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PRESIDENCYUNIVERSITY BENGALURU

SCHOOLOFENGINEERING

MAKE UP EXAMINATION- JULY 2024

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| **Semester: VI** | **Date: 05 July 2024** |
| **Course Code: EEE3002** | **Time: 01.30pm to 04.30pm** |
| **Course Name: Power System Analysis** | **Max Marks: 100** |
| **Program: B. Tech EEE** | **Weightage: 50** |

**Instructions:**

1. *Readallquestionscarefullyandansweraccordingly.*
2. *Questionpaperconsistsof3parts.*
3. *Scientificandnon-programmablecalculatorare permitted.*
4. *DonotwriteanyinformationonthequestionpaperotherthanRoll Number.*

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| **PART A** | | | |
| **ANSWER ANY 4 QUESTIONS 4Q X 5M=20M** | | | |
| 1 | Define per unit value of any electrical quantity? Also list the advantages of per unit system. | (CO 1) | [Knowledge] |
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| 2 | Define the Term Bus. Mention the advantages of bus admittance matrix. | (CO 1) | [Knowledge] |
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| 3 | Define power flow study or load flow study and mention the need of load flow analysis. | (CO 2) | [Knowledge] |
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| 4 | List the various types of shunt and series faults. | (CO 3) | [Knowledge] |
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| 5 | Define the term stability. Depending upon the nature and magnitude of the disturbance how the stability studies can be classified? | (CO 4) | [Knowledge] |
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| 6 | Define the term Contingency Analysis. List the different types of Contingency analysis. | (CO 5) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 7 | A power is transferred from 100 MW Gas power plant Yelhanka to KGF, In this system the various components are connected such as Generator, one transmission line, one transformer and two loads. It is suggested to perform steady sate study on this system mainly to know the power flows of the system for a particular operating condition, so it required model the system, summarize that points that could be assumed while obtaining the per unit impedance diagram. | (CO 1) | [Comprehension] |
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| 8 | Consider the power system as shown in Fig. 1. Each generator and the line impedance of (0.2 + j0.2) pu and (0.5 + j0.5) pu respectively. Neglecting line charging admittances, form YBus by for the given power system network by using Singular Transformation method and verify the result by direct inspection method.  http://guqbms.inpods.com:57953/api/v1/downloadFile?fileId=19094&tenantid=13  Fig. 1 | (CO 1) | [Comprehension] |
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| 9 | A power system consists of 4 buses. Generators are connected at buses 1 and 3 reactance of which are jO.2 and jO.1 respectively. The transmission lines are connected between buses 1-2, 1-4, 2-3 and 3-4 and have reactance’s jO.25, jO.5, jO.4 and j 0.1 respectively. Construct the power system network, draw the oriented graph and mark all the necessary values. | (CO 2) | [Comprehension] |
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| 10 | There is proposal from AP Government to supply power from RTPS to Kurnool, AP. In this connection KPTCL is planning to construct the new transmission line from the RTPS, Raichur to Kurnool, AP. Identify what type of transmission line need to be selected to transfer the power, in order to planning, what kind of study is need to be done, and what are the data is required to conduct the study as per the IEEE standard identify and list all the data. | (CO 2) | [Comprehension] |
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| 11 | With necessary diagram explain the symmetrical components of three phase system and significance. | (CO 3) | [Comprehension] |
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| 12 | Maintaining synchronism between the various elements of a power system has become an important task in power system operation as systems expand with the increasing interconnection of generating stations and load centers. The electromechanical dynamic behavior of the prime mover-generator-excitation systems, various types of motors, and other types of loads with widely varying dynamic characteristics can be analyzed through somewhat oversimplified methods for understanding the processes involved. Discuss the common assumptions made during transient stability studies. | (CO 4) | [Comprehension] |
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| 13 | Mr. Kiran would want to do a Contingency study on the network of the power system that is currently being utilised to transmit electricity from Mysuru to Bengaluru. In power systems, the contingency analysis simulates single failure events (such as the failure of a single line or a single unit) or multiple equipment failure events (such as the failure of several units or lines or their combination) one after the other until all "credible outages" are evaluated. Describe the method that must be followed in order to carry out the contingency plan, including the relevant flow chart | (CO 5) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 14 | The single line diagram of an unloaded power system is shown in Fig 2.The generator transformer ratings are as follows.  G1=20 MVA, 11 kV, X’’=25%  G2=30 MVA, 18 kV, X’’=25%  G3=30 MVA, 20 kV, X’’=21%  T1=25 MVA, 220/13.8 kV (∆/Y), X=15%  T2=3 single phase units each rated 10 MVA, 127/18 kV(Y/∆), X=15% T3=15 MVA, 220/20 kV(Y/∆), X=15%  Draw the reactance diagram using a base of 50 MVA and 11 kV on the generator1.    Fig. 2 | (CO 1) | [Application] |
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| 15 | Obtain the load flow solution by using the GS method at the end of the first iteration of the given power system network by constructing the single line diagram and marking all the given parameters in SLD. Also compute the voltage at each bus.  Table No. 1: Line Data   |  |  |  |  | | --- | --- | --- | --- | | Starting Bus | Ending Bus | Resistance in pu | Reactance in pu | | 1 | 2 | 0.05 | 0.15 | | 1 | 4 | 0.10 | 0.30 | | 2 | 3 | 0.15 | 0.45 | | 2 | 4 | 0.10 | 0.30 | | 3 | 4 | 0.05 | 0.15 |   Table No. 2: Bus Data   |  |  |  |  | | --- | --- | --- | --- | | Bus  Number | Pi in PU | Qi in  pu | Vi | | 1 | - | - | 1.00 | | 2 | 0.5 | -0.2 | - | | 3 | -1.0 | 0.5 | - | | 4 | -0.3 | -0.1 | - | | (CO 2) | [Application] |
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| 16 | A 20 MVA, 13.8 kV generator has a direct axis sub transient reactance of 0.25 pu. Its negative sequence reactance is 0.35 pu, and its zero sequence reactance is 0.1 pu. The neutral of the generator is grounded. Compute the fault current, line-to-ground voltage, and line-to-line voltages for a single line-to-ground fault. | (CO 3) | [Application] |
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