**14EE802**

**Hall Ticket Number:**

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| **IV/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **July, 2021** | **Electrical & Electronics Engineering** | | |
| **Eight Semester** | **Computer Aided Power Systems** | | |
| **Time:** Three Hours | | **Maximum :** 60 Marks | |
| *Answer ALL Questions from PART-A.* | | | (12X1 = 12 Marks) |
| *Answer* ***ANY FOUR*** *questions from PART-B.* | | | (4X12=48 Marks) |
| **PART - A** | | | |

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| 1. | Answer all questions | | (12X1=12 Marks) | |
|  | a) | Explain loop incidence matrix. | |  |
|  | b) | How many numbers of trees can form with a system of ‘n’ buses and ‘e’ elements and ‘b’ branches? | |  |
|  | c) | Define oriented graph. | |  |
|  | d) | What is necessity of power flow studies? | |  |
|  | e) | Define load flow. | |  |
|  | f) | When PV bus will be considered as PQ bus? | |  |
|  | g) | What is meant by fault? | |  |
|  | h) | Draw the sequence network of L-L-G fault | |  |
|  | i) | Write the equations used to calculate the elements of bus impedance matrix when a new branch is added. | |  |
|  | j) | Define stability? | |  |
|  | k) | List the factors affecting the transient stability. | |  |
|  | l) | What is infinite bus? | |  |
| **PART - B** | | | | |
| 2. | a) | The oriented connected graph of a system is shown in Figure-1. Obtain:    i) Basic cut-set incidence matrix  ii) Basic loop incidence matrix C. Select elements 5, 6 and 7 as links. | | 6M |
|  | b) | Define the following:  i. Graph ii. Bus incidence Matrix  iii. Loop incidence Matrix iv. Branch path Incidence Matrix | | 6M |
|  | | | | |
| 3. | a) | Derive YBUS and YBR using singular transformation method. | | 6M |
|  | b) | What is primitive network? Represent its impedance and admittance forms. | | 6M |
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| 4. | a) | Describe the Newton- Raphson method for the solution of power flow equations in power systems by deriving necessary equations. | | 12M |
|  | | | | |
| 5. | a) | A two bus system is shown in below figure. Calculate the bus 2 voltage at the end of first iteration by G-S method. The elements of bus admittance matrix are Y11= Y22= 1.5 ∟-86° P.U and Y21=Y12= 1.8∟110° P.U. | | 6M |
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|  | b) | Compare NR and GS method for load flow analysis procedure in respect of the following  i) Time per iteration ii) total solution time  iii) Memory requirement iv)number of iterations | | 6M |
|  | | | | |
| 6. |  | Using step by step procedure, determine the ZBUS for the network when an element is added from a new bus to an old bus with mutual coupling. | | 6M |
|  | 12M |
|  | | | | |
| 7. | a) | Compute the bus impedance matrix for the system shown in figure by adding element by element. Take bus (2) as reference bus | | 8M |
|  | b) | Give the classification of faults that occur in power system. | | 4M |
|  | | | | |
| 8. | a) | Define steady state, transient and Dynamic stability related to power system | | 6M |
|  | b) | Derive the swing equation of a synchronous machine connected to an infinite bus. | | 6M |
|  | | | | |
| 9. | a) | With a neat block diagram explain IEEE type 1 excitation system | | 6M |
|  | b) | A 4-pole, 50 Hz, 11 KV turbo generator is rated 75 MW and 0.86 power factor lagging. The machine rotor has a moment of inertia of 9000 Kg-m2. Find the inertia constant in MJ / MVA and M constant or momentum in MJs/elec degree | | 6M |

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**Brief Scheme of valuation**

1. Each question from a to l carries 1 mark-**12M**

2. a) Formation of tree-**2M**

Formation of basic cut-set incidence matrix-**21/2M**

Formation of basic Loop incidence matrix-**21/2M**

b) Graph-**1M**

Bus incidence matrix-**2M**

Basic Loop incidence matrix-**2M**

Branch path incidence matrix-**2M**

3. a) Derivation-**6M**

b) Primitive network-**2M**

Impedance form along with equation-**2M**

Admittance form along with equation-**2M**

4. NR method for solution of power flow derivation-**12M**

5. a) Formulae-**2M**

Calculation of bus 2 voltage-**4M**

b) Each comparision-**11/2M**

6. Derivation-**12M**

**7.** a)Formulae-2M

Each element addition-**2M** (total **6M**)

b) Classification-**4M**

**8.** a) Each definition-**2M \*3=6M**

b) Swing equation derivation-**6M**

9. a) Block diagram-**3M**

Explanation-**3M**

b) K.E calculation-**2M**

Calculation of H-**2M**

Calculation of M-**2M**