Code No: **R1632022** **R16** SET - 1

III B. Tech II Semester Regular/Supplementary Examinations, August-2021

POWER SYSTEM ANALYSIS

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (Part-A and Part-B)
2. Answer ALL the question in Part-A
3. Answer any **FOUR** Questions from **Part-B**

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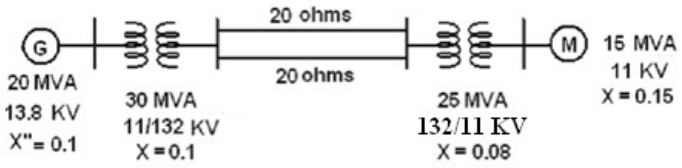
PART –A **(14 Marks)**

1. a) What is the need of single line diagram in power systems? [2M]
   b) Define slack bus. [2M]
   c) Mention different types of short circuit faults which may occur in power system. [2M]
   d) What is the importance of representing power system with its equivalent reactance diagram in short circuit studies? [3M]
   e) Write the order of severity of short circuit faults on power system. [3M]
   f) Define critical clearing angle. [2M]

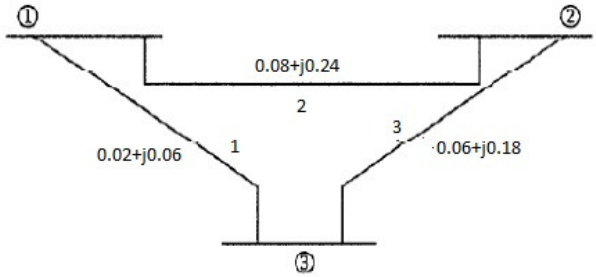
PART –B **(56 Marks)**

2. a) Derive per unit impedance in terms of base MVA and base KV for a three phase system. [7M]
   b) Draw the P.U diagram for the circuit shown in below figure. Choose base values as relevant to the given quantities. [7M]



3. a) Explain how the buses are classified in the calculation of power flow? [4M]
   b) Explain the step by step computational procedure for the Newton-Raphson method of load flow studies. [10M]

4. a) Form Z_{BUS} through step-by-step method of building algorithm for the power system network shown below. [7M]



   b) Explain in detail the procedure of addition of a branch or link to a partial network. [7M]

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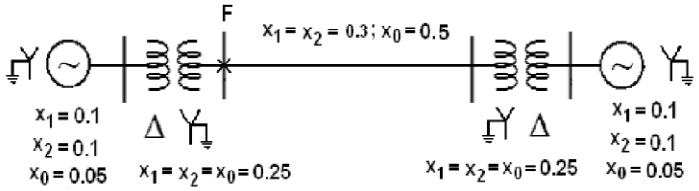
5. A 3 phase transmission line operated at 33kV having resistance of 5Ω and reactance of 20Ω is connected to a generating station through 15MVA step up transformer with 5% reactance. Two alternators are connected in parallel to the bus bar. First alternator is rated with 10MVA, 11KV and 10% reactance and second alternator with 5MVA, 11KV and 7.5% reactance. Calculate short circuit MVA, short circuit current and fault current in rms, if a symmetrical fault occurred at: [14M]
   (i) the end of the transmission line;
   (ii) high voltage terminals of the transformer.

6. a) What are symmetrical components? Explain their necessity in the calculation of unsymetrical phase vectors. [4M]
   b) For the system shown in below figure, find the short circuit current, short circuit MVA and fault current if a LL fault occurs at point F. [10M]



7. a) Define the following terms: [6M]
   i) Steady state stability limit
   ii) Dynamic state stability limit
   iii) Transient state stability limit.
   b) Derive the expression of swing equation. Show the stability of rotating machines with the help of swing curves. [8M]

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