Code No: **R42039** **R10** **Set No. 1**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. a) Explain the classification of coals with examples.
   b) What is the necessity of coal storage? Discuss the different methods used for coal storage at plant.

2. a) Explain the working of an induced draft type cooling tower with a sketch.
   b) How dust collection system differs from ash collection?
   c) Explain the chain grate type stoker with a simple sketch.

3. a) Give the general layout of Diesel power plant and explain the components.
   b) What are the advantages of Diesel plants over thermal plants?

4. The run-off data of two rivers is tabulated below for 12 months. The run-off is in millions of cu.m. per month.

Month	J	F	M	A	M	J	J	A	S	O	N	D
River (A)	15	15	30	40	70	60	80	100	80	30	20	20
River (B)	10	10	5	5	2	100	120	120	100	50	40	20

   Find i) the ratio of run-off of river A and B if the constant run-off is required for 50% time of the year.
   ii) Which river is more suitable for storage type plant and why?
   iii) Which river is more suitable for run-off river plant if the constant run-off is required for 70% of the time of the year?
   iv) What is the percentage time when the run-off rate of both the rivers is same?

5. a) Define the unit of nuclear radiation and classify the waste accordingly.
   b) Discuss with the help of diagrams, the methods used for treating the medium and high radioactive wastes.

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6. a) Explain the method of determining the distribution of the given load among the two plants for most economic generation.
   b) Discuss the working of hydro-electric plants having ample storage with steam power plant.

7. a) How do you define the water purity used for a power plant?
   b) Draw an electrical circuit used to measure the dissolved impurities in water and explain its working.

8. a) Define load duration curve. Explain the method of its construction and state its merits in the design of power plant.
   b) What are the different methods used to control NO_X in the flue gases? Explain anyone with a sketch.

Code No: **R42039** **R10** **Set No.2**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. a) What are the different methods of outside coal handling? Discuss their relative merits and demerits.
   b) Describe the different equipments used for coal handling at plant site.

2. a) Explain the working of electrostatic precipitator with a sketch and list its merits.
   b) Classify the pulverised fuel burners and list the requirements of them.

3. Give the layouts of high capacity, medium capacity and low capacity Diesel power plants and explain their components.

4. The average monthly run-off data of two rivers A & B is tabulated below for 12 months. The run-off is in millions of cu.m. per month.

Month	J	F	M	A	M	J	J	A	S	O	N	D
River (A)	8	5	10	3	2	20	30	40	35	20	10	10
River (B)	10	5	5	10	5	50	80	100	20	20	15	15

The head available for river A is 20 meters and for river B is 18.5 meters. Using the above data, find

i) Which river is more suitable for storage type plant? Assume equal overall efficiency for both cases.
ii) Which river is more suitable for run-off river plant if the constant run-off is required for 90% of the year?
iii) What is the percentage time when the run-off rate of both the rivers is same?

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5. a) What are the general components of nuclear reactor? Explain them with a sketch.
   b) With the help of a schematic diagram, explain the working of pressurised water reactor.

6. a) How would you make an economic analysis of the combined operation of the hydro and steam power plants?
   b) What factors decide the distribution of plants for operation on different portions of the annual load duration curve of a power system?

7. a) What is pH value? Explain its significance for the feed water used in power plants.
   b) Draw an electric circuit used to measure pH value of feed water and explain its working.

8. Define the following and explain the importance of each of them with examples:
   i) Demand Factor ii) Load Factor
   iii) Use Factor iv) Capacity Factor.

Code No: **R42039** **R10** **Set No.3**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1. a) Discuss the classification of the modern ash-handling systems and explain them with sketches.
   b) List the advantages of pneumatic ash-handling system.

2. a) Explain the working of spreader type stoker with a neat sketch and discuss its advantages.
   b) Describe the working of a mechanical type cooling tower with a sketch.

3. a) Explain the components of gas turbine plant with sketches.
   b) List the advantages of gas turbine plants over Diesel power plants.

4. a) How the hydro-electric power plants are classified?
   b) What do you understand by run-off river power plant?
   c) What do you understand by pumped storage plant?

5. a) Sketch and explain the operation of sodium-graphite type nuclear reactor and list its merits.
   b) List the merits and demerits of gas cooled reactor.

6. a) Discuss the suitability of steam power plants to supply the load in case of an interconnected system.
   b) The annual load duration curve of a system of loads is a straight line with maximum of 12 Mw at the beginning and 2 Mw at the end of the year. Annual costs of base and peak load stations are as given below:
   C_1 = 800000 + Rs 7500 / kw + Rs 3 / kwh (base load)
   C_2 = 600000 + Rs 5500 / kw + Rs 4 / kwh (peak load). Find the duration of time when peak load station will work in order to obtain the minimum annual cost.

7. a) What is paramagnetic affect? Explain the working of O_2 meter with a neat sketch.
   b) Draw an electric line diagram to measure CO_2 in the flue gases and explain its working.

8. The loads on a power plant with respect to time for 24 hours are tabulated below:

Time in hours.	0-6	6-8	8 -12	12 -14	14 -18	18 -22	22 -24
Load (MW)	40	50	60	50	70	80	40

Draw the load curve and find the load factor of the power station.

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POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. a) Give the general layout of the thermal power plant and explain the four circuits.
   b) Explain the operation of screw conveyor and list its advantages.

2. a) Explain the mechanism of combustion in under-feed supply of coal with a sketch.
   b) What are the affects of impurities in feed water on the boiler?

3. a) Give the layout of the gas turbine plant with auxiliaries and explain its components.
   b) Sketch and explain the closed type gas turbine plant and list its merits and demerits.

4. a) Explain the operation of any four types of dams with sketches.
   b) Explain the operation of any four types of spill ways with sketches.

5. a) Sketch and explain the operation of Fermi-fast breeder type nuclear reactor and list its merits.
   b) Explain the meaning of fertile material with examples.
   c) Explain the engineering properties required for nuclear fuels.

6. a) What are the advantages of gas turbine plant as peak load plant in an inter-connected system?
   b) The annual load duration curve of a station varies uniformly from 64000kw to zero. The load is supplied by two stations whose cost equations are as given below:
   C_1 = Rs (840000 + 840 kw + 0.116 kwh)
   C_2 = Rs (500000 + 440 kw + 0.2985 kwh). Find the minimum cost of generation in Rs/kwh.

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7. a) What is photocell? Draw a line diagram of smoke meter and explain its working.
   b) Draw a neat line diagram of a circuit to analyse the gas for nuclear radiation.

8. A power station supplies the loads as tabulated below:

Time Hours	6AM – 8AM	8AM to 9AM	9AM to 12Noon	12Noon to 2PM	2PM to 6PM	6PM to 8PM	8PM to 9PM	9PM to 11PM	11 PM - 5AM	5AM to 6AM
Load (KW)	1200	2000	3000	1500	2500	1800	2000	1000	500	800

i) Draw the load curve and find the load factor on the basis of 24 hours.
ii) Choose the proper number and size of generator units to supply this load.