B.TECH. DEGREE EXAMINATION, MAY 2014

First and Second Semesters

BASIC MECHANICAL ENGINEERING

(Old Scheme—Supplementary/Mercy Chance—Prior to 2010 admissions)

[Common for all branches]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 4 marks.

1. Explain Zeroth law of thermodynamics. What is its significance ?

2. What are the assumptions made in arriving at air standard cycle ?

3. Write four methods of classification of reciprocating IC engines.

4. What do you mean by refrigerant ? Name a few refrigerants that are commonly used ?

5. What is the principle of power transmission in a belt drive ? Who do we have a tight side and slack side in belt drive ?

6. **When do we use bevel gear for power transmission ? Give reasons.**

7. What is meant by nuclear fission ? How do you get heat energy by nuclear fission ?

8. Define the terms : penstock, tailrace and head race as applied to a hydraulic turbine installation.

9. What are the two commonly used methods of milling ? Explain briefly.

10. What are the different gas combinations that are used for gas welding ?

(10 × 4 = 40 marks)

Part B

Answer all full questions.
Each full question carries 12 marks.

11. Show that for isothermal process, the heat transferred is equal to work done during the process. Also show that there will not be any change for the internal energy and enthalpy of the gas.

Or

12. When 160 kJ of heat is added to an ideal gas, its temperature has raised from 18° C. to 93° C. Find the two specific heats of the gas. Also calculate the change in internal energy, change in enthalpy and the work done.

13. Draw the circuit for a battery ignition system and explain the functions of its different components. Discuss the advantages and disadvantages of battery and magneto ignition systems.

Or

14. Explain with the help of neat sketches the methods to condition ambient air for comfort under the following environmental conditions :–

   (a) Hot and dry weather.

   (b) Hot and wet weather.

   (c) Cold and wet weather.

15. With simple sketches of a gear, explain the following :—

   (i) Pitch point.

   (ii) Pitch circle.

   (iii) Pitch circle diameter.

   (iv) Addendum.

   (v) Tooth profile.

   (vi) Tooth thickness.

Or

16. A rope drive transmits 75 kW through a 150 cm. diameter 45° grooved pulley rotating at 200 r.p.m.. Coefficient of friction between the rope and the pulley grooves is 0.3 and angle of lap is 160°. Each rope has mass 0.6 kg./m. and can safely take a pull of 800 N. Taking centrifugal tension into account, determine :

   (i) The number of ropes required for the drive.

   (ii) Initial rope tension.

17. With the help of a line sketch, explain the working of boiling water reactor nuclear plant. Discuss its merits and demerits.

Or

18. With the help of neat sketches, explain the working of a reaction turbine. What are the differences between an impulse and reaction steam turbine ?

19. With the help of simple sketches, explain different processes that can be carried out in a conventional drilling machine.

Or

20. What are the different smith forging operations that can be carried out in a foundry. Explain with neat sketches.

(5 × 12 = 60 marks)