UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2020

Programme Name: B.Tech –EL   **Semester   : V**
Course Name   : Power System I   **Time   : 3 Hr**
Course Code   : EPEG 3010   **Max. Marks : 100**

Instructions:

1. **Attempt all the questions (Theory, Numerical, Case study etc.)**
2. **Attempt all questions serially as per Question paper.**
3. **Answer should be neat and clean. Draw a free hand sketch for circuits/tables/schematics wherever required.**
4. **Scan the required answer script and check the resolution carefully before uploading. No other mode of submission is acceptable.**
5. **You are expected to be honest about each attempt which you make to progress in life**

SECTION A [5x6]

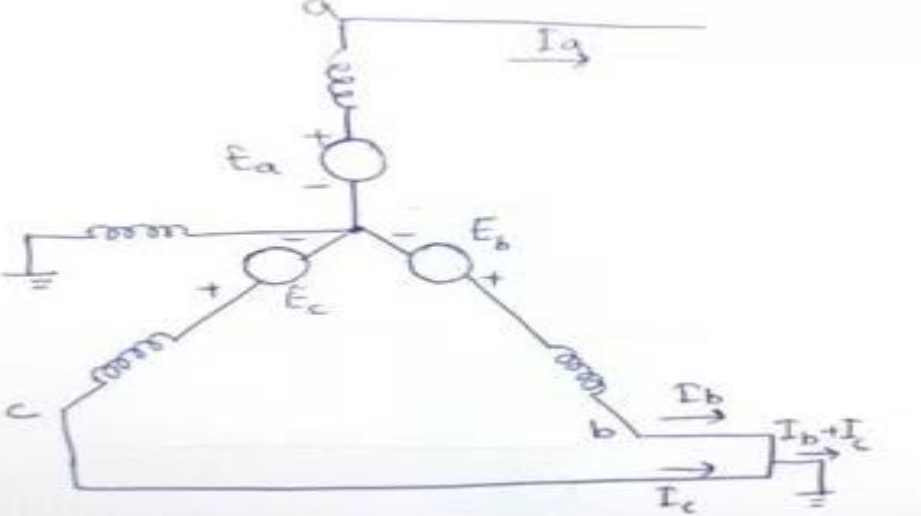| S. No.		Marks	CO
Q1			
I	What is the value of the zero-sequence current?	**3**	
(A)	1/3 times the current in the neutral wire		
(B)	3 times the current in the neutral wire		
(C)	√3 times the current in the neutral wire		**CO1**
(D)	Equal to the current in the neutral wire		
II	In which portion of the transmission system is the occurrence of the fault more common?	**2**	
(A)	Alternators		

(B)	Transformers		
(C)	Transmission lines		
(D)	Underground cables		
Q2	What will be the value of I_C, if Ia1 = 100 ∠ 30° and Ib2 = 20 ∠ 90°? [Assume the type of Fault to be Line to Line(L-L)]		
(A)	111.35 ∠ 21.05 °	**5**	**CO3**
(B)	111.35 ∠ 15.05°		
(C)	111.35 ∠ 145.06°		
(D)	111.35 ∠ 158.94°		

Q3 **I** **(A)** **(B)** **(C)** **(D)**	**Higher the frequency, _____**
	
	     Lower the corona loss
	     Higher is the corona loss
	     Does not effect
	     Depends on the physical conditions		

II **(A)** **(B)** **(C)** **(D)**	**What is the use of bundled conductors?** Reduces surface electric stress of conductor. Increases the line reactance. Decreases the line capacitance. None of these	**1+2+2**	**CO4**

III **(A)** **(B)** **(C)** **(D)**	The effect of dirt on the surface of the conductor is to _____ irregularity and thereby _____ the break down voltage.
	
	     Decreases, reduces.
	      Increases, increases.
	     Increases, reduces.
	     Decreases, increases		

Q4 **I** **(A)** **(B)**	**Why is the wavy structure of pin insulators used?** Increases mechanical strength. Increases puncture strength.		**CO5**

(C)	Increases flash over voltage	**2+1+2**	
(D)	Increases thermal strength		
II	**On what factors does the skin effect depend upon?**		
(A)	Cross section of the conductors.		
(B)	Supply frequency.		
(C)	Permeability of the conductor.		
(D)	All of these		
III	**Where the Radial systems are generally employed?**		
(A)	Where power is generated at low voltage.		
(B)	Where power is generated at high voltage.		
(C)	Where power is generated at low voltage and substation is located at the centre of the load.		
(D)	Where power is generated at high voltage and substation is located at the centre of the load.		
Q5 **I** **(A)** **(B)** **(C)** **(D)**	**In a distribution system, which of the following items shares the major cost?** Conductors Earthing systems Distribution transformer Insulators	**2+2+1**	**CO1**
II	**A three wire dc distribution makes available how many voltages?**		
(A)	One		
(B)	Two		

(C)	Three		
(D)	Both (a) and (b)		
III	**Which type of distribution is preferred in residential areas?**		
(A)	Single phase, two wire.		
(B)	Three phase, three wire		
(C)	Three phase, four wire		
(D)	Two phase, four wire		
Q6			
I	**Assertion (A):** Transposition of conductors in a transmission line is necessary. **Reason (R):** Corona losses are reduced by transposition of conductors		
(A)	Both A and R are true and R is the correct explanation of A		
(B)	Both A and R are true and R is not the explanation of A		
(C)	A is true but R is false		
(D)	A is false but R is true		
II	In case of stranded conductors, what is the ratio of the GMR to the actual radius?	**3+2**	**CO1**
(A)	Equal to 1		
(B)	More than 1		
(C)	Equal to 0.7788		
(D)	Less than 0.7788		

SECTION B [10 x 5]

Q7	Identify the fault presented in the picture and obtain its positive, negative and zero sequence components of 3 phase current.		
		10	CO2
Q8	(a) Draw the zero sequence network of transformer in the following cases: $\Delta / \curlywedge$ $\qquad$ Δ / Δ $\qquad$ $\curlywedge / \curlywedge$ (b) Discuss the potential factors and their effects while considering the phenomenon of CORONA discharge in power system. (c) Express the condition of Reciprocity and Symmetrical behavior w.r.t. Long Transmission line [2 port network can be used].	3+5+2	CO3
Q9	(a) A transmission line operating at 125 MHz has $Z_0 = 40\ \Omega$, $\alpha = 0.02$ Np/m, and $\beta = 0.75$ rad/m. Find the line parameters R, L, G, and C. (b) Explain the Ferranti Effect in power system and support your answer with the help of neat Phasor Diagram.	5+5	CO4

Q10	(a) Identify the application of the following insulators used in Power System:
	  i. Pin Insulator
	  ii. Suspension Insulator
	  iii. Strain Insulator
	  iv. Shackle Insulator
	  v. Disc Insulator
		5+5	CO3

	(b) Plot the voltage profile of a transmission line w.r.t. length of the line without ignoring the Surge Impedance Loading.		
Q11	With the help of neat diagram, elucidate the following Distribution systems: (a) Radial distribution system (b) Parallel feeders distribution (c) Ring main distribution system (d) Interconnected distribution Also, brief about the advantages of Ring main distribution system	**8+2**	**CO5**
Q12 **(i)**	**The transmission line is a closed system through which the power is transferred from generating station to the consumers. The transmission lines are categorized as AC transmission lines and DC transmission lines. Differentiate the aforementioned lines on the basis of :** a) Number of Conductors b) Inductance & surges c) Voltage drop d) Skin Effect e) Need of Insulation f) Interference g) Corona Loss h) Dielectric Loss i) Synchronizing and Stability Problem j) Cost k) Repairing and Maintenance l) Transformer	**12**	**CO4**
(ii)	Regarding the potential distribution over a string of suspension insulators[as depicted in the		

picture below], comment over the following :

a) The voltage impressed on a string of suspension insulators does not distribute itself uniformly across the individual discs due to_____?
b) The disc nearest to the conductor has _____voltage across it. As we move towards the cross-arm, the voltage across each disc goes on _____.
c) The unit nearest to the conductor is under _____electrical stress and is likely to be _____. Therefore, means must be provided to equalize the potential across each unit.
d) **If the voltage impressed across the string were D.C., comment on the voltage across each unit. Also, specify the reason for your answer;**

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