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Code No. : 13305 O3

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (EEE) II Year I-Semester Old Examinations, May/June-2018

Principles of Mechanical Engineering

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Define critical radius of insulation.
2. Define the coefficient of performance of a refrigerating machine.
3. State the significance of clearance volume in reciprocating air compressors.
4. Give the classification of gas turbines.
5. Mention the applications of belt drives.
6. List the merits and demerits of gear drive.
7. Mention any four applications of Bernoulli equation.
8. Define specific speed of hydraulic turbine.
9. List the preventive measures against cavitation.
10. Define suction head, delivery head and static head of a centrifugal pump.

Part-B (5 × 10 = 50 Marks)

11. a) Discuss the classification of heat exchangers. [5]
b) A hollow cylinder of 5 cm inner diameter and 10 cm outer diameter has an inner surface temperature of 200°C and an outer surface temperature of 100°C. Determine the temperature at a point halfway between the inner and outer surfaces. If the thermal conductivity of the cylinder material is 70 W/m K, determine the heat flux through the cylinder per meter length. [5]
12. a) Explain the working of a two stroke petrol engine with a neat sketch and draw the P-v diagram. [5]
b) Explain the classification of steam boilers. [5]
13. a) Describe the working of reverted gear train with the help of neat sketch. Also mention any two applications of the same. [5]
b) Find the power transmitted by a belt running over a pulley of 600 mm diameter at 200 rpm. The coefficient of friction between the belt and pulley is 0.25, Angle of lap 160° and maximum tension in the belt is 2500 N. [5]
14. a) Explain various parameters of Darcy's formula along with their units. Also mention its applications. [4]
b) A turbine develops 9000 kW of power running at 100 rpm. The head on turbine is 30 m. If the head on turbine is reduced to 18 m, determine the speed and power developed by the turbine. [6]

15. a) Explain the working principle and constructional details of a centrifugal pump with a neat sketch. [5]
- b) A double acting reciprocating pump running at 40 rpm is discharging 1 m^3 of water per minute. The pump has a stroke of 400 mm. The diameter of the piston is 200 mm. The delivery and suction heads are 20 m and 5 m respectively. Find the slip of the pump and power required to drive the pump. [5]
16. a) Explain the working of air refrigeration system working on Bell-Coleman cycle. [5]
- b) The torque produced by an IC engine is 140 N-m. Engine consumes 4.2 kg/h of fuel at a rated speed of 1000 rpm. The calorific value of the fuel is 43900 kJ/kg. Calculate: (i) Brake specific fuel consumption and (ii) Brake thermal efficiency. [5]
17. Answer any *two* of the following:
- a) Derive the condition for maximum power transmission in the case of belt drive. [5]
- b) Explain the working principle of Orifice meter with the help of neat sketch. [5]
- c) Sketch single acting and double acting reciprocating pump and label the parts. [5]

