No. of Printed Pages : 3

BIME-017

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

Term-End Examination

00792

December, 2017

BIME-017 : POWER PLANT ENGINEERING

Time : 3 hours *Maximum Marks : 70*

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

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

(b) What do you understand by proximate and ultimate analysis of coal ? What are the uses of these analyses when coal is used as fuel in thermal power plants ? 7

2. (a) What is a Moderator ? Name the common moderators and discuss their advantages and disadvantages. 7

(b) What are the different types of nuclear wastes ? Which are more dangerous and why ? How do you dispose off nuclear wastes ? 7

3. (a) A gas turbine has an overall pressure ratio of 5 : 1 and maximum cycle temperature of 550°C. The turbine drives the compressor and an electric generator, the mechanical efficiency of drive being 97%. The ambient temperature is 20°C and the isentropic efficiencies of the compressor and the turbine are 0·8 and 0·83 respectively. Calculate the power output in kW for an air flow of 15 kg/s. Calculate the thermal efficiency and work ratio. Neglect the changes in kinetic energy, and the loss of pressure in the combustion chamber. 7

(b) How are hydro turbines classified ? What points should be considered while selecting the right type of hydro turbine ? 7

4. (a) Explain the working principle of a closed cycle gas turbine plant with the help of a block diagram. 7

(b) What is Cavitation ? How can it be avoided ? What safety measures need to be taken for the safe operation of a hydro-electric power plant ? 7

5. (a) What factors should be considered while selecting a site for a diesel power plant ? 7

(b) During a trial of a four-stroke diesel engine, the following observations were recorded :

Area of diagram	= 475 mm^2
Length of indicator diagram	= 62 mm
Spring index	= 1·1 bar/mm
Dia of piston	= 100 mm
Length of piston	= 100 mm
Length of stroke	= 150 mm
Engine speed	= 375 rpm

Determine : 7

(i) Indicated mean effective pressure

(ii) Indicated power

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

(b) What are the environmental hazards in a power plant ? How can they be avoided and overcome ? 7

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Water-cooled Surface Condenser

(b) Turbo-charging

(c) Utilization Factor

(d) Economic Loading

(e) Superheater

(f) Fuel Injection System