

Code No: RT22024

R13**SET - 1****II B. Tech II Semester Regular/Supplementary Examinations, April/May - 2017****POWER SYSTEMS - I**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
- ~~~~~

PART-A

1. a) What are the advantages and disadvantages of thermal power station?
b) List out the main parts of nuclear reactor.
c) Give the comparison of DC and AC distribution.
d) What is the need of substation in a power system?
e) What is meant by capacitive grading of cables? What are practical difficulties in this grading?
f) Define the Two-port tariff method? (4M+3M+4M+4M+4M+3M)

PART-B

2. a) Draw the flow diagram for feed water circuit? Explain.
b) Explain the ash handling system in thermal plants. (8M+8M)
3. a) What is the function of a moderator? What are the desirable properties of a moderator?
Compare the performance of various materials used as moderator in a nuclear reactor.
b) Discuss the nuclear waste disposal (9M+7M)
4. a) Explain in detail about the radial and ring main distribution systems.
b) A DC ring main ABCDA is fed from point A with 250 V supply and the resistances (including both lead and return) of various sections are as follows: AB=0.02 Ω ; BC=0.018 Ω ; CD=0.025 Ω ; and DA=0.02 Ω . The main supplies a load of 150 A at B, 300 A at C, and 250 A at D. Determine voltage at each load point. If the points A and C are linked through an interconnector of resistance 0.02 Ω , determine the new voltage at each load point. (7M+9M)
5. a) Discuss the different ways of classifying the sub-stations and explain each one in detail.
b) Explain the installation and maintenance of gas insulated substations. (8M+8M)
6. a) Draw the cross section of a 3-core belted cable and explain the function of each part.
b) A single core cable for 66 kV, three phase system has a conductor diameter of 2 cm and sheath of inside diameter 5.3 cm. It is required to have two intersheaths so that stress varies between the same maximum and minimum values in the three layers of dielectric. Find the positions of intersheaths, maximum and minimum stress and voltage on the intersheaths. Also find the maximum and minimum stress if the intersheaths are not used. (7M+9M)
7. a) Explain the various power factor tariff methods
b) A Power station is to fed four regions of load whose peak loads are 12, 7, 10 and 8 MW. The diversity factor at the station is 1.4 and the average annual load factor is 65%. Determine the following: (i) Maximum demand on the station, (ii) Annual energy supplied by the station and (iii) Suggest the installed capacity. (8M+8M)

Code No: RT22024

R13**SET - 2****II B. Tech II Semester Regular/Supplementary Examinations, April/May - 2017****POWER SYSTEMS - I**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
- ~~~~~

PART-A

1. a) What are the functions of economizer and super heater in a thermal plant?
b) What is nuclear chain reaction? What are different types of nuclear reactions?
c) Write the differences between radial and ring main distribution systems.
d) Write the demerits of single bus bar and double bus bar schemes.
e) What is the need of grading of cables?
f) What is a tariff? Why tariff for power load is less than the lighting load.
(4M+4M+4M+4M+3M+3M)

PART-B

2. a) Describe the schematic arrangement of a thermal plant and explain the function of each component briefly.
b) What is the need of Boilers? Discuss various types of boilers
(8M+8M)
3. a) Describe the construction and uses of nuclear reactor core.
b) Name different nuclear fuels. Explain each of them in detail.
(8M+8M)
4. a) Explain the design features of primary distribution system.
b) Derive the expression for voltage drop of an AC distribution system with an example?
(7M+9M)
5. a) With a neat schematic diagram, explain the main and transfer bus arrangement? Discuss its merits and demerits.
b) Explain the constructional features of gas insulated substations.
(8M+8M)
6. a) Discuss the methods for grading of cables. What are the limitations of grading of cables?
b) A 33 kV, three phase underground feeder, 3.4 km long, uses three single core cables. Each cable has a conductor diameter of 2.5 cm and radial thickness of insulation is 0.6 cm. The relative permittivity of dielectric is 3.1. Find (i) capacitance of cable per phase, (ii) charging current per phase, (iii) total charging kVAR and (iv) maximum stress in the cable. (8M+8M)
7. a) Explain briefly the following: i) Load curve, (ii) Load duration curve and (iii) integrated load duration curve
b) Determine the generating cost per kWh from the following data: Installed capacity 500 MW; Capital cost: Rs. 35000 per kW; Interest and depreciation: 12 %; Fuel consumption: 0.85 kg/kWh; Fuel cost: Rs. 800 per 1000 kg; other operating costs: 25 % of fuel cost; Peak load: 475 MW; Load Factor: 0.82.
(8M+8M)

Code No: RT22024

R13**SET - 3****II B. Tech II Semester Regular/Supplementary Examinations, April/May - 2017****POWER SYSTEMS - I**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
- ~~~~~

PART -A

1. a) What are the functions of condenser and chimney in a thermal plant?
b) Write the advantages and disadvantages of Pressurized Water Reactor (PWR).
c) Write the features of radial distribution system.
d) Give the comparison between air insulated and gas insulated substations.
e) What are the various types of cables and give their applications
f) Define load factor, plant use factor and plant capacity factor? (4M+4M+3M+4M+4M+3M)

PART -B

2. a) Explain how the economizers and super heaters improve the performance of the boilers.
b) Describe the needs of electrostatic precipitators (8M+8M)
3. a) Discuss the boiling water reactor, mentioning its merits and demerits.
b) Explain the nuclear waste disposal mechanism in nuclear power stations. (8M+8M)
4. a) Explain the design features of secondary distribution system.
b) A DC 2 wire distribution AB 300 meters long is fed from both ends and supplies a uniformly distributed load of 0.15 A per meter length together with the following concentrated loads: 50 A at C, 60 A at D and 40 A at E, distance AC, CD and DE being 75 m, 100 m and 50 m respectively. If the supply voltage at A and B is 205 and 200 V respectively and resistance of each conductor is 0.00015 ohm per meter, calculate the current supplied at each end the point of minimum potential. (7M+9M)
5. a) Explain the double bus bar with one and two circuit breakers with neat diagrams.
b) What are different types of gas insulated substations? Explain merits and demerits of each one. (8M+8M)
6. a) Find the expression for electrostatic stress in a single core cable. Where does maximum stress occur and where is it minimum and why?
b) A single core, lead covered cable is to be designed for 66 kV to earth. It conductor radius is 10 mm and its insulating material A, B, and C have relative permittivities of 5, 4 and 3 respectively and corresponding maximum permissible stresses of 3.8, 2.6 and 2.0 kV/mm (rms) respectively. Find the minimum diameter of the lead sheath. (8M+8M)
7. a) Discuss the flat rate and block rate tariff methods for cost calculation of generation.
b) Data of a power station as follows: Installed capacity = 200MW; Capital Cost = Rs. 350 $\times 10^6$; rate of interest and depreciation = 20%; annual cost of fuel oil, salaries and taxation = Rs. 40 $\times 10^6$; and load factor = 0.5. Determine the cost of generation and the cost of saving per kWh, if the annual load factor is raised to 0.6. Comment on the results. (8M+8M)

Code No: RT22024

R13**SET - 4****II B. Tech II Semester Regular/Supplementary Examinations, April/May - 2017****POWER SYSTEMS - I**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answer **ALL** the question in **Part-A**3. Answer any **THREE** Questions from **Part-B****PART-A**

1. a) What are the functions of boilers and electrostatic precipitator in a thermal plant.
b) What are the advantages and disadvantages of Boiling Water Reactor (BWR)?
c) What are the characteristics of ring main distribution system?
d) What are the advantages of gas insulated substations?
e) What are the uses of intersheaths in the cables?
f) What are the differences between base and peak load plants? (4M+4M+3M+3M+4M+4M)

PART-B

2. a) Explain with the help of neat diagrams the working of cooling towers in a steam power plant.
b) What is feed water? What are the problems associated due to impurities in feed water? How they can be eliminated. (8M+8M)
3. a) What is nuclear radiation? Discuss the radiation hazards and shielding in nuclear power plant.
b) Draw the schematic diagram of nuclear power plant and explain its operation. (8M+8M)
4. a) Discuss the classification of distribution systems and explain their features.
b) A ring distributor ABC is fed at point A. The impedances of sections are $(2+j1)$, $(2+j3)$, and $(1+j2)$ ohms respectively. Load at point B is 40 A at 0.8 p.f lagging while that at point C is 60 A at 0.6 p.f lagging, both with respect to voltage at A. Find current in the three sections with respect to voltage at A. (7M+9M)
5. a) Explain main and transfer bus bar system with relevant diagrams and list its merits and demerits.
b) Explain the features of indoor and outdoor air insulated substations. (8M+8M)
6. a) What materials are used for the insulation of cables? Discuss the advantages of each.
b) 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. (8M+8M)
7. a) Explain about fixed, semi-fixed and running costs in connection with power generation cost.
b) The yearly duration curve of a certain plant can be considered as a straight line from 150MW to 40MW. Power is supplied with one generating unit of 100MW capacity and two units of 50MW capacity each. Determine (i) installed capacity, (ii) load factor, (iii) plant factor and (iv) utilization factor. (7M+9M)