Reg. No.



IV SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) END SEMESTER EXAMINATIONS, MAY 2023

GENERATION, TRANSMISSION & DISTRIBUTION [ELE 2252]

REVISED CREDIT SYSTEM

Time: 3 Hours		Date: 24 MAY 2023	Max. Marks: 50		
Instructions to Candidates:					
	✤ Answer ALL the questions.				
	 Missing data may be suitab 	ly assumed.			
1A.	Discuss the function of th (ii) Super-heater, (iii) El	he following in a thermal power plant: (i) I ectrostatic Precipitator and (iv) Economiz	Pulverizer, er ((03)	
1B.	Calculate the average po project from the followin	ower in kW that can be generated in a hyd ng data	ro-electric		
	Catchment area = 5×1	$.09 \text{ m}^2$; Mean head, H = 30 m			
	Annual rainfall, $F = 1.25$	5 m ; Run-off = 80 % of F			
	Overall efficiency, η _{overall}	= 70 %		()	
1C.	(i)If the load factor is 40 An ideal PV cell produc condition. Compute the p in the following arranger	1%, what is the rating of generators insta ces 2.5W at 0.5 V during certain envi power, current and voltage if the cells are ment	lled? ronmental connected	(04)	
	1. When PV cells are co	nnected as a panel of 4 parallel columns	and each		
	column has 10 series cel	lls			
	2. When several panels and each column has 4 s	are connected as an array of two paralles	el columns		
	3. When several arrays parallel columns and each	are connected as a solar system consis ch column has 20 series arrays.	ting of 10	(03)	
2A.	Discuss the need of moderator in a nuclear reactor. Explain the suitable materials used as moderator in a nuclear reactor.			(02)	
2B.	A transmission line is composed of ACSR conductors consisting of six aluminum strands and one steel strand. The diameter of the ACSR conductor is 6 cm, and each aluminum strand has a diameter of 2 cm. The conductors are spaced at 120 cm in a horizontal plane. Neglecting the steel strand, determine		ing of six conductor conductors eel strand,		
	(i) the inductance p	er conductor			
	(ii) the loop inductar				
	(iii) the loop reactand	ce at 50 Hz.		(04)	
2C.	A 3-phase transmission with horizontal configura if the radius of each co between the conductors 14 m from centre to cen	line is composed of 4 bundled conductor ation. Find the capacitance per km length of onductor in the bundle is 1.725 cm. The in a bundle is 0.5 m and the inter phase atre. Neglect bundle spacing for calculation	per phase of the line, le spacing spacing is n of GMD.	(04)	

3A. 3B.	The A, B,C,D constants of a 3-phase transmission line are A=D= 0.936 + j0.016, B=33.5 + j138 ohm and C= (-0.9280 + j901.223) x 10 ⁻⁶ mho. The load at the receiving end is 40 MW at 220 kV with power factor of 0.86 lagging. Determine the efficiency & voltage regulation of the line. A 275 kV transmission line has the following line constants: A = $0.85 \perp 5^{\circ}$	(04)
	 (a) Determine the power at unity power factor that can be received if the voltage profile at each end is to be maintained at 275 kV. (b) Compute the rating of compensation equipment required if the load is 150 MW at unity power factor, with the same voltage profile as in part (a). 	(03)
3C.	An overhead transmission line conductor is subjected to a horizontal wind load of 1.78 kg/m and vertical ice loading of 1.08 kg/m. The height of both the towers= 30 m. If the minimum ground clearance to be maintained is 26 m, calculate the permissible span between two supports. Take tension = 1500 kg & Weight of the conductor = 0.844 kg/m.	(03)
4A.	Explain the following terms with reference to corona a) Critical disruptive voltage b) visual critical voltage c) Factors affecting Power loss due to corona	(03)
4B.	Compare porcelain with glass overhead insulators.	(02)
4C.	A 3-phase line is supported by suspension string having 3 units. The voltage across the nearest to the line 18kV and that adjacent unit is 12kV. Find i) ratio of pin to earth capacitance to self-capacitance of the disc ii) string efficiency iii) the pin to line capacitances for uniform voltage distribution when a guard ring is used iv) string efficiency when the guard ring introduces pin to line capacitance of 0.1C and 0.3C(for the insulator unit close to the	
	conductor).	(05)
5A.	Discuss the properties of an insulating material used for underground cables & also compare the properties of rubber with PVC.	(03)
5B.	A 66 kV, 3-phase system uses a single-core cable of conductor diameter 2 cm and lead sheath of diameter 5.3 cm. Two intersheaths of diameters 3.1 cm and 4.2 cm are introduced between the core and lead sheath. If the	

intersheaths.
 A feeder supplies 2500 customers & has a system average interruption frequency index of 1.5 interruptions/year & system average interruption duration index of 85 min/year. Compute customer average interruption duration index & average service availability index.

maximum stress in the layers is the same, find the voltages on the

(04)

(03)