Reg. No. ☐☐☐☐☐☐☐☐☐☐☐☐

B.E./ B. TECH.DEGREE EXAMINATIONS, MAY 2024
Fourth Semester
EE18401 – ELECTRIC POWER SYSTEM
(Electrical and Electronics Engineering)
(Regulation 2018/2018A)

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

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

PART- A(10x2=20Marks)
(Answer all Questions)

		CO	RBT LEVEL
1.	Discuss the different sources of energy available in nature.	1	2
2.	What are the different voltage levels in a common distribution system?	1	2
3.	A single phase line has two parallel conductors 1 metre apart. The radius of each conductor is 0·5 cm. Calculate the loop inductance per km of the line?	2	2
4.	What is skin effect? Why is it absent in the D.C. system?	2	2
5.	What do you understand by long transmission lines? How capacitance effects are taken into account in such lines?	3	2
6.	Why Ferranti effect is significant only in medium and long lines?	3	2
7.	What are the undesirable effects of too much voltage variation on a distribution circuit?	5	2
8.	Assess the advantages of ring main distributors.	5	2
9.	Compare AIS and GIS substation.	4	2
10.	Identify the ways by which power theft is carried out.	4	2

PART- B (5x 14=70Marks)

				Marks	CO	RBT LEVEL
11. (a)	(i)	Perform comparative analysis of overhead and underground Transmission/Distribution systems.		(7)	1	3

(ii) Examine the operation of Generation, Transmission & Distribution system in India.   **(7) 1 3**

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(OR)

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(b) **(i)** Explain in detail with a block diagram of the working of Hydro power plant.   **(7) 1 3**

(ii) Explain the concept of energy generation using Wind Power in detail.   **(7) 1 3**

12. (a) Find the Capacitance per phase per km of double circuit 3-phase line shown in Figure 1. The conductors are transposed and are of radius 0·75 cm each. The phase sequence is ABC.   **(14) 2 3**
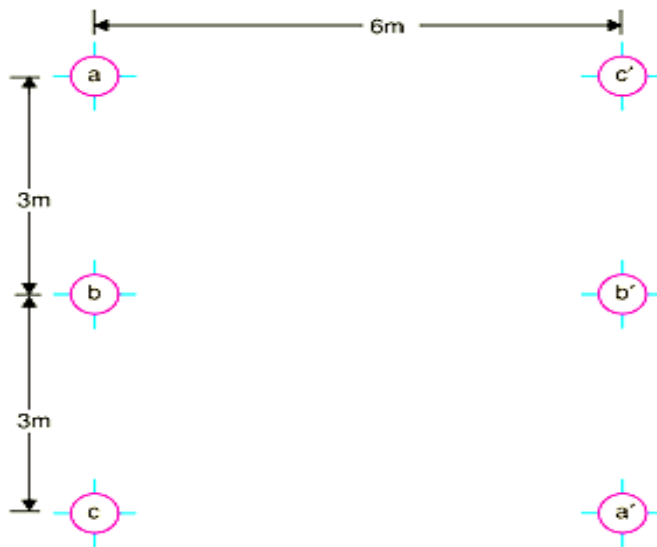

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Figure 1.

(OR)

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(b) A 3-phase transmission line is being supported by three disc insulators. The potentials across top unit (i.e., near to the tower) and middle unit are 8 kV and 11 kV respectively. Calculate (i) The ratio of capacitance between pin and earth to the self-capacitance of each unit (ii) Line voltage and (iii) String efficiency.   **(14) 2 3**

13. (a) Calculate A, B, C and D constants of a 3-phase, 50 Hz transmission line 160 km long having the following distributed parameters   **(14) 3 3**

$R = 0\cdot15\Omega/km$; $L = 1\cdot20 \times 10^{-3}$ H/km ; $C = 8 \times 10^{-9}$ F/km ; $G = 0$

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(OR)

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(b) Show how regulation and transmission efficiency are determined for   **(14) 3 3**

medium lines using

(i) Nominal T method

(ii) Nominal π method

Illustrate your answer with suitable vector diagrams.

14. (a) **(i)** State and prove Kelvin's law for size of conductor for transmission. Discuss its limitations. **(8)** **5** **3**

(ii) The present trend is towards A.C for generation and distribution and D.C. for transmission. Discuss the reasons for it. **(6)** **5** **3**

(OR)

(b) Two tram cars (A & B) 2 km and 6 km away from a sub-station return 40 A and 20 A respectively to the rails. The sub-station voltage is 600 V D.C. The resistance of trolley wire is 0·25 Ω/km and that of track is 0·03 Ω/km. Calculate the voltage across each tram car. **(14)** **5** **3**

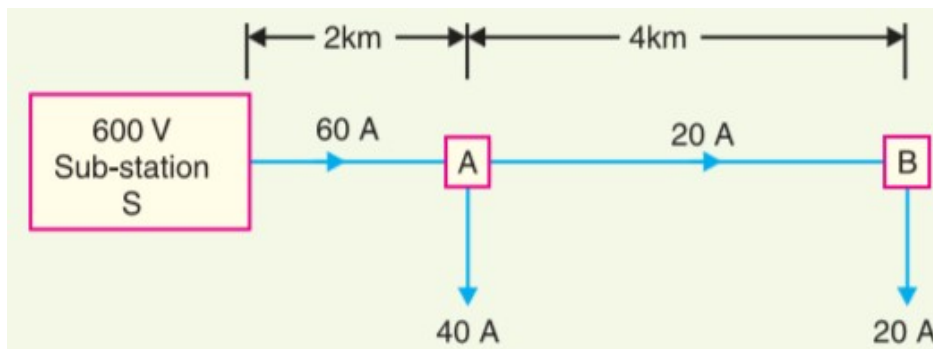**Figure.2**

15. (a) Analyze and Compare Ungrounded Neutral System and Grounded Neutral System. **(14)** **4** **4**

(OR)

(b) Analyze the several Bus-Bar arrangements that can be used in a sub-station with suitable diagrams. **(14)** **4** **4**

PART- C (1x 10=10Marks)
(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	The towers of height 30 m and 90 m respectively support a transmission line conductor at water crossing. The horizontal distance between the towers is 500 m as shown in Figure 3. If the tension in the conductor is	**(10)**	**3**	**5**

1600 kg, Estimate the minimum clearance of the conductor and water and clearance mid-way between the supports. Weight of conductor is 1·5 kg/m. Bases of the towers can be considered to be at water level.
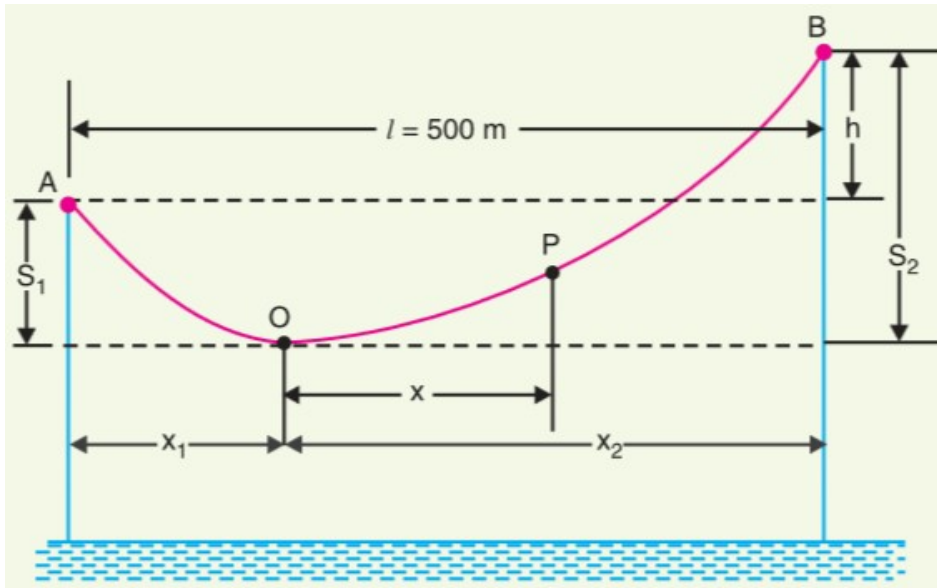

Figure 3

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