

The Assam Royal Global University, Guwahati

Royal School of Engineering & Technology

B.Tech CSE 2nd Semester

Semester End Examination, July 2022

Course Title : Basic Electrical Engineering

Course Code : ELE022C203

Time: 3 Hours

Maximum Marks: 70

Note: Attempt all questions as per instructions given.

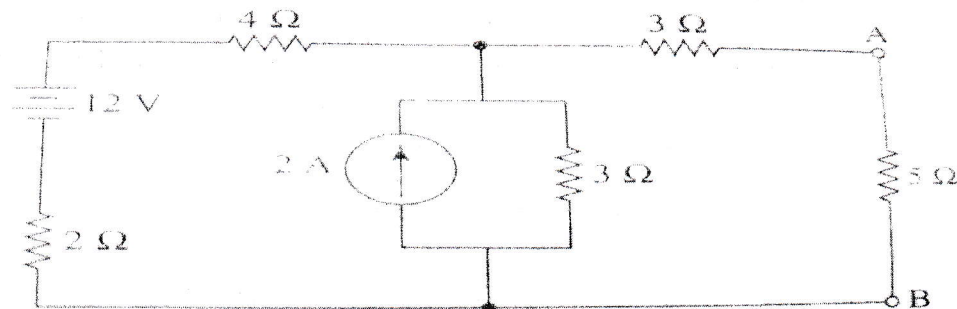
The figures in the right-hand margin indicate marks.

Section – A

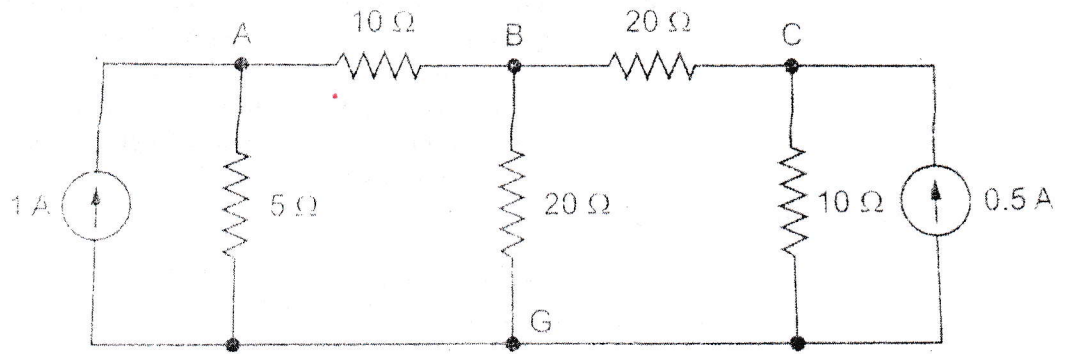
1. Attempt all questions. 2 x 8
- a. Define: Node and Branch. 2
 - b. Define Kirchhoff's Law. 2
 - c. Define Phase. 2
 - d. Define power factor. 2
 - e. A six pole lap wound armature has 840 conductors and flux per pole of 0.018 webers. Calculate the emf generated when the machine is running at 600 rpm. 2
 - f. Why a transformer cannot operate on DC? 2
 - g. Define fuse. 2
 - h. What is the difference between star connection and delta connection in three phase AC system? 2

Section – B

2. Attempt any two of the following: 6x2
- a. Use Thevenin's theorem to calculate the current flowing through the 5Ω resistor in the circuit shown below.



- b. State and explain Maximum Power Transfer Theorem
- c. Determine the current in each branch using Nodal Analysis.



3. Attempt **any two** of the following: 7 x 2
- For a single phase sinusoidal current waveform, derive average and r.m.s values of current. 7
 - Draw the phasor diagram of series RLC circuit. A series circuit has $R=10\Omega$, $L=50\text{mH}$, and $C=100\ \mu\text{F}$ and is supplied with 200V, 50 Hz. Find (i) impedance, (ii) current (iii) power (iv) power factor (v) voltage drop across each element. 2+5
 - Define the following terms: real power, reactive power and apparent power. Also, draw the power triangle. 5+2
4. Attempt **any two** of the following: 7 x 2
- Define an ideal transformer. A 100 kVA, 2400/200 V, 50 Hz transformer has a no-load current of 0.64 A and a core loss of 700 W, when its high-voltage side is energized at rated voltage and frequency. Calculate the components of the no-load current and no-load branch parameters of the equivalent circuit. 2+5
 - Derive the emf equation of a DC machine. 7
 - Give few applications of DC shunt motor. A DC shunt machine connected to 220 V supply has armature resistance of 0.1Ω and field resistance of 110Ω . Find the ratio of the speed of the machine working as a generator to the speed of the machine when working as a motor when the line current is 100 A in both the cases. 2+5
5. Attempt **any one** of the following: 14x1
- Why Earthing is important? What are the different methods of earthing? Explain any one method of earthing, in details. 5+2+7
 - Explain the principle of operation and construction of a PMMC instrument.
A balanced delta connected load of $(12+j9)\Omega$ /phase is connected to 3-phase 400 V supply. Find (i) Line current (ii) Power factor (iii) Power drawn (iv) Reactive volt-amperes (v) Total volt-amperes. 7+7