TME-201 2004

Even Semester Examination 2017-18

B.TECH. (SEMESTER-II)

BASIC MECHANICAL ENGINEERING

Time: 03:00 Hours **Max Marks : 100**

Section-A

Note: Attempt any **four** questions:- 4×5=20

Q.1 Define quasi-static process & thermodynamic cycle.

Q.2 Explain extensive, intensive property and thermodynamics equilibrium.

Q.3 What is the difference between macroscopic & microscopic approaches?

Q.4 Explain Clauisus Inequality & thermodynamic temperature scale.

Q.5 Calculate the work done in a piston cylinder arrangement during the expansion process, where the process is given by the equation $P= (V^2+6V)$ bar. The volume changes from 1 m^3 to $4m^3$ during expansion.

Section-B

Note: Attempt any **four** questions:- 5×4=20

Q.6 Explain steady flow energy equation and simplify when applied for the following systems.

(a) Nozzle & Diffuser

(b) Hydraulic turbine & Hydraulic pump.

Q.7 Fill in the missing data for each of the following processes of a closed system between states 1 & 2

S.No.	Q(input)	W(output)	U_1	U_2	dU
A	18	6		35	
B	10			4	-15
C		12	3		32
D	25		14		10

Q.8 0.02 m^3 of air initially at pressure of 1 bar & temperature 20°C is heated at constant volume till the pressure reaches 4 bar. The air then reject heat at constant pressure will temperature reaches 20°C. From this, state the air receives heat at constant temp and complete the cycle. Determine the change in entropy for each process and represent the cycle of P-v 7 T-S diagram.

Q. 9 Explain Kelvin-Planck statement &Clausius Statement.

Q.10 Explain Carnot cycle & Carnot Theorem.

Section-C

Note: Attempt any **two** questions:- 10×2=10

Q.11 Derive the relation for air standard efficiency of otto cycle or diesel cycle with p-v & T-S diagram.

Q.12 In an otto cycle air at 17°C & 1 bar is compressed until the pressure is 15 bar. Heat is added at constant volume until the pressure becomes 40 bar. Calculate-

(a) Air standard efficiency

(b) Compression Ratio

(c) Mean effective pressure.

Q.13 Write short notes any two:

(a) (i) Sensible heat of water

(ii) dryness fraction

(iii) latent heat of vaporization.

(b) Triple point & Enthalpy at wet, dry & superheated steam.

(c) Steam enter an engine at a pressure of 12 bar with a 67^0C of superheat. It ia exhausted at a pressure of 0.15 bar & dryness fraction 0.95. Find the drop in enthalpy of steam.

Section-D

Note: Attempt any **two** questions:- 5×2=10

Q.14 Drive the torsion equation and write its assumptions.

Q.15 A uniform ladder, 5 m long weighs 180 N. it is placed against a wall making an angle of 60^0 with the floor. The Coefficient of friction between the ladder and wall is 0.25 and between the floor and ladder is 0.35. the ladder has to support a man 900N at its top. Calculate

(a) The horizontal force P applied to the ladder at the floor level to prevent slipping.

(b) if the force P is not applied what should be the minimum inclination of the ladder with the horizontal so that there is no slipping og it with the man at its top?

Q.16 Determine the diameter of a solid shaft which will transmit 300 KW at 250 r.p.m. The maximum shear stress should not exceed 30 N/mm^2 and twist should not be more than 1^0 in a shaft length of 2 m. Takes modulus of rigidity = 1×10^5 N/mm^2.

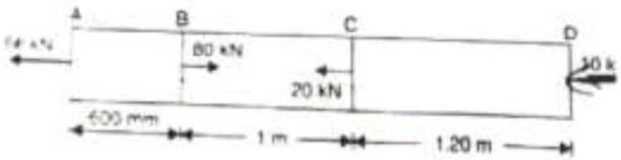
Section-E

Note: Attempt any **two** questions:- 5×2=10

Q.17 Derive the bending equation & its assumptions.

Q.18 Draw the shear force and bending moment diagram for a simply supported beam of length 9 m and carrying a uniformly distributed load of 10 KN/m for a distance of 6 m from the left end. Also calculate the maximum B.M. on the section.

Q.19 A brass bar, having cross- sectional area of 1000 mm^2, is subjected to axial force as shown in figure



Find the total elongation of bar. Take E= 1.05 $\times 10^5$ N/mm^2.

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