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B.Tech DEGREE EXAMINATION, NOVEMBER 2023

Fourth Semester

18EEC208T - GENERATION, TRANSMISSION AND DISTRIBUTION

(For the candidates admitted during the academic year 2020 - 2021)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	The price per unit in the first block of block rate tariff is highest and progressively reduces for the succeeding blocks, this is due to ---------- (A) The greater number of units the greater will be the fixed charges to make the tariff highest in the first block. (B) Fixed charges are merged to running charges for the first and second blocks of energy. (C) The first block is based on only running charges alone. (D) The greater the number of units consumed the greater will be running charges.	1	1	1
2.	In a closed loop OTEC ----------is used as the heat exchanger (A) Nitrogen (B) Ammonia (C) Carbon (D) Hydrogen	1	1	1
3.	A generating station has a connected load of 50 MW , maximum demand of 35 MW and average demand of 8.2 MW. What will be the load factor? (A) 0.2342 (B) 0.164 (C) 1.428 (D) 0.426	1	2	1
4.	The maximum demand of a consumer is 400kW at 75% of the load factor. The annual charges for the maximum demand is Rs 40,000. Calculate the total annual charge when the overall cost of the tariff is 10 paise per kWh. (A) Rs 302800 and 12.85 paise (B) Rs 900800 and 11.52 paise (C) Rs 900800 and 12.85 paise (D) Rs 302800 and 11.52 paise	1	3	1
5.	In a 110 kV, 3Ø transposed transmission system, the conductors A, B, C are arranged horizontally. The distance between the conductors AB=BC=40 cm and AC=80 cm, find the capacitance per phase per km of the line by assuming the radius of each conductor being 0.042 cm (A) 0.00784 μF/phase/km (B) 0.00392 μF /phase/km (C) 0.00184 μF /phase/km (D) 0.01532 μF/phase/km	1	2	2
6.	The GMD of a three-phase double circuit is given as 16.5572m and the GMR is 2.64m. The inductance per phase per metre is --------- (A) $11.0454*10^{-7}$H/m (B) $3.86*10^{-7}$H/m (C) $3.6818*10^{-7}$H/m (D) $11.54*10^{-7}$H/m	1	3	2
7.	The capacitance per phase of an 80km line is $0.00885*10^{-6}$F/km and its three-phase working voltage is132kV calculate its charging current per phase. (A) 21.18A (B) 16.94A (C) 50.82A (D) 63.54A	1	2	2

8. If the GMD increases and GMR decreases, then 1 1 2

(A) The resistance of the transmission will increase
(B) The inductance of the transmission line will increase
(C) The inductance of the transmission line will decrease
(D) The capacitance of the transmission will increase

9. The propagation constant of a transmission line with the resistance of 0.16Ω, the inductive reactance of 0.25Ω and the capacitive susceptance of $1.5*10^{-6}$ S is ---------- 1 4 3

(A) 0.0667
(B) 0.00667
(C) 0.000667
(D) 0.667

10. The A and D constant of a 132kV, 400km long transmission line with its resistance/Phase is 64Ω, Inductive reactance /phase is100Ω and its shunt admittance is j0.0006 is ------ 1 3 3

(A) 0.9190
(B) 0.9290
(C) 0.9590
(D) 0.9890

11. A 1Φ overhead transmission line delivers 1000 kW of 33kV at 0.8 p.f lagging. The R and X_L of the line are 10 Ω and 15 Ω respectively, What is the line current? 1 3 3

(A) 37.87 A
(B) 35.40 A
(C) 40.12 A
(D) 41.05 A

12. In a medium type transmission line by T network, if the receiving end current (I_R) and the charging current (I_C) are given then the formula for finding the sending end current (I_S) is 1 1 3

(A) $I_S = I_R - I_C$
(B) $I_S = I_R + I_C$
(C) $I_S = I_R + (I_C/2)$
(D) $I_S = I_R$

13. In a 3Ø system having a string of 3 suspended insulators, if the voltage across third unit is 21.8 kV and line to neutral voltage is 58.26 kV, then the string efficiency will be 1 4 4

(A) 99.79%
(B) 95.36%
(C) 91.18%
(D) 89.08%

14. For achieving an uniform voltage distribution among the string of insulators, the string efficiency should be in the order of 1 1 4

(A) 10%
(B) 50%
(C) 75%
(D) 100%

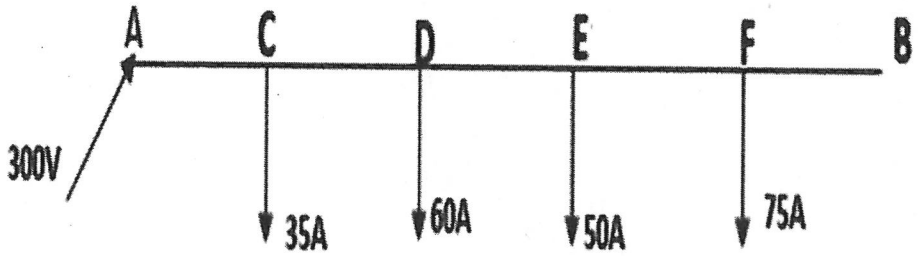
15. For conducting wet test, the angle at which spraying of water over the insulator unit is 1 2 4

(A) 90°
(B) 45°
(C) 40°
(D) 35°

16. Maximum stress in a single core cable is ---------- 1 1 4

(A) $2V/(d \log_e D/d)$
(B) $2V/(\log_e d/D)$
(C) $2V*(d \log_e D/d)$
(D) $2V*(D \log_e D/d)$

17. Find the current through the section AC for the following 2 wire DC distributor 100 Km long and the loads are tapped off as shown in the figure. 1 4 5



(A) 35A
(B) 95A
(C) 75A
(D) 220A

18.	In a network of electrical equipment, electricity supply to end users is given in a structured way order through---------- (A) Generating stations (B) Transmission lines (C) Electricity Substation (D) Insulators	1	1	5
19.	Out of the following bus bar schemes, in which schemes performing any type of maintenance work is difficult. (A) Single Bus (B) Main Bus and Transfer (C) Double Bus Double Breaker (D) Double Bus Single Breaker	1	2	5
20.	Which of the following type of the D.C distribution system is more reliable and efficient? (A) Ring main (B) Radial (C) Inter-connected (D) Star	1	1	5

PART - B (5 × 4 = 20 Marks)

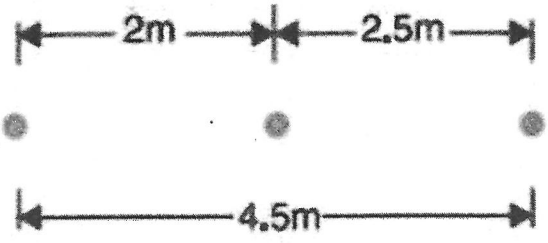
Answer **any 5** Questions

		Marks	BL	CO
21.	A generating station has a connected load of 43MW and a maximum demand of 20MW, the units generated is $61.5*10^6$ per annum. Calculate demand factor and load factor.	4	3	1
22.	Define transposition. Identify and list out the need for the transposed transmission line.	4	1	2
23.	Distinguish between GMD and GMR with necessary formulae.	4	2	2
24.	Brief on visual critical voltage and disruptive critical voltage.	4	2	3
25.	A single core cable, 1.7 km long, has a conductor radius of 13mm and insulation thickness of 5.8mm. The dielectric has a relative permittivity of 2.8. Calculate the capacitance per meter length of cable.	4	3	3
26.	List the methods of achieving uniformity in dielectric stress and explain any one method.	4	1	4
27.	Detail on the difference between the AC distribution system from DC distribution system.	4	2	5

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

		Marks	BL	CO
28.	(a) Draw a neat layout of hydro power plant and explain the functions of its main components.	12	1	1
	(OR)			
	(b) Explain in detail on the power tariff methods used for energy consumption.			
29.	(a) Deduce an expression for the capacitance per phase for a three-phase overhead transmission line when the conductors are symmetrically and unsymmetrically spaced.	12	3	2
	(OR)			
	(b) A 3-phase, 50 Hz, 66 kV overhead line conductors are placed in a horizontal plane as shown in Fig. The conductor diameter is 1·25 cm. If the line length is 100 km, calculate (i) capacitance per phase, (ii) charging current per phase, assuming complete transposition of the line.			



30.	(a) A balanced three phase load of 30MW is supplied 132kV, 50Hz and 0.85 p.f lagging by means of a transmission line. The series impedance of a single conductor is (20+j52) ohm and the total phase neutral admittance is 315×10^{-6} Siemen. Using nominal T method. Determine (i) A,B,C and D constants of the line (ii) Sending end voltage (iii) regulation of the line.	12	3	3
	(OR)			
	(b) A 3 phase.50Hz power transmission line has line resistance of 30 ohm and inductive reactance of 70 ohm per phase. The capacitive susceptance is 4×10^{-4} mho per phase. If the load at the receiving end is 50MVA at 0.8pf lagging with 132kV line voltage. Calculate (i) Voltage and current at sending end (ii) regulation and (iii) efficiency of the line for this load. Use nominal π method.			
31.	(a) A single core cable of conductor diameter 2 cm and lead sheath of diameter 5.3 cm is to be used on a 66 kV, 3-phase system. Two intersheaths of diameter 3·1 cm and 4·2 cm are introduced between the core and lead sheath. If the maximum stress in the layers is the same, find the voltages on the intersheaths. Also brief on intersheath grading.	12	3	4
	(OR)			
	(b) A string of 6 insulators units has self-capacitance equal to 10 times the pin to earth capacitance. Determine (i) The voltage distribution from top to bottom insulators. (ii) The string efficiency, Derive the expressions required.			
32.	(a) Write short notes on the following (i) Ring main distributor (ii) Current distribution in a 3-wire DC system.	12	2	5
	(OR)			
	(b) What are the different types of bus bar arrangements used in substations? explain the types of bus bar arrangement in detail and illustrate your answer with suitable diagrams.			

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