BMET- 102

Roll No.

Odd Semester Examination, 2019-20
B.Tech (Semester-I)
Basic Mechanical

Time:3:00 Hrs.

Max. Marks: 100

Total no. of printed pages: 2

Note: Attempt all the questions:

$4 \times 5 = 20$

Q1. Attempt any four:

a) Explain thermodynamic System, Boundary, Surrounding and Universe with suitable diagram.

b) Write the difference between SI and CI engine.

c) State and explain Newton's law of viscosity. Also drive the equation for same.

d) What do you understand by the term entropy? Explain the principle of entropy increase.

e) Explain open, closed and isolated system?

f) List different mechanical properties of materials and explain any four of them.

$4 \times 5 = 20$

Q2. Attempt any four:

a) Explain zeroth law of thermodynamics.

b) Derive the relation of air standard efficiency of Otto cycle. Also show the cycle on P-V and T-S diagram.

c) State Pascal's law and briefly explain its two practical applications.

d) What is Carnot cycle? What are the four processes which constitutes the cycle?

e) Determine the Bulk modulus of elasticity of a liquid, if the pressure of the liquid is increased from 7 MN/m^2 to 13 MN/m^2. The volume of a liquid decreases by 0.15%.

f) Explain the difference between water tube and fire tube boilers?

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Q3. **Attempt any two:** 2×10 = 20

   a) State Bernoulli's theorem and drive the expression for the same. Also write the assumptions made in.

   b) Differentiate between: (a) the impulse and reaction turbine (b) Radial and axial flow turbines, (c) Inward and outward radial flow turbine.

   c) Differentiate the following :

      i.   Instrumental error and environmental error

      ii.   Observation error and operational error

2×10 = 20

Q4. **Attempt any two:**

   a) Explain in detail Kelvin Plank and Clausius statement of second law.

   b) What is the principle of Brinell Hardness test? What are the factors affecting the test results?

   c) An air standard Otto cycle has a compression ratio of 8. At the start of compression process the temperature is 260 C and the pressure is 1 bar. If the maximum temperature of the cycle is 1080 K. Calculate: (i) net output (ii) thermal efficiency. Take $C_v = 0.718$ kJ/kgK.

2×10 = 20

Q5. **Attempt any two:**

   a) Define a centrifugal pump. Explain the working of a single- stage centrifugal pump with sketches.

   b) A mild steel bar is subjected to tensile test. The gauge length was 80 mm, initial diameter was 12 mm. The load at yield point was 3750 kg, the maximum load observed 5500 kg and the breaking load was 3900 kg. The final length at breaking point was 100 mm. The diameter of sample was 8 mm at the fracture surface. Calculate (i) Yield stress, UTS and breaking stress in mega Pascal (ii) Ductility and percentage reduction in area.

   c) Define Hook's law and modulus of elasticity. Explain the stages in a stress-strain curve for a ductile material.