Code No: 114AD **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, November/December - 2015
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) Mention the materials used as control rods and shield in a nuclear reactor. [2M]
b) What is the function of combustion chamber in gas turbine power plant? [3M]
c) Name the important components of an overhead transmission line. [2M]
d) Indicate the advantages of Ring mains system [3M]
e) What is a gas insulated substation? State its advantages. [2M]
f) List out different types of bus bar arrangements. [3M]
g) What is the significance of power factor? [2M]
h) What is a static capacitor? [3M]
i) Define annual plant capacity factor [2M]
j) Mention the types of tariffs are used for domestic and commercial consumer? [3M]

PART-B

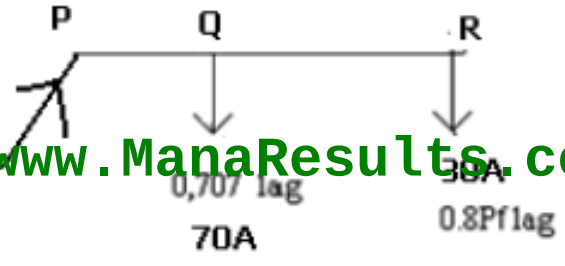
(50 Marks)

2.a) Draw the schematic line diagram of gas turbine power plant. Discuss its advantages over a steam turbine power plant. Also give applications of this type of power plant.
b) Describe working of PWR (pressurized water reactor). What are its advantages and disadvantages? [5+5]

OR

3.a) What are the basic components of nuclear reactor? Explain the function of each component.
b) What are the methods for arresting ash from flue gasses? Explain any one method in detail. [5+5]

4.a) Distinguish between primary and secondary distribution systems with suitable examples.
b) A single phase distributor PQR fed at P is as shown in figure. The power factors are lagging and expressed relative to the voltage at the far end. The impedances between the sections PQ and QR is (0.1 + j 0.15) . If the voltage at the far end is 230 V, calculate the voltage at the supply end and also its phase angle with respect to the far end. [4+6]



OR

5.a) Draw the phasor diagrams of A.C. distributor with concentrated loads for power factors with respect to respective load points.

b) An 800m distributor fed from both ends A and B is loaded uniformly at the rate of 1.2A/m run, the resistance of each conductor being 0.05 ohm per/km. Determine the minimum voltage and the point where it occurs if feeding points A and B are maintained at 255 V and 250 V respectively. Find also the current supplied from feeding point A and B. [4+6]

6.a) Draw the schematic line diagram of a typical 11kV/400V indoor substation showing all equipment.

b) With suitable diagrams explain the main and transfer bus arrangement. [5+5]

OR

7.a) Explain in detail about constructional aspects of gas insulated substation

b) What is group switching? Explain its operation in detail with help of suitable diagram. [5+5]

8.a) Explain the role of shunt and series capacitors in p.f. correction.

b) 3 - phase, 5kW induction motor has a p.f. of 0.75 lagging. A bank of capacitors is connected in delta across the supply terminals and p.f. raised to 0.9 Lagging. Determine the kVAR rating of the capacitors connected in each phase. [4+6]

OR

9.a) Derive the expression for the capacity of phase modifier to improve power factor of a system.

b) A 400V, 50 cycles/sec, three phase line delivers 207 kW at 0.8 p.f.(lag). It is desired to bring the line p.f. to unity by installing shunt capacitors. Calculate the capacitance if they are delta connected. [5+5]

10.a) Explain how a load duration curve is plotted? What is its use?

b) An industrial organization takes a steady load of 2 MW at a p.f. of 0.75 lagging and pays Rs. 125 per annum per KVA of maximum demand. Determine the capacity of the phase advancing equipment required for minimum overall annual expenditure if the phase advancing equipment costs Rs. 200 per KVAR. An interest and depreciation charge on phase advancing equipment is 10%. Also, determine the new p.f. of the supply. [4+6]

OR

11.a) What are the objectives and requirements of tariff?

b) A consumer has the following connected loads: 15 lamps of 40W each and two heaters of 1,000W each. His maximum demand is 15000W. On the average he uses 10 lamps 5 hours a day and each heater for 3 hours a day. Find his average load, monthly energy consumption and load factor. [4+6]

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