CBCS SCHEME

USN | | | | | | | | | | |

18EE32

Third Semester B.E. Degree Examination, Jan./Feb. 2023
Electric Circuit Analysis

Time: 3 hrs. Max. Marks: 100

Note: ***1. Answer any FIVE full questions, choosing ONE full question from each module.***
2. Missing data, if any, may be suitably assumed.

Module-1

1 a. Define : i) Linear and non-linear circuit
ii) Active and Passive circuit. **(04 Marks)**

b. For the circuit shown in Fig.Q1(b), find potential between M and N using source transformation.

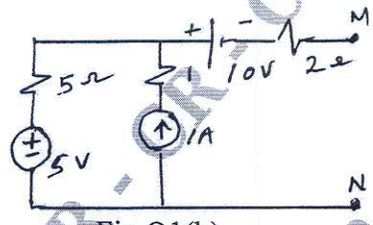

Fig.Q1(b) **(06 Marks)**

c. Use Mesh current analysis for the network shown in Fig.Q1(c) to find source voltage 'V' when current flowing in 4Ω is zero.

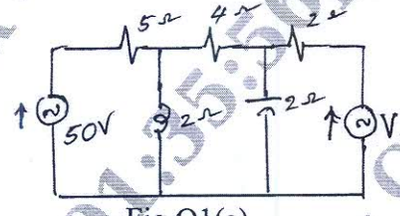

Fig.Q1(c) **(10 Marks)**

OR

2 a. Define : i) Unilateral and Bilateral Network
ii) Planner and Non Planner Network. **(04 Marks)**

b. Using Star/Delta transformation, find resistance between M and N for the network shown in Fig.Q2(b).

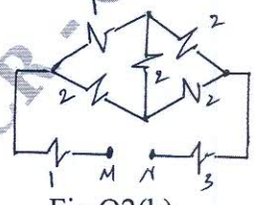

Fig.Q2(b) **(07 Marks)**

c. For the network shown in Fig.Q2(c), find the output of dependent source using node voltage analysis.

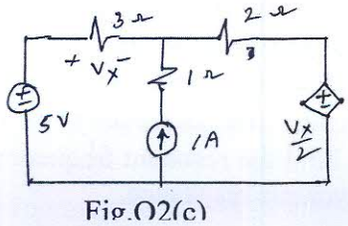

Fig.Q2(c) **(09 Marks)**

Module-2

3 a. State and prove reciprocity theorem. **(06 Marks)**

b. For the network shown in Fig.Q3(b), find I_x using super position theorem.

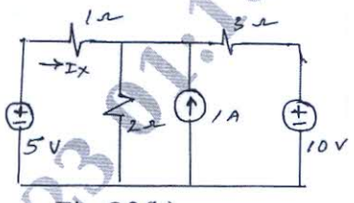

Fig.Q3(b) **(08 Marks)**

c. Draw the Thevenin's equivalent circuit of the Fig.Q3(c).

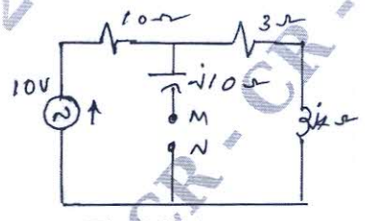

Fig.Q3(c) **(06 Marks)**

OR

4 a. State and obtain condition for the maximum power transfer when the load consist of variable resistance and variable reactance. **(07 Marks)**

b. Find current I in the network shown in Fig.Q4(b) using Norton's theorem.

Fig.Q4(b) **(07 Marks)**

c. Using Milliman's theorem, find I in the network shown in Fig.Q4(c).

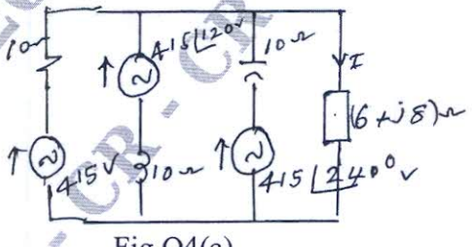

Fig.Q4(c) **(06 Marks)**

Module-3

5 a. Obtain the relation between Band width and Quality factor. **(08 Marks)**

b. To a R – L – C circuit. Voltage of 50 sin ωt volts is applied. At resonance, the impedance of series circuit in 100Ω and voltage drop across capacitor is 400V and band width is 50 rad/sec. Determine inductance, capacitance and quality factor. **(06 Marks)**

c. A coil of 20Ω resistance has inductance of 0.2H and is connected in parallel with capacitance of 100μF. Find the resonant frequency at which circuit will act as non inductive resistance. Also find dynamic resistance. **(06 Marks)**

OR

6 a. Explain the behavior of R, L ad C for initial condition. **(06 Marks)**

b. For the network shown in Fig.Q6(b), switch is closed at t = 0. Obtain expression for current i(t) for $t \geq 0$.

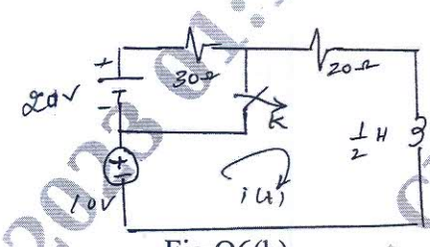

Fig.Q6(b) **(08 Marks)**

c. For the circuit shown in Fig.Q6(c) switch is closed at t = 0. Determine :

$i(t), \frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$.

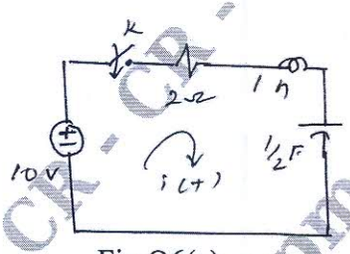

Fig.Q6(c) **(06 Marks)**

Module-4

7 a. State and prove initial value theorem. **(05 Marks)**

b. For the circuit shown in Fig.Q6(c), draw transformed circuit and obtain expression for current i(t) for $t \geq 0$. **(07 Marks)**

c. Determine Laplace transforms of the periodic waveform shown in Fig.Q7(c).

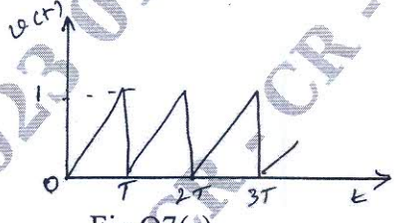

Fig.Q7(c) **(08 Marks)**

OR

8 a. State and prove final value theorem. **(06 Marks)**

b. For the network shown in Fig.Q8(b) switch is opened at t = 0. Determine $v_1(t)$ and $v_2(t)$.

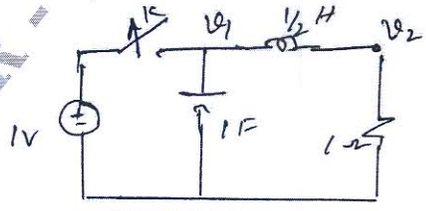

Fig.Q8(b) **(08 Marks)**

c. Find initial and final value of following functions :

i) $F_1(s) = \frac{s^3 + 7s^2 + 5}{s(s^3 + 3s^2 + 4s + 2)}$ ii) $F_2(s) = \frac{s(s+4)(s+8)}{(s+1)(s+6)}$. **(06 Marks)**

Module-5

9 a. A 3-ϕ supply with the line voltage of 250 volts has an unbalanced delta connected load as shown in Fig.Q9(a). Determine line current, total active and reactive power for ABC sequence.

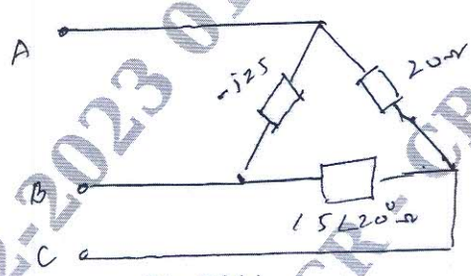

Fig.Q9(a) **(10 Marks)**

b. A 3-ϕ, 4 wire, star connected load with $Z_A = 3\Omega$, $Z_B = 2 + j3\Omega$ and $Z_C = 2 - j1\Omega$. For ACB sequence, find line and neutral current. **(10 Marks)**

OR

10 a. Explain the Z-parameters in terms of transmission parameters. **(10 Marks)**

b. For the network shown in Fig.Q10(b). Determine the admittance parameters.

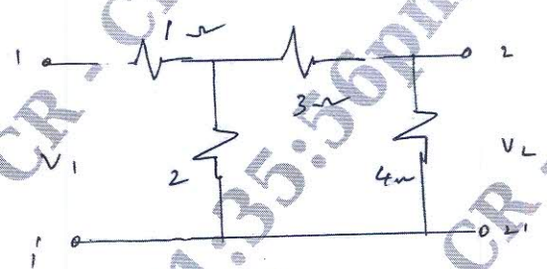

Fig.Q10(b) **(10 Marks)**

* * * * *