

Code No: 114AD**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year II Semester Examinations, October/November - 2016****POWER SYSTEMS – I****(Electrical and Electronics Engineering)****Time: 3 Hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) What is the need of Boilers in thermal plants? [2]
- b) What is the function of moderator in nuclear plants? [3]
- c) What are the requirements distribution systems? [2]
- d) What are the merits and demerits of ring main distributor? [3]
- e) How the substations are classified? [2]
- f) What are the merits of Gas insulated substations? [3]
- g) What are the causes of low power factor? [2]
- h) What are the methods used for voltage control. [3]
- i) Define the load curve. [2]
- j) What are the different types of power factor tariff methods. [3]

PART - B**(50 Marks)**

- 2.a) Draw a neat schematic diagram of feed water/steam flow circuit of a modern large thermal power plant. Explain the working.
- b) What is the function of a condenser in a steam power plant? Describe with a neat sketch any one type of condenser commonly used in power plants. [5+5]

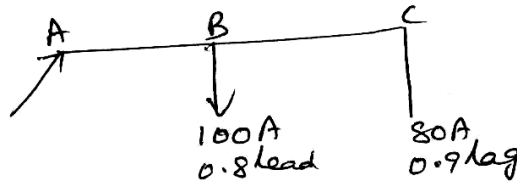
OR

- 3.a) With the help of a neat diagram explain the working principle of a fast breeder reactor used in a nuclear power plant.
- b) Explain the radiation hazards and shielding in nuclear power plants. [5+5]

- 4.a) Explain the radial distribution system with neat diagram and list out its merits and demerits.
- b) A 2 wire DC distributor ABCDEA in the form of a ring main is fed at point 'A' at 230V and is loaded as follows: 20A at B, 40A at C, 60A at D and 20A at E. The resistances of various sections (ground and return) are $AB = 0.1\Omega$, $BC = 0.05\Omega$, $CD = 0.01\Omega$, $DE = 0.025\Omega$ and $EA = 0.075\Omega$. Determine the point of minimum potential and current in each section of distributor. [5+5]

OR

5. The Figure shows a 1-phase line having resistance and reactance (ground and return) as 0.06 and 0.1 ohm/km. The length of section AB and BC are 1.0 km each. The voltage at the far end is 230V. Find the voltage at the sending end and the phase angle difference between the voltages of two ends, if
 - a) Power factors of the loads are with reference to farther end voltage
 - b) Power factors of the loads are with reference to the voltages at the load points.[5+5]



- 6.a) What do you understand by substation? Explain briefly the components of a substation.
 b) Draw the single line diagram of gas insulated substation? Explain. [5+5]

OR

- 7.a) Draw the schematic diagram of main and transfer bus arrangement? Explain.
 b) What are the different types of gas insulated substations? Explain any one type. [5+5]

- 8.a) Explain the working of on-load tap changing transformer for voltage control.
 b) A consumer is charged at the rate of Rs.100 per annum per kVA of maximum demand plus a flat rate of Rs 2/- per kWh. The phase advancing plant can be purchased at a rate of Rs.75 per kVA. The rate of interest and depreciation on the capital is 10%. Find the most economical p.f to which it can be improved. [5+5]

OR

- 9.a) Derive the expression for most economical power factor for constant kVA load .
 b) A 3 phases, 750 H.P, 50 Hz, 11 kV star connected induction motor has a full load efficiency of 90% at lagging p.f. of 0.8 and is connected to a feeder. If it is desired to correct the p.f of load to 0.95 lagging. Determine the size of the capacitor bank in kVAR and the capacitance of each unit if the capacitors are connected in delta as well as in star. [5+5]

- 10.a) Define and explain the significance of the following terms with illustrations.
 (i) Demand factor, (ii) Load factor, (iii) Diversity factor and (iv) Plant factor
 b) The load on a power plant on a typical day is as under

| Time | 12-5 AM | 5-9 AM | 9-6 PM | 6-10 PM | 10-12 Mid Night |
|--------------|---------|--------|--------|---------|--------------------|
| Load (MW) | 20 | 40 | 80 | 100 | 20 |

Plot the chronological load curve and load duration curve. Find the load factor of the plant and energy supplied by the plant in 24 hours. [5+5]

OR

- 11.a) What is meant by tariff? Explain some commonly used tariffs.
 b) The maximum demand of a consumer is 1MW and the units consumed per annum are 5, 00, 000 kWh. Calculate the reduction in cost if the power factor is raised from 0.5 to 0.8. The tariff is Rs 900 per annum per kW demand plus Rs 1.5 per kWh plus Rs 0.3 per kVAh reactive. Calculate the flat rate tariff for a unity power factor load. [5+5]

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