diameter of cylinder = 300 mm ;
 Stroke = 450 mm ; RPM = 120 ; Steam pressure 7 bar and 0.9 dry ;
 back pressure = 1.2 bar, cut - off takes place at 32% of stroke for both ends.
- 9. a) Draw the electrical circuit used for battery ignition in a four stroke four cylinder engines. 7 Explain the function of each component.
 - b) List the advantages and disadvantages of a two stroke cycle engine over a four stroke engine.

OR

- 10. a) Explain the fuel supply system sued in petrol engine with neat sketch. 5 b) The following particulars refer to a two stroke engine : bore = 20 cm ; stroke = 30 cm ; 9 speed = 300 rpm; Indicated m.e.p. = 275 kN/m^2 , Net brake load = 610 N; diameter of brake drum = 1 m; fuel consumption 4.25 kg/hr; calorific value of fuel = 44000 kJ/kg. Determine : I.P. i) B.P. ii) iii) Mechanical efficiency Indicated thermal efficiency iv) Brake thermal efficiency & Overall efficiency **v**) vi) 11. 7 a) Draw p-v and T-S diagram for a single stage reciprocating air compressor, without clearance. Derive the expression for the work done when compression is isothermal and i) ii) isentropic b) Enumerate the application of compressed air. 6 OR 12. a) What do you mean by multistage compression? State its advantages. 6 A single stage reciprocating compressor takes 1 m³ of air per minute at 1.013 bar and 15°C b) 7 and delivers it at 7 bar. Assuming that the law of compression is $py^{1.35} = constant$, and the clearance is negligible, calculate the indicated power.
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