II B. Tech II Semester Regular Examinations August - 2014
POWER SYSTEMS - I
(Electrical and Electronics Engineering)

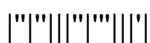Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain the factors to be considered for the selection of the site for a thermal power station
    b) Explain the functions of Economizer and super heater in a thermal power plant.   (8M+7M)

2. a) Explain the different Nuclear materials used in a Nuclear power station
    b) Explain the Basic components of a Nuclear reactor with a neat diagram   (7M+8M)

3. a) Explain the functions of different components of a Gas turbine power plant with a neat block diagram
    b) Explain about the point focusing collector of solar power generation?   (8M+7M)

4. a) List the advantages of ring mains system of distribution over the radial system
    b) A DC ring main ABCDA is fed from point A with 230 V supply and the loop resistances of various sections are AB = 0.04 ohms; BC = 0.35 ohms; CD = 0.5 ohms and DA = 0.05 ohms. The main supplies 100 A at B, 150A at C and 200 A at D. Calculate the voltages at each load point. If the points A and C are inter connected through a link of 0.05 ohm.
                                                               (7M+8M)

5. a) Compare Air insulated and gas insulated substations.
    b) Explain with a neat lay out diagram of main and transfer bus bar system   (7M+8M)

6. a) What is meant by capacitance grading of a cable?
    b) Find the most economical diameter of a single core cable to be used on a 132 kV, 3-phase system. Find also the overall diameter of the insulation if the peak permissible stress is not to exceed 60 kV per cm.   (7M+8M)

7. a) Explain Two-part tariff and compare it with power factor tariff.
    b) A system has a straight line annual load duration curve with maximum and minimum demands of 1500MW and 500 MW respectively. The annual cost characteristics of base load and peak loads stations are respectively given by
    C_1 = (Rs.10, 00,000 + Rs. 1000/kW + Rs 6/kWh)
    C_2 = (Rs.8, 00,000 + Rs. 600/kW + Rs 8/kWh).
    Determine the operating schedule of peak load station for minimum annual cost. Also calculate the overall cost per kWh.   (7M+8M)

8. Write short notes on the Following:
    a) Importance of control rods in nuclear power stations
    b) Stepped distributor in Distribution systems
    c) Integrated load duration curves   (5M+5M+5M)

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1.　a) Explain with a neat lay out diagram with main parts and the working of a steam power station.
　　b) What are the limitations of a thermal power plant?　　　　　(10M+5M)

2.　a) List the advantages and disadvantages of a pressurized water reactor (PWR).
　　b) Explain the classification of nuclear reactor and briefly discuss about each one. (7M+8M)

3.　a) What is Solar cell? Explain its principle of operation.
　　b) Explain the following terms with reference to a solar concentrator
　　　i) Aperture area　　　　　　ii) Acceptance angle　　　iii) Absorber area
　　　iv) Optical efficiency　　　　v) Thermal efficiency　　　　(5M+10M)

4.　a) What is an inter connector? Discuss its advantages in a distribution system
　　b) Discuss in detail about different types of distributors used in distribution system.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(7M+8M)

5.　a) Explain with a neat layout diagram of a single bus bar system with sectionalization and list merits and demerits.
　　b) List the advantages and disadvantages of Gas-insulated substation.　　　(10M+5M)

6.　Show that in a 3-core (belted type) cable the neutral capacitance of each conductor C_n is equal to $C_s + 3C_c$, where C_s and C_c are the capacitances of each conductor to sheath and to each other respectively. And further explain how these capacitances can be measured experimentally.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(15M)

7.　a) Define the following with respect to the economic aspects power generation
　　　i) Load duration curve　　　　　　ii) Demand factor
　　　iii) Diversity factor　　　　　　　iv) Maximum demand
　　b) A generating station has a maximum demand of 500 MW. The annual load factor is 50 % and capacity factor is 40 %. Find the reserve capacity of the plant.　　　(8M+7M)

8.　Write short notes on the Following:
　　a) Importance of reflectors and coolants in nuclear power stations
　　b) Types of insulating materials used in underground cables
　　c) Three part tariff　　　　　　　　　　　　　　　　　　(5M+5M+5M)

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SET - 3

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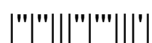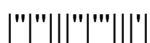
Time: 3 hours   Max. Marks: 75

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1. a) Explain briefly the types of fuels used in Thermal Power stations
    b) What is feed water? What are the problems associated due to impurities in feed water? How they can be eliminated.   (7M+8M)

2. a) Explain the methods of producing nuclear reaction? What is chain reaction?
    b) Explain the following with respect to Nuclear power station
       i) Isotope   ii) Atomic mass unit   iii) Binding energy and mass defect   (7M+8M)

3. a) Explain the economic feasibility of harnessing solar energy.
    b) Explain the construction and working principle of operation of a flat plate solar energy collector with a neat diagram   (5M+10M)

4. a) Explain clearly the criteria for selecting a suitable size of the conductor for a feeder and distributor
    b) Explain in detail about the distribution feeder fed from both ends with equal voltages and derive the expressions for voltage drop of each section.   (7M+8M)

5. a) What are the factors to be considered for selecting bus bars?
    b) Explain with a neat lay out diagram of a single bus bar arrangement and list its merits and demerits.   (5M+10M)

6. Explain classification of cables and discuss their general construction with neat sketch.
                                                                                            (15M)

7. a) Explain the terms load factor and diversity factor and discuss their effect on the cost of generation of electrical energy.
    b) A 1000MW power station delivers 1000 MW for 2 hours, 500 MW for 6 hours and is shut down for the rest of each day. It is also shut down for maintenance for 60 days annually. Calculate its annual load factor.   (8M+7M)

8. Write short notes on the Following:
    a) Radiation hazards and shielding in nuclear power stations
    b) Interconnector in Distribution systems
    c) Block rate Tariff   (5M+5M+5M)

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SET - 4

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1. a) List the advantages and disadvantages of a thermal power station.
    b) Explain the functions of Cooling tower and condenser with respect to a thermal power station. (8M+7M)

2. a) Explain the mechanism of energy release in a nuclear reaction?
    b) Explain the factors for selecting the site for a nuclear power stations (8M+7M)

3. a) Explain the methods to improve thermal efficiency of gas turbine plant
    b) Explain open cycle and closed cycle gas turbine plants (8M+7M)

4. a) Explain briefly about various electric distribution systems
    b) Explain about the stepped distributor? (8M+7M)

5. a) Explain the factors to be considered when selecting a location for a substation
    b) List the merits and demerits of indoor substations over outdoor substations. (7M+8M)

6. a) Explain the purpose of using inters heaths in a cable.
    b) A single core cable has a conductor diameter of 2.5 cm and a sheath of inside diameter 6cm. Calculate the maximum stress. It is desired to reduce the maximum stress by using two inters heaths. Determine their best position, the maximum stress and the voltage on each. Consider the System voltage as 3-phase 66 kV. (5M+10M)

7. a) Define the following with respect to the economic aspects power generation
       i) Connected load   ii) Load factor   iii) Plant capacity factor
    b) Calculate the generating cost per kWH, delivered from a generating station from the following data. Plant capacity 500 MW; annual load factor 45 %; capital cost Rs.1200×10^6; annual cost of fuel etc Rs.160×10^6, interest 9.2 % per annum of initial value. (8M+7M)

8. Write short notes on the Following:
    a) Types of Nuclear reactors
    b) Comparison of AC and DC distribution
    c) Power factor Tariff (5M+5M+5M)

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