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B.TECH. DEGREE EXAMINATIONS: OCTOBER/NOVEMBER – 2008

Third Semester

TEXTILE TECHNOLOGY (FASHION TECHNOLOGY)

U07ME307: Basics of Mechanical Engineering

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions: -

PART A (20 x 1 = 20 Marks)

1. According to first law of thermodynamics
   A. Work done by the system is equal to heat transferred by the system.
   B. Total internal energy of the system during the process remains constant
   C. Internal energy, enthalpy and entropy during the process remain constant.
   D. Total energy of the system remains constant

2. If Q_1 is the heat transfer between hot temperature source and machine and Q_2 between the cold temperature source and machine, then for refrigeration, COP will be equal to
   A. $Q_2/(Q_1 - Q_2)$ B. $Q_1/(Q_1 - Q_2)$ C. $(Q_1 - Q_2)/Q_1$ D. $(Q_2 - Q_1)/Q_1$

3. Which of the following property remains constant during throttling process?
   A. Pressure B. Enthalpy C. Temperature D. Entropy

4. Heating of dry steam above saturation temperature is known as
   A. Latent Heat Evaporation B. Superheating
   C. Super tempering D. Latent Heat Fusion

5. Reflector in nuclear plants is used to
   A. Returns the neutrons back into the core B. Shield the radio activity completely
   C. Check pollution D. conserve energy

6. Water tube boilers are in which
   A. Flue gases passes through the tubes and water around it
   B. Water passes through the tube and flue gases around it
   C. Forced circulation takes place in the tubes
   D. Water passes through the tubes and also around it

7. In Impulse reaction turbine, the pressure drops
   A. In Fixed nozzle B. In moving blades
   C. In fixed blades D. In both fixed and moving blades

8. The material used for the solar collector is
   A. Aluminium B. Cast Iron C. Lead D. Silica

9. For the same compression ratio
   A. Otto cycle is more efficient than the Diesel cycle
   B. Diesel cycle is more efficient than Otto cycle
   C. Compression ratio has nothing to do with efficiency
   D. Both Otto and Diesel cycles are equally efficient

10. Scavenging air in Diesel engine means
    A. Air fuel mixture
    B. Air used for combustion sent under pressure
    C. Air used for forcing burnt gases out of the engine's cylinder during the exhaust period
    D. Burnt air containing products of combustion

11. The bank of tubes at the back of the domestic refrigerant are
    A. Condenser tubes B. Evaporator tubes C. Capillary tubes D. Throttling tubes

12. Dew point is
    A. The temperature at which condensation of steam in saturated air will start
    B. The lowest attainable temperature for a mixture of air and steam
    C. The temperature at which evaporation of water in saturated air will start
    D. Used in connection with air conditioning

13. Oxygen to acetylene ratio in case of oxidizing flame is
    A. 3 : 1 B. 1.2 : 1 C. 1.5 : 1 D. 2:1

14. The commonly used flux in brazing is
    A. resin B. soft iron C. soft silver D. borax

15. Coining is the operation of
    A. Cold Forging B. Hot Forging C. Cold Extrusion D. Piercing

16. The important mechanical property for a material to be successfully rolled or forged is
    A. Ductility B. Elasticity C. Machinability D. Malleability

17. The velocity ratio of two pulleys connected by an open belt is
    A. Directly proportional to their diameters
    B. Inversely proportional to their diameters
    C. Directly proportional to the square of their diameters
    D. Inversely proportional to the square of their diameters

18. In simple gear train, if the number of ideal gears is odd, then the motion of the driven gear will
    A. Be same as that of driving gear
    B. Be opposite as that of driving gear
    C. Depends upon the number of teeth on the driving gear
    D. Depends upon the number of teeth on the driven gear

19. Bevel gears have their teeth
    A. Straight over the wheel rim B. Inclined to the wheel rim
    C. Curved over the wheel rim D. Cut on the surface of the frusta of the cones

20. Coefficient of fluctuation of energy is the
    A. Variation of the energy above and below the mean resisting torque line
    B. Ratio of maximum and minimum energies
    C. Difference between maximum and minimum energies
    D. Ratio of maximum fluctuation of energy to the work done per cycle

PART B (5 x 16 = 80 marks)

21. (a) (i) In steady flow apparatus, 135 kJ of work is done by each kg of fluid. The specific volume of the fluid, the pressure and velocity at the inlet are $0.37m^3/kg$, 600 kPa and 16 m/s. The inlet is 32 m above the floor and the discharge pipe is at floor level. The discharge conditions are 0.62 m^3/kg, 100 kPa and 270 m/s. The total heat loss between the inlet and discharge is 9 kJ/kg of fluid. Find the change in specific internal energy. (10)

(ii) Write the two statements of the Second law of thermodynamics. (3+3)

(OR)

21. (b) (i) A closed system containing an ideal gas, undergoes a reversible polytropic process during which 25 kJ of heat is rejected. During the process the volume changes from $0.15m^3$ to 0.06 m^3 and the pressure increases by 3.25 times. Find the mass, change in internal energy and work done of the system when the temperature increases by 100 K. Take R = 0.300 kJ/ kg K, $\gamma = 1.4$ (12)

(b) (ii) Discuss about sensible heat and latent heat of evaporation? (4)

22. (a) With neat schematic layout of a Hydro electric power Plant, explain working principle, function of each component of the plant. Also state advantages and disadvantages of this plant (16)

(OR)

22. (b) (i) Discuss the various basis for the classification of boilers. (8)

(ii) Sketch and explain each component of the geo-thermal plant. (8)

23. (a) (i) Explain the working of four stroke cycle diesel engine with neat sketches. (8)

(ii) With a neat diagram, briefly explain the working principle of summer air conditioning system for dry weather. (8)

(OR)

23. (b) (i) Draw the layouts of a vapour compression refrigeration system and state the function of each of the component. (12)

(ii) List out the merits of 2 stroke engine over 4 stroke engines for the same values of output and engine speed. (4)

24. (a) (i) Describe, with a sketch, the principal of gas welding process and three types of gas flames with their applications. (12)

(ii) Distinguish between soldering and brazing. (4)

(OR)

(b) (i) Define forging and discuss the various forging operations. (12)

(ii) How do you specify the milling machine? (4)

25. (a) (i) A leather belt 9 mm X 250 mm is used to drive a cast iron pulley 900 mm in diameter at 336 r.p.m. If the angle of contact is spread over 120° in smaller pulley and the stress in tight side is 2 MPa, find the power capacity of the belt. The density of the leather belt is 980 kg /m^3, and the coefficient of friction of leather on cast iron is 0.35. (12)

(ii) Write about any two terms used in spur gear terminology. (2+2)

(OR)

25. (b) (i) The intercepted areas between the output torque curve and the mean resistance line of a turning moment diagram for the multi cylinder engine, taken in order from one end are as follows:

- 35, 410, - 285, 325, -335, 260, - 365, 285, - 260 mm^2.

The diagram has been drawn to a scale of 1 mm = 70 Nm and 1 mm = 4.5^{0}. The engine speed is 900 r.p.m. and the fluctuation in speed is not to exceed 2 % of the mean speed. Find the mass and cross section of the flywheel rim having 650 mm mean diameter. The density of the material of the flywheel may be taken as 7200 kg/m^3. The rim is rectangular with the width 2 times the thickness. Neglect the effect of arms, etc. (12)

(ii) A compound gear consists of six gears. The numbers of teeth on the gears are as follows:

Gear	:	A	B	C	D	E	F
No. of Teeth	:	60	40	50	25	30	24

The gears B and C are on one shaft while the gears D and E are on another shaft. The gear A drives gear B, gear C drives gear D and gear E drives gear F. Gear A rotates at 100 r.p.m. What is the speed of gear F? (4)

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