

II B. Tech II Semester Supplementary Examinations January - 2014**POWER SYSTEMS - I**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Mention the advantages and disadvantages of steam power station.  
b) What points should be considered while selecting a site for a steam power station.
2. a) Define nuclear power station. And state its working principle.  
b) Explain the two types of Hazards caused by radiation in nuclear power plants?
3. Describe about electrical characteristics of solar collectors.
4. a) Derive the expression for the voltage drop for a uniform loaded distributor fed at one end.  
b) Calculate the voltage at a distance of 200m of a 300 m long distributor uniformly loaded at the rate of 0.75A per meter. The distributor is fed at one end at 250 V. The resistance of the distributor per metre is 0.00018ohm. Also find the power loss in the distributor.
5. a) Classify the sub-stations according to service requirement.  
b) Mention the advantages of gas insulated sub-stations.
6. a) With a neat sketch explain the construction of a 3- conductor cable.  
b) Show that insulation resistance of a single core cable is inversely proportional to its length.
7. Write short notes the following:
  - a) Load factor
  - b) Diversity factor
  - c) Plant capacity factor
  - d) Plant use factor
8. a) Describe briefly about Flate rate tariff and Block rate tariff.  
b) Calculate annual bill of a consumer whose maximum demand is 100 kW, p.f. = 0.8 lagging and load factor= 60%. The tariff used is Rs 75 per KVA of maximum demand plus 15 paisa per kWH consumed

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1. Draw the schematic diagram of steam power station. And explain the stages in that arrangement.
2. a) With a neat sketch explain the working of Nuclear reactor.
b) Mention the fuel materials for nuclear reactor.
3. Explain briefly the types of focusing collectors or concentrating collectors.
4. a) Draw the single line diagram of a typical low tension distribution system. Explain it briefly.
b) A 2 wire d.c. distributor 200 meters long is uniformly loaded with 2A/metre. Resistance of single wire is 0.3 ohm/km. If the distributor is fed at one end, calculate:
i) The voltage drop up to a distance of 150 m from the feeding point
ii) The maximum voltage drop
5. a) Mention the steps to be kept in view while designing gas insulated sub-station.
b) Give the chief advantages of single bus-bar system and single bus-bar system with sectionalisation.
6. Describe briefly the construction and principal insulating materials used in cables.
7. a) Define load curve and explain the importance of daily load curves.
b) A power station has a maximum demand of 15000 kW. The annual factor is 50 % and plant capacity factor is 40%. Determine the reserve capacity factor.
8. a) The cost of electrical energy generated into three parts, explain them.
b) The tariff in force is Rs 150 per KVA of maximum demand and 8 paise per unit consumed. If the load factor is 30%, find the overall cost per unit at i) unity p.f. and ii) 0.7 p.f.

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1. a) Define thermal efficiency and overall efficiency.  
b) A steam power station spends Rs. 30 lakhs per annum for coal used in the station. The coal has a calorific value of 5000 kcal/kg and costs Rs. 300 per ton. If the station has thermal efficiency of 33 % and electrical efficiency of 90 %. Find the average load on the station.
2. With a schematic diagram explain pressurized water reactor and also state its advantages.
3. a) Mention the advantages of non-conventional energy sources.  
b) Describe the flat type solar collectors.
4. a) Write some of the requirements of a good distribution system.  
b) Derive the expression for power loss in a uniformly loaded distributor fed at one end.
5. a) Draw the symbols for important equipment (at least eight) in sub-station and explain briefly.  
b) Give the comparison between air insulated substation and gas insulated substation.
6. a) Write short notes on belted cables.  
b) If the cable has a length of 1 metres then derive the expression for capacitance.
7. a) With the help of neat sketches, explain load curve, load duration curve and integrated load duration curve.  
b) Differentiate between utilization and plant use factors?
8. a) Explain briefly about the important types of power factor tariff.  
b) A factory has a maximum load of 240 kW at 0.8 p.f. lagging with an annual consumption of 50,000 units. The tariff is Rs. 50 per KVA of maximum demand plus 10 paise per unit. Calculate the flat rate of energy consumption. What will be annual saving of p.f. is raised to unity.

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1. What are the most important constituents of a steam power station? Explain them briefly.
2.
 - a) What are the functions to be considered for the selection of site for nuclear power reactor.
 - b) Give the comparison between thermal reactor and breeder reactor.
3. Explain briefly about the main components of simple gas turbine power plant. And state its advantages and disadvantages.
4. Explain the following distribution systems.
 - a) Radial distribution system
 - b) Ring main distribution system.Also state its advantages and disadvantages.
5.
 - a) Give the comparison between outdoor and indoor sub-stations.
 - b) Explain briefly about insulators, circuit breakers and power transformers.
6.
 - a) Derive the expression for thermal resistance of dielectric of a single core cable.
 - b) A 33 kV single core cable has a conductor diameter of 1cm and a sheath of inside diameter 4cm. Find the maximum and minimum stress in the insulation.
7. Write short notes the following:
 - a) Connected load
 - b) Maximum demand
 - c) Average load
 - d) Demand factor
8.
 - a) Discuss about the desirable characteristics of a tariff.
 - b) A consumer has a maximum demand of 200 kW at 40% load factor. If the tariff is Rs. 100 per kW of maximum demand plus 10 paise per kW, find the overall cost per kW.