

--	--	--	--	--	--	--	--	--	--



## GIET UNIVERSITY, GUNUPUR – 765022

### B. Tech (Seventh Semester – Regular) Examinations, November – 2022 BPCEL7010 / BPCEE7010 – Power Station Engineering and Economy (EE & EEE)

Time: 3 hrs

Maximum: 70 Marks

#### Answer ALL Questions

The figures in the right hand margin indicate marks.

#### PART – A: (Multiple Choice Questions)

(1 x 10 = 10 Marks)

- | <u>Q.1. Answer ALL questions</u>   | [CO#] | [PO#] |
|--|-------|-------|
| a. _____ advises the government on policy matters and formulates plans for the development of electricity systems      | 1     | 1     |
| (i) Central Electricity Authority  |       |       |
| (ii) Central Energy Authority  |       |       |
| (iii) Power Grid Corporation of India Ltd.   |       |       |
| (iv) Ministry of New and Renewable Energy  |       |       |
| b. The share of private sector in installed power generation capacity of India till 31.05.2022 is                      | 1     | 1     |
| (i) 24.6%  |       |       |
| (ii) 49.4%   |       |       |
| (iii) 26.0%  |       |       |
| (iv) 33.33%  |       |       |
| c. The time required for half of the _____ of a radioactive isotope to decay is called its half-life.                  | 2     | 1     |
| (i) Nuclei   |       |       |
| (ii) Electrons   |       |       |
| (iii) Protons  |       |       |
| (iv) Neutrons  |       |       |
| d. Safety rods provided in nuclear reactors to guard against accidents, in case of earthquake are made of              | 2     | 2     |
| (i) High carbon steel  |       |       |
| (ii) Molybdenum  |       |       |
| (iii) Zircaloy   |       |       |
| (iv) Boron/Cadmium   |       |       |
| e. Heavy water is preferred over ordinary water as a coolant, because it   | 2     | 2     |
| (i) Acts both as an efficient coolant as well as a moderator   |       |       |
| (ii) Can be heated to a higher temperature without pressurizing  |       |       |
| (iii) is less prone to radiation damage  |       |       |
| (iv) All of the above  |       |       |
| f. The surge tanks are usually provided in high or medium head _____ power plants when considerably _____ is required. | 3     | 2     |
| (i) Hydro-electric, short penstock   |       |       |
| (ii) Hydro-electric, long penstock   |       |       |
| (iii) Thermal, short penstock  |       |       |
| (iv) Thermal, large steam turbine  |       |       |
| g. What is the function of the turbine in hydropower plant?  | 3     | 1     |
| (i) Produce electrical power   |       |       |
| (ii) Produce heat power  |       |       |
| (iii) Produce hydropower   |       |       |
| (iv) Produce mechanical power  |       |       |
| h. In hydro-electric power plants, reduces water hammer effect in penstock   | 3     | 1     |
| (i) Spill way  |       |       |
| (ii) Trash rack  |       |       |
| (iii) Surge Tank   |       |       |
| (iv) Forebay   |       |       |
| i. Which calorific value of fuel should be considered for calculation of thermal efficiency of a power plant?          | 4     | 2     |
| (i) Lower calorific value  |       |       |
| (ii) Higher calorific value  |       |       |
| (iii) Gross heating value  |       |       |
| (iv) None of the above   |       |       |
| j. Which of the following is NOT a part of the steam generating subsystem in steam power plant?                        | 4     | 2     |
| (i) Boiler   |       |       |
| (ii) Economizer  |       |       |
| (iii) Super heater   |       |       |
| (iv) ESP   |       |       |

**PART – B: (Short Answer Questions)****(2 x 10 = 20 Marks)**Q.2. Answer ALL questions

	[CO#]	[PO#]
a. Define load factor.	1	1
b. Name the various costs associated with power plant economics	1	1
c. What are fissile and fertile materials? Give examples.	2	1
d. What do you mean by mass defect and binding energy?	2	2
e. Write the mass of electron and proton in kilogram.	2	2
f. Write advantages of hydroelectric power plant.	3	2
g. Explain what do you mean by storage and pondage	3	2
h. What is the function of superheater in a steam power plant?	4	1
i. What do you mean by boiler power? What are their units?	4	2
j. Mention the circuits which constitute a Steam Power Plant	4	2

**PART – C: (Long Answer Questions)****(10 x 4 = 40 Marks)**Answer ALL questions

	Marks	[CO#]	[PO#]																
3. a. The peak load on a power plant is 60MW. The loads having maximum demands of 30MW, 20MW, 10MW and 14MW are connected to the power plant. The capacity of the power plant is 80MW and annual load factor is 0.5. Estimate (i) Average Load (ii) Demand Factor (iii) Diversity Factor (iv) Energy supplied per year	10	1	1																
(OR)																			
b.	10	1	2																
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Hours</th> <th>0-6</th> <th>6-10</th> <th>10-12</th> <th>12-16</th> <th>16-20</th> <th>20-22</th> <th>22-24</th> </tr> </thead> <tbody> <tr> <td>MW</td> <td>30</td> <td>70</td> <td>90</td> <td>60</td> <td>100</td> <td>80</td> <td>60</td> </tr> </tbody> </table>				Hours	0-6	6-10	10-12	12-16	16-20	20-22	22-24	MW	30	70	90	60	100	80	60
Hours	0-6	6-10	10-12	12-16	16-20	20-22	22-24												
MW	30	70	90	60	100	80	60												
i. Draw the load factor and estimate load factor of the plant.																			
ii. What is the load factor of a standby equipment of 30MW capacity if it takes up all loads above 70MW? What is its use factor?																			
4. a. With a neat diagram explain the working of a PHWR.	7	2	2																
b. Mention three differences between PWR and PHWR	3	2	1																
(OR)																			
c. Write short note on automated gas cooled reactor.	5	2	1																
d. List the advantages to differentiate between PWR and BWR.	5	2	2																
5. a. Mention various types of dam on the basis of structure, use and material.	5	3	2																
b. Classify turbines on the basis of	5	3	2																
(i). Head and quantity of water available (ii). Hydraulic action (iii). Direction of flow of water (iv). Specific speed v. Disposition of the dam																			
(OR)																			
c. A Pelton wheel has to be designed for the following specifications. Power to be developed = 6000 kW. Net head available = 300 m. Speed 550 rpm. Ratio of jet diameter to wheel diameter=1/10. Hydraulic efficiency = 0.85. Assuming the velocity coefficient C= 0.98 and speed ratio f = 0.46 find (i) the number of jets (ii) diameter of each jets (iii) diameter of the wheel and (iv) the quantity of water required.	10	3	1																
6. a. Explain the various stages of Rankine cycle for steam power plant with PV diagram	10	4	2																
(OR)																			
b. What is the function of super-heater? Mention its advantages and types	5	4	2																
c. Classify different types of boilers. (According to the position of the axis, furnace, flow of water and hot gas, circulating water, steam pressure)	5	4	2																

--- End of Paper ---