

R18

Code No: 154BW

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, April/May - 2023

POWER SYSTEM - I

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

- Note:** i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A**(25 Marks)**

- 1.a) Which system carry water from intake to the turbines in power system? [2]
- b) How to raise the temperature in boiler? [3]
- c) What is a peak load station? [2]
- d) What is the relationship between load, utilization and capacity factors? [3]
- e) Why underground cables are used? [2]
- f) What are the types of cables? [3]
- g) What is a bundled conductor? [2]
- h) What is symmetrical spacing? Explain its advantages. [3]
- i) What is the purpose of substation? [2]
- j) What are the objectives of distribution of power? [3]

PART – B**(50 Marks)**

- 2.a) Draw the block diagram of hydro power plant and describe in detail.
- b) How power is extracted from tidal energy? Explain. [5+5]

OR

- 3.a) Draw the block diagram of steam power plant and describe in detail.
- b) What are the advantages and disadvantages of fuel cell? Explain. [5+5]

- 4.a) How the cost of electrical energy is decided? Explain.
- b) Installed capacities of generating station is 25MW and generated 200×10^6 units/annum. Calculate the cost per unit generated, if the annual fixed charges are Rs. 150/kW installed and running charges are 5 paise/kWh. [5+5]

OR

- 5.a) What are the different types of loads? Explain.
- b) A power station has a maximum demand of 40 MW with annual load factor is 60%. Determine the cost per kWh generated from the following data. Capital cost=Rs. 80×10^5 , annual cost of fuel and oil = Rs. 8×10^5 , taxes, wages, and salaries = Rs. 5×10^5 , and the rate of interest and depreciation is 12%. [5+5]

- 6.a) What are the differences between over head and underground cables? Explain.
b) Which power lines are used for extra high voltages? Explain. [5+5]

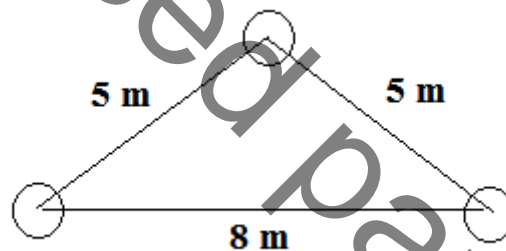
OR

- 7.a) Discuss in detail about the grading of cables.
b) Give the detailed classification of insulators. [5+5]

- 8.a) Which factors influence corona loss? Explain.
b) A single phase, two-wire transmission line, 10 km long, is made up of round conductors, each 0.5 cm in diameter, separated from each other by 30 cm. Calculate the equivalent diameter of a fictitious hollow, thin walled conductor having the same inductance as the original one. What is the value of this inductance? [5+5]

OR

- 9.a) Why there is interference between power and communication lines? Explain.
b) A single circuit, three phase, 60-Hz transmission line consists of three conductors arranged as shown below. If the conductors are 5-km long solid cylindrical aluminum conductor with a diameter of 20 m, find the capacitive reactance of the line per kilometer per phase. [4+6]



- 10.a) How DC distribution is done? Explain with neat sketch.
b) Explain the major differences and similarities of radial and ring main distributors in detail. [5+5]

OR

- 11.a) How bus bars are arranged in substations? Explain in detail.
b) What are the types of distribution systems? Explain each in detail. [5+5]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, August/September - 2021

POWER SYSTEM - I

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

**Answer any five questions
All questions carry equal marks**

- 1.a) Draw the schematic of gas turbine power plant and explain.
- b) Explain in detail about energy conservation and storage. [8+7]
- 2.a) Give the advantages and disadvantages of hydroelectric plants.
- b) Discuss in detail about the components of tidal power plant. [7+8]
- 3.a) A generating station has a maximum demand of 30 MW and has connected load of 60 MW. The annual generation of units is 30×10^7 kWh. Calculate the load factor and the demand factor.
- b) Discuss in detail about the difference between load curve and load duration curve. [8+7]
- 4.a) An industry daily load is 200 kW for first 2 hr, 90 kW for next 8 hr, 140 kW for next 6 hr, and 6 kW for the remaining time. Calculate the electricity expenditure per year, if the tariff in force is Rs. 1,100/kW of maximum demand per annum plus Rs. 1.0/kWh.
- b) Explain the significance of load factor and diversity factor. [8+7]
- 5.a) Explain different types of Insulators.
- b) A string of eight suspension insulators is to be fitted with a grading ring. If the pin to earth capacitances are all equal to C, find the values of line to pin capacitances that would give a uniform voltage distribution over the string. [8+7]
- 6.a) Discuss about various types of cables.
- b) Determine the maximum working voltage of a single core lead sheathed cable having a conductor 1 cm dia and sheath of 5 cm dia inside. Two insulating materials with permittivities and maximum stresses 4, 2.5 and 60 kV/cm and 50 kV/cm respectively are used. [8+7]
- 7.a) Explain the methods of reducing corona loss.
- b) Derive the expression for the capacitance of three phase lines with symmetrical spacing. [7+8]
- 8.a) Give the detailed comparison between AC and DC distributions.
- b) Discuss in detail about the selection of site for substation. [8+7]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B. Tech II Year II Semester (Special) Examinations, January/February - 2021****POWER SYSTEM - I****(Electrical and Electronics Engineering)****Time: 2 Hours****Max. Marks: 75****Answer any Five Questions
All Questions Carry Equal Marks**

1. Explain with neat diagram various parts and its function in nuclear power plant. [15]
2. Draw a neat schematic diagram of feed water/steam flow circuit of a modern large thermal power plant. Explain the working. [15]
- 3.a) Define the following with respect to the economic aspects power generation:
i) Connected load ii) Plant capacity factor.
b) From the following data, estimate the cost per kWh for the generating station:
Plant capacity = 50 MW
Annual load factor = 40%
Capital cost = Rs 12×10^6
Annual cost of wages, taxes etc = Rs 4,00,000
Cost of fuel, lubrication, maintenance = Rs 17,52,000
Annual interest and depreciation = 10% of initial value. [8+7]
4. Explain the following:
a) Base load and peak load plants
b) Fixation of tariff to a consumer. [7+8]
5. Each conductor of a three phase transmission line is suspended from a cross arm of a steel tower by a string of four suspension insulators. The voltage across the second unit is 15 kV and across the third is 20 kV. Find the voltage between the conductors and the string efficiency. [15]
6. Discuss the methods for grading of cables. What are the limitations of grading of cables? [15]
7. In a 3 phase transmission line the 3 conductors are placed at the corners of a triangle of sides 2m, 3m and 2.5m. If the diameter of each conductor is 1.6cm and conductors are regularly transposed, calculate the inductance per phase per kilometer. [15]
8. Write short notes on the following:
a) Difference between d.c. and a.c. distribution.
b) Current distribution in a 3-wire d.c. system. [8+7]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B. Tech II Year II Semester Examinations, November/December - 2020****POWER SYSTEM - I****(Electrical and Electronics Engineering)****Time: 2 Hours****Max. Marks: 75****Answer any Five Questions
All Questions Carry Equal Marks**

- 1.a) Explain the function of feed water heater and air pre-heater.
- b) Explain the working of fuel cell and their applications. [8+7]
2. What is the function of a condenser in a steam power plant? Describe with a neat sketch any one type of condenser commonly used in power plants. [15]
3. The capital cost of a hydro-power station of 50 MW capacity is Rs 1,000 per kW. The annual depreciation charges are 10% of the capital cost. A royalty of Re 1 per kW per year and Re 0.01 per kWh generated is to be paid for using the river water for generation of power. The maximum demand on the power station is 40 MW and annual load factor is 60%. Annual cost of salaries, maintenance charges etc. is Rs 7,00,000. If 20% of this expense is also chargeable as fixed charges, calculate the generation cost in two part form. [15]
4. Define and explain the importance of the following terms in generation:
a) Connected load b) demand factor c) average load. [5+5+5]
5. In a string of 3 units, the capacitance between each link to pin to earth is 11% of the capacitance of one unit. Calculate the voltage across each unit and string efficiency when the voltage across the string is 33kV. [15]
6. Explain different types of Insulators used in overhead lines. [15]
- 7.a) What are bundled conductors? Discuss the advantages of bundled conductors, when used for overhead lines
- b) How the corona forms in power systems and write the advantages and disadvantages. [8+7]
8. Explain the radial distribution system with neat diagram and list out its merits and demerits. [15]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, March - 2022

POWER SYSTEM - I

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

**Answer any five questions
All questions carry equal marks**

1. Construct the hydro power plant with neat sketch and explain each component. [15]
2. Discuss the principle and operation of fuel cell with neat diagram. [15]
- 3.a) Discuss about base load and peak load plants with suitable diagrams.
b) Explain i) Load curve ii) Load duration curve [8+7]
4. Classify tariffs and explain in brief with expressions. [15]
5. Explain about various types of overhead line insulators. [15]
- 6.a) Explain different types of cables.
b) Derive an expression for capacitance of a single core cable. [9+6]
7. Derive an expression for the inductance of a 3-phase transmission line with
a) Symmetrical spacing b) unsymmetrical spacing. [8+7]
- 8.a) How does AC distribution differ from DC distribution?
b) Explain the ring main distribution system with neat sketch and write the advantages over radial distribution system. [7+8]

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