

Code No: R22022

R10

SET -1

II B. Tech II Semester Regular Examinations April/May – 2013

POWER SYSTEMS - I

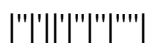
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

1. Draw a layout of a Thermal Power Station and describe the function of several components
2. a) Explain the process of nuclear fission and nuclear fusion
b) What is a nuclear reactor? Describe briefly various components of a Nuclear reactor
3. With the help of block diagram, Explain the working principle and function of components of Gas power plant
4. Explain in detail the radial and ring main distribution systems. Indicate the merits and demerits of each system. Also explain the design features of each system.
5. a) Draw schematic arrangement of double bus bar arrangement in substation? Explain its functionality
b) What is the advantage of main and transfer bus bar arrangement in sub station? Describe its operation with relevant diagrams.
6. a) Derive the expression for insulation resistance of a single core cable?
b) Explain the types of insulating materials commonly used in cables
7. Explain the following:
a) Load curve b) Load duration curve
c) Load factor d) Demand factor e) Diversity factor
8. a) Describe how two-part and three part tariff are defined? Mention all kinds of costs considered in it?
b) Explain the advantages of power factor tariff methods.



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SET -2

II B. Tech II Semester Regular Examinations April/May – 2013

POWER SYSTEMS - I

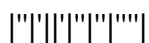
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

1. a) What are the factors to be considered for selection of the site for a thermal power station
b) Describe the function of the economizer and super heater and air preheater in a thermal power plant
2. With the help of neat diagram, Explain the Pressurized Water Reactor and boiling water reactor
3. a) With the help of line diagram, Explain the working principle of solar power generation
b) With the help of line diagram, Explain the working principle of gas power generation
4. a) Discuss briefly various electric distribution systems
b) Discuss the advantages of ring main system of Distribution over the radial system
5. a) Explain how the substations are classified? Discuss them in brief.
b) Explain the advantages and disadvantages of a Gas Insulated substation over a conventional air insulated substation
6. a) Explain what is meant by capacitance grading in connection with cables with necessary equations
b) A single core cable has a core diameter of 2.5 cm, Insulation thickness of 1.25 cm and resistivity of the insulation is 4.5×10^{14} ohm-cm. Calculate the insulation resistance per km.
7. a) Explain the following: i) Capacity factor ii) Utilization factor iii) Plant use factor
b) A Domestic lighting installation having fifteen 60 watt lamps is operated as follows
5 lamps from 6 p.m till 8 p.m.
10 lamps from 8 p.m. till 10 p.m.
6 lamps from 10 p.m. till 12 p.m.
Determine the demand factor and the daily load factor
8. a) Explain what is meant by Fixed, semi-fixed and running costs in connection with Power generation cost
b) Write short notes on the following i) Two-part tariff ii) Power factor tariff.



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R10**SET -3****II B. Tech II Semester Regular Examinations April/May – 2013****POWER SYSTEMS - I**

(Electrical and Electronics Engineering)

Time: 3 hours

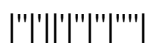
Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

1. a) Draw the line diagram of thermal power station and discuss briefly each component.
b) What are the special features adopted in super thermal power stations?
2. a) Explain “chain reaction”? How it is controlled in a nuclear reactor?
b) Sketch a modern nuclear reactor and discuss function of each part.
3. a) Explain principle of operation of a Solar Power Plant. And briefly explain construction of solar radiation collection devices.
b) Draw the wire diagram of solar energy storage and explain its components.
4. a) Explain different types of AC distribution systems?
b) What are the advantages of a doubly fed distributor over singly fed distributor?
5. a) Distinguish between air insulated sub-station and Gas Insulated sub-station?
b) Discuss installation and maintenance of Gas Insulated sub-station?
6. a) Prove that the ratio of internal sheaths diameter to conductor diameter for a single core cable for most economical section is 2.718
b) The maximum and minimum stresses in the dielectric of a single core cable are 40 kV/cm (rms) and 10 kV/cm (rms) respectively. If the conductor diameter is 2 cm find i) Thickness of insulation and ii) Operating voltage.
7. a) Explain the terms i) Load Factor ii) Demand Factor iii) Diversity factor and iv) Plant capacity factor
b) The following data were collected from daily load curves of a power system during a year.

Load	20,000	15,000	10,000	7,500	4,500	8,760
(kW)	and above	and above	and above	and above	and above	
Duration	85	876	1750	4300	7500	8760
(hours)						

 Calculate yearly load duration curve and calculate load factor.



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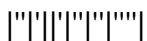
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8. a) What are different Tariffs used in operation of power plants.

b) A 10 MW thermal power plant has the following data:

Peak load	= 8 MW
Plant annual use factor	= 0.72
Cost of the plant	= Rs. 800/kW installed capacity
Interest, insurance and depreciation	= 10% of the capital cost
Cost of Transmission and distribution	= Rs. 350 x1000
Interest, depreciation on distribution	= 5%
Cost of coal	= Rs. 6 per kN
Plant maintenance cost	= Rs. 30,000/year (fixed) = Rs. 40,000/year (running)
Coal used	= 250,000 kN/year

Assume transmission and distribution costs are to charged to generation i) Devise a Two-part tariff and ii) Average cost of generation in paise / kWh



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R10**SET -4****II B. Tech II Semester Regular Examinations April/May – 2012****POWER SYSTEMS - I**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

1. a) Explain principle of operation of Electro static precipitator.
b) Discuss the following:
 - i) Economizers ii) Condensers iii) Cooling Towers and iv) Chimney
2. a) Discuss different types of control rods that are used in Nuclear reactors?
b) Draw a neat sketch and explain working of a modern nuclear power plant.
3. a) With a neat sketch explain principle of operation of Gas power station?
b) Discuss how solar energy be converted into electrical energy? Draw the line diagram of solar energy storage?
4. a) Explain different types of distribution systems?
b) A. d.c 2 wire distribution AB 300 meters long is fed from both ends and supplies a uniformly distributed load of 0.15 amp per meters length together with the following concentrated loads : 50A at C, 60 A at D and 40A at E, distance AC, CD and DE being 75,100 and 50 meters respectively. If the supply voltage at A and B are 205 and 200 V respectively and resistance of inductor is 0.00015 ohm, per meter, calculate the current supplied at each and the point of minimum potential.
5. a) Explain construction, installation and maintenance of Gas Insulated substation.
b) Discuss different types of bus-bar arrangements of Air insulated sub-station.
6. a) Sketch a 3-phase cable cross section and explain the function of each component.
b) A single core lead sheath cable has a conductor diameter of 1 cm and has insulation of two layers of different materials each 1.5 cm thick. The relative permittivities are 2.5 and 3.5. Calculate potential gradient at the surface of the conductor with a potential difference of 65 kV between conductor and sheath.
7. a) A generating station has a connected load of 43 MW and a maximum demand of 20 MW, the units generated being 61.5×10^6 per annum. Calculate i) Demand Factor and ii) Load Factor.
b) Explain how you would find the economic loading of base and peak load stations for a given load duration curve.
8. a) Describe how two-part and three part tariff are defined? Mention all kinds of costs considered in it?
b) Explain the advantages of power factor tariff methods

