No. of Printed Pages : 3

BIME-017

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

00126

Term-End Examination

June, 2015

BIME-017 : POWER PLANT ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **five** questions. Assume missing data suitably, if any. Use of calculator is permitted.*

1. (a) Enumerate the major sources of energy and explain nuclear fission. 7

(b) Draw the general layout and discuss the salient features of a modern coal-fired thermal power plant. 7

2. (a) What is the difference between blade efficiency and stage efficiency of a turbine ? Derive the expression for it. 7

(b) With the help of neat diagrams, explain the various methods of turbine governing. 7

3. (a) Describe the different types of nuclear reactions, with examples. 7

(b) What are the different types of nuclear reactors ? What are PWR and BWR ? Explain any one in detail. 7

4. (a) Draw the general layout and describe the various components of hydroelectric power plants. 7

(b) The available discharge and head of a hydroelectric power plant are 400 m^3/s and 40 m. The efficiency of the turbine is 90%. The generator frequency is 50 Hz with 25 poles. Determine the least number of Francis turbines required having a specific speed of 400. 7

5. (a) With the help of neat sketches, show the difference between propeller and Kaplan turbines. 7

(b) In a hydro-power plant, a turbine develops 8000 kW with a head of 30 m, running at 200 rpm.

Determine : 7

(i) Specific speed

(ii) Normal speed and output power at a head of 20 m

6. (a) What are the advantages and disadvantages of a diesel engine power plant ? Write a note on Lubricating system of diesel power plant. *7*

(b) In a diesel power plant, an air standard diesel cycle has a compression ratio of 15. The pressure at the beginning of the stroke is 1 bar and the temperature is 27°C. The maximum temperature is 2500°C. Determine the thermal efficiency of the engine. Take $\gamma = 1{\cdot}4$. *7*

7. (a) What are the costs involved in a nuclear power plant ? Explain briefly. *4*

(b) The yearly duration curve of a certain plant can be considered as a straight line from 20 MW to 3 MW. To meet this load, three turbine generator units, two rated at 10 MW each and one at 5 MW, are installed.

Determine the following : *10*

(i) Installed capacity

(ii) Plant factor

(iii) Maximum demand

(iv) Load factor

(v) Utilization factor