

F 3119

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Reg. No.....

Name.....



B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Electrical and Electronics Engineering
POWER GENERATION AND DISTRIBUTION (E)
(Prior to 2010 Admissions—Old Scheme)
[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer all questions.
Each question carries 4 marks.*

1. Explain the differences in the operations of peak load and base load stations.
2. Briefly explain the general expression for cost of electrical energy.
3. Define the terms feeder and distributor.
4. What is LT capacitor ? Explain its size selection.
5. State Kelvin's law. Explain its significance.
6. What is the importance of power factor in the supply system ?
7. Derive an expression for insulation resistance of a cable.
8. Briefly explain the Varley loop test for locating earth fault in UG cables.
9. Explain the generation of high voltage DC using voltage doubler circuit.
10. Explain the cascade connection of transformer for producing very high a.c. voltage.

(10 × 4 = 40 marks)

Part B

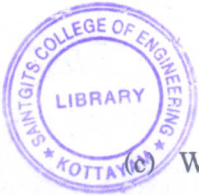
*Answer all questions.
Each question carries 12 marks.*

11. (a) With suitable example clearly explain plant capacity factor and plant use factor. (6 marks)
- (b) A generating station supplies the following loads 15000 kW, 12000 kW, 8500 kW, 6000 kW and 450 kW. The station has a maximum demand of 22000 kW. The annual load factor of the station is 48%. Calculate (i) number of units supplied annually ; (ii) the diversity factor and (iii) the demand factor.

(6 marks)

Or

Turn over



- (c) What is tariff? Briefly explain the different types of tariff. (12 marks)
12. (a) With help of neat sketches, explain the different connection schemes of distribution systems. (12 marks)

Or

- (b) A single-phase A.C distributor AB is fed from end A and has a total resistance of $(0.2 + j 0.3) \Omega$. At the far end, the voltage $V_B = 240$ V and the current is 100 A at a p.f. of 0.8 lagging. At the midpoint M, a current of 100 A is tapped at a p.f. of 0.6 lagging with reference to the voltage V_M at the midpoint. Calculate the supply voltage V_A and phase angle between V_A and V_B . (12 marks)
13. (a) List the important rules regarding the generation of electrical energy. (6 marks)
- (b) A two conductor cable, one km in length, is required to supply a constant load of 200 A throughout the year. The cost is Rs. $(50a + 25)/m$ where, 'a' is the area of the conductor in cm^2 . Determine the most economical cross section of the conductor if the cost of the energy is 5 paise/kWh and interest and depreciation charges amount to 10%. Specific resistivity of the conductor is $1.85 \mu\Omega\text{-cm}$. (6 marks)

Or

- (c) What is most economical power factor? Derive an expression for most economical power factor with constant kW demand. (12 marks)
14. (a) Write a short note on insulating materials used for cables. (5 marks)
- (b) A single core cable for use on 11kV, 50 Hz system has conductor area of $0.645 cm^2$ and internal diameter of sheath is 2.18 cm. The permittivity of the dielectric used in the cable is 3.5. Find : (i) the maximum electrostatic stress in the cable ; (ii) minimum electrostatic stress in the cable ; (iii) capacitance of the cable per km length ; (iv) charging current. (7 marks)

Or

- (c) What is the purpose of grading of cable? Briefly explain the inter sheath grading of cable. (12 marks)
15. (a) With help of neat sketches, describe the working of a Van de Graaff generator. What are the factors that limit the maximum voltage obtained? (12 marks)

Or

- (b) Explain the principle of operation of a resonant transformer. How it is advantageous over the cascade connected transformers? (7 marks)

- (c) A 12 stage impulse generator has $0.15 \mu\text{F}$ capacitors. The wave front and wave tail resistances connected are 1200 ohms and 6000 ohms respectively. If the load capacitor is $1200 \mu\text{F}$, find the front and tail times of the impulse wave produced.

(5 marks)

[5 × 12 = 60 marks]

