B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)
Term-End Examination
December, 2014

00295

BIME-017 : POWER PLANT ENGINEERING

Time : 3 hours   *Maximum Marks : 70*

Note : *Answer any **five** questions. Assume any missing data suitably. Use of scientific calculator is allowed.*

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1. (a)   Discuss the different criteria for selection of a site and also discuss the points of consideration of layout of a thermal power plant.   *9*

    (b)   Write a short note on co-generation.   *5*

2. (a)   What are the main components of steam turbine ? Show the diagram of Governing and Protection system.   *7*

    (b)   Discuss the various losses occurring in a steam turbine.   *7*

3. (a) What do you mean by binding energy, radio-activity and mass defect ?   7

(b) Calculate the energy released in the following reactions :   7

     (i) $^{2}_{1}D + ^{3}_{1}T \rightarrow ^{4}_{2}He + ^{1}_{0}n$

     (ii) $^{2}_{1}D + ^{2}_{1}D \rightarrow ^{3}_{1}T + ^{1}_{+1}e$

4. (a) Establish a relation between various efficiencies considered in Pelton turbine.   7

(b) Five jets each of 50 mm diameter strike the buckets of impulse turbine and each gets deflected by 165°. The speed of the bucket wheel is 40 m/s.

Determine the,   7

     (i)   Velocity of jet for maximum efficiency

     (ii)   Power developed

     (iii)   Hydraulic efficiency

5. (a) Write short notes on the following :   7

     (i)   Mixed flow reaction turbine

     (ii)   Types of turbines

(b) In a hydro-power plant, a Kaplan turbine developes 3,000 kW power at head of 40 m. Assume the speed ratio 2 and flow ratio 0·6, diameter of Boss as 0·4 times the diameter of the runner and an overall efficiency of 90%. Determine the diameter of turbine and speed.   7

6. (a) Explain the operation of a fuel pump in a diesel power plant. How is the fuel supply regulated in diesel engine power plant ? 7

(b) A diesel engine of the power plant has a diameter of 20 cm and a stroke of 25 cm. The clearance volume is 10% of the swept volume. Determine the compression ratio and air standard efficiency of the engine, if the cut-off takes place at 10% of the stroke. 7

7. (a) What are the cost elements of a thermal power plant ? Explain briefly. 4

(b) A residential consumer has 10 lamps of 40 W each connected at his residence. His demand is

Midnight to 5 AM — 40 W

5 AM to 6 PM — no load

6 PM to 7 PM — 320 W

7 PM to 9 PM — 360 W

9 PM to 12 Midnight — 160 W

(i) Plot the load curve.

Find

(ii) Average load

(iii) Maximum load

(iv) Load factor

(v) Energy consumption during day 10

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