Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2022

EE3CO11/ EX3CO11 Power System -I

Programme: B.Tech. Branch/Specialisation: EE/EX

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. What is the shape of the load duration curve? **1**

(a) Triangular (b) Rectangular

(c) Circular (d) Parabolic

ii. Which one is a good value of power factor? **1**

(a) 0.1 (b) 0.3 (c) 0.98 (d) 0.4

iii. The critical mass for U^{235} fission reaction is about- **1**

(a) 10 kg (b) 100 kg (c) 50 kg (d) 1000 kg

iv. Which of the following material is not used in the boiler furnace walls? **1**

(a) Fire clay (b) Concrete (c) Silica (d) Kaolin

v. In short overhead transmission line, we may neglect- **1**

(a) Series resistance (b) Shunt conductance

(c) Shunt capacitance (d) Both (b) and (c)

vi. The value of characteristic impedance of a transmission line with impedance and admittance of 16 and 9 respectively will be- **1**

(a) 25.0 Ω (b) 7.0 Ω (c) 1.33 Ω (d) 3 Ω

vii. The expression of the surge impedance for loss free transmission line is- **1**

(a) √(L/C) (b) √(C/L) (c) √(LC) (d) √(RC/L)

viii. The value of the receiving end impedance of a transmission line having a voltage of 24V and a conduction current of 1.2A will be- **1**

(a) 25.2 Ω (b) 20.5 Ω (c) 50.5 Ω (d) 20.0 Ω

P.T.O.

	ix.	Which of the following is the main field of application of pin type insulator? (a) Distribution system (b) Transmission system (c) EHV transmission system (d) Nowhere	**1**
	x.	If a string of suspension insulator has three units, each can withstand a maximum 11 kV and total string can withstand 25.76 kV. What is the string efficiency? (a) 78 % (b) 80 % (c) 90 % (d) 92 %	**1**
Q.2	i.	Discuss in brief about the components of power system network.	**2**
	ii.	Explain the terms load forecasting and tariff.	**3**
	iii.	Explain the different terms load factor, demand factor, connected load and load duration curve involved in power plant	**5**
OR	iv.	Enumerate and explain the two methods for power factor improvement.	**5**
Q.3	i.	Differentiate between the conventional and non-conventional energy sources (four differences).	**2**
	ii.	Explain with a neat block diagram the complete operation of thermal power plant. Illustrate the specific action of each block of the thermal power plant.	**8**
OR	iii.	Write the comparison for site selection in nuclear and hydroelectric power plants (any five). Also, derive the calculations of total energy generated in thermal power station.	**8**
Q.4	i.	Derive the inductance (L) of three phase single circuit transmission line.	**3**
	ii.	Explain the concept of GMR and GMD in case of inductance calculation of single-phase line.	**7**
OR	iii.	Prove that transposition of conductors of a three-phase transmission line yields equal inductance per phase, with suitable derivations.	**7**

Q.5	i.	Illustrate in short, the two methods of voltage control in a transmission line.	**4**
	ii.	Derive the ABCD parameters for long transmission line.	**6**
OR	iii.	A three phase, 50Hz transmission line, 40km long delivers 36MW at 0.8 power factor lagging at 60kV per phase. The line constants per conductor are R=2.511 Ω, L=0.1 H, C=0.25 μF, shunt leakage may be neglected. Calculate efficiency, voltage regulation, voltage, Current, Power factor and active power.	**6**
Q.6		Attempt any two:	
	i.	Corona formation and its disadvantages	**5**
	ii.	String chart and Sag template	**5**
	iii.	Underground cable and its comparison with overhead lines	**5**

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Marking Scheme

EE3CO11/ EX3CO11 Power System -I

Q.1	i.	What is the shape of the load duration curve? (b) Rectangular		**1**
	ii.	Which one is a good value of power factor? (c) 0.98		**1**
	iii.	The critical mass for U^{235} fission reaction is about- (a) 10 kg		**1**
	iv.	Which of the following material is not used in the boiler furnace walls? (b) Concrete		**1**
	v.	In short overhead transmission line, we may neglect- (d) Both (b) and (c)		**1**
	vi.	The value of characteristic impedance of a transmission line with impedance and admittance of 16 and 9 respectively will be- (c) 1.33 Ω		**1**
	vii.	The expression of the surge impedance for loss free transmission line is- (a) √(L/C)		**1**
	viii.	The value of the receiving end impedance of a transmission line having a voltage of 24V and a conduction current of 1.2A will be- (d) 20.0 Ω		**1**
	ix.	Which of the following is the main field of application of pin type insulator? (a) Distribution system		**1**
	x.	If a string of suspension insulator has three units, each can withstand a maximum 11 kV and total string can withstand 25.76 kV. What is the string efficiency? (a) 78 %		**1**
Q.2	i.	Components of power system network		**2**
		1 mark for each point	(1 mark * 2)	
	ii.	Load forecasting	1.5 marks	**3**
		Tariff	1.5 marks	
	iii.	Load factor	1.25 marks	**5**
		Demand factor	1.25 marks	
		Connected load	1.25 marks	
		Load duration curve involved in power plant	1.25 marks	
OR	iv.	Two methods for power factor improvement		**5**
		2.5 marks for each	(2.5 marks * 2)	
Q.3	i.	Four differences of conventional and non-conventional energy sources		**2**
		0.5 mark for each	(0.5 mark * 4)	
	ii.	Operation of thermal power plant.		**8**
		Block Diagram	3 marks	
		Explanation	5 marks	
OR	iii.	Five comparisons for site selection in nuclear and hydroelectric power plants		**8**
		1 mark for each (1 mark * 5)	5 marks	
		Derivation calculations of total energy generated	3 marks	
Q.4	i.	Derivation of inductance (L) of three phase single circuit transmission line.		**3**
	ii.	Concept of GMR	3.5 marks	**7**
		Concept of GMD	3.5 marks	
OR	iii.	Transposition of conductors of a three-phase transmission line yields equal inductance per phase		**7**
		Diagram	3 marks	
		Proof	4 marks	
Q.5	i.	Two methods of voltage control in a transmission line		**4**
		2 marks for each method	(2 marks * 2)	
	ii.	the ABCD parameters for long transmission line		**6**
		Diagram	2 marks	
		1 mark for each parameter of ABCD (1 mark * 4)	4 marks	
OR	iii.	Calculate efficiency, voltage regulation, voltage, Current, Power factor and active power.		**6**
		1 mark for each calculation	(1 mark * 6)	
Q.6		Attempt any two:		
	i.	Corona formation	3 marks	**5**
		Its disadvantage	2 marks	
	ii.	String chart	2.5 marks	**5**
		Sag template	2.5 marks	
	iii.	Underground cable	3 marks	**5**
		Its comparison with overhead lines	2 marks	

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