Hall Ticket Number:

### 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 $(10 \times 2 = 20 \text{ Marks})$

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 $(5 \times 10 = 50 \text{ Marks})$

- 11. a) Discuss the classification of heat exchangers.
  - b) A hollow cylinder of 5 cm inner diameter and 10 cm outer diameter has an inner [5] 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.
- 12. a) Explain the working of a two stroke petrol engine with a neat sketch and draw the P-v [5] diagram.

b) Explain the classification of steam boilers.

[5]

[5]

- 13. a) Describe the working of reverted gear train with the help of neat sketch. Also mention [5] any two applications of the same.
  - b) Find the power transmitted by a belt running over a pulley of 600 mm diameter at [5] 200 rpm. The coefficient of friction between the belt and pulley is 0.25, Angle of lap 160<sup>0</sup> and maximum tension in the belt is 2500 N.
- 14. a) Explain various parameters of Darcy's formula along with their units. Also mention its [4] applications.
  - b) A turbine develops 9000 kW of power running at 100 rpm. The head on turbine is [6] 30 m. If the head on turbine is reduced to 18 m, determine the speed and power developed by the turbine.

[5]

- 15. a) Explain the working principle and constructional details of a centrifugal pump with a neat sketch.
  - b) A double acting reciprocating pump running at 40 rpm is discharging 1 m<sup>3</sup> of water [5] 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.
  - 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.
  - 17. Answer any two of the following:

a) Derive the condition for maximum power transmission in the case of belt drive.	[5] [5]
Explain the working principle of Orifice meter with the help of neat sketch. Sketch single acting and double acting reciprocating pump and label the parts.	
	[5]

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