Reg. No. | | | | | | | | | | | | | |

B.E. / B. TECH. DEGREE EXAMINATION, MAY 2023

Fourth Semester

EE18401 – ELECTRIC POWER SYSTEM

(Electrical and Electronics Engineering)

(Regulations 2018 / 2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

CO 1 Understand DC/AC and overhead/underground transmission and distribution systems.
CO 2 Understand transmission line parameter calculations and their effect on power system.
CO 3 Model Overhead Transmission lines / Underground cables and analyse their performance.
CO 4 Understand the types, lay out and operation of substation.
CO 5 Learn Indian Electricity Rules and Acts, Electrical Safety. Anti-theft measures and Demand side management.

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	List out any three quality parameters of electric supply.	**1**	**1**
2.	Compare feeder and distributor.	**1**	**2**
3.	How do you classify transmission lines?	**2**	**2**
4.	Mention the methods of improving string efficiency in line insulators.	**2**	**1**
5.	What is meant by Ferranti effect?	**3**	**2**
6.	Write the expressions of ABCD parameters for short transmission lines.	**3**	**2**
7.	Comment on undesirable effect of voltage variation in a distribution circuit.	**4**	**2**
8.	Kelvin's law does not give exact size of conductor, Justify.	**4**	**2**
9.	Assess the purpose of substation in power system.	**5**	**2**
10.	Differentiate system grounding and equipment grounding.	**5**	**2**

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Explain the layout of a typical ac power supply scheme using single line diagram.	**(14)**	**1**	**3**
	(OR)			
(b)	Elaborate the need of renewable energy. Explain the energy generation using wind power in detail.	**(14)**	**1**	**3**

12. (a)	Analyze the expression for inductance per phase per km of double circuit three phase transmission lines. Also find the inductance/phase/km of double circuit 3Φ transmission line shown below in Fig. 12 (a). The conductors are transposed and are of radius 0.75 cm each. The phase sequence is ABC.	**(14)**	**2**	**4**

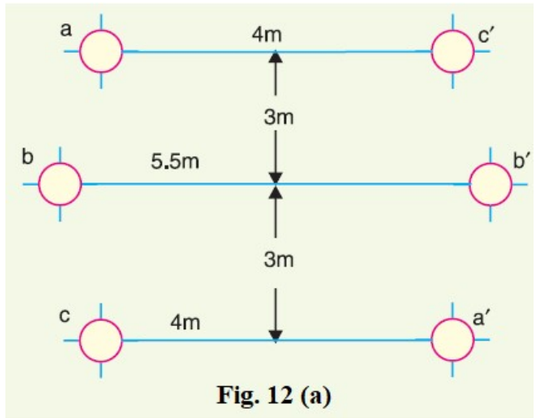

Fig. 12 (a)

(OR)

(b)	**(i)**	Calculate the capacitance and charging current of a single core cable used on a 3-phase, 66 kV system. The cable is 1 km long having a core diameter of 10 cm and an impregnated paper insulation of thickness 7 cm. The relative permittivity of the insulation may be taken as 4 and the supply at 50 Hz.	**(06)**	**2**	**4**
	(ii)	Each conductor of a 3 phase high-voltage transmission line is suspended by a string of four suspension type disc insulators. If the potential difference across the second unit from top is 13.2 kV and across the third from top is 18 kV, determine the voltage between conductors.	**(08)**	**2**	**4**
13. (a)		Show the nominal T and π model of medium transmission line with its parameters filled. Derive A, B, C, D constants using nominal T method and nominal л method for medium transmission lines.	**(14)**	**3**	**3**
		(OR)			
(b)		Derive the expression for sag when the supports are at equal intervals and at unequal intervals. Mention its effect of wind and ice loading.	**(14)**	**3**	**3**

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14. (a)	**(i)**	Derive an expression for the power loss in a uniformly loaded distributor fed at one end.	**(07)**	**4**	**4**
	(ii)	A 250 m, 2-wire d.c. distributor fed from one end is loaded uniformly at the rate of 1.6 A/m. The resistance of each conductor is 0.0002 Ω per metre. Find the voltage necessary at feed point to maintain 250 V (i) at the far end, (ii) at the mid-point of the distributor.	**(07)**	**4**	**4**
		(OR)			
(b)	**(i)**	A single phase a.c. distributor AB 300 metres long is fed from end A and is loaded as under: (i) 100 A at 0.707 pf lagging 200 m from point A (ii) 200 A at 0.8 pf lagging 300 m from point A The load impedance of the distributor is (0.2 + j0.1) Ω per km. Calculate the total voltage drop in the distributor. The load power factor refer to the voltage at far end.	**(08)**	**4**	**4**
	(ii)	Explicate the scope, benefits and different techniques of Demand Side Management in power system.	**(06)**	**4**	**4**
15. (a)	**(i)**	Explore in depth the grounding system used in underground substation.	**(07)**	**5**	**3**
	(ii)	Analyse the GIS and AIS substation.	**(07)**	**5**	**3**
		(OR)			
(b)	**(i)**	Explore the mandatory functions of NLDC, RLDC and SLDC.	**(08)**	**5**	**3**
	(ii)	Enumerate the working of SCADA in power system.	**(06)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	A 3-phase, 50 Hz, 66 kV overhead line conductors are placed in a horizontal plane as shown below in Fig.16. The conductor diameter is 1.25 cm. If the line length is 100 km, Evaluate (i) capacitance per phase, (ii) charging current per phase. Assume complete transposition of line.	**(10)**	**2**	**5**

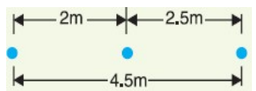

Fig.16