## MID TERM EXAMINATIONS – October-November 2023

| Programme | : B.Tech. | Semester | : Fall 2023-24 |
|---|---|---|---|
| Course Title/ Course Code | : Electric Circuits and Systems / EEE1001 | Slot | : B11+B12+B13 |
| Time | : 1 ½ hours | Max. Marks | : 50 |

### Answer all the Questions

| Q.No. | Sub. Sec. | Question Description | Marks |
|---|---|---|---|
| 1 | | Design the DC circuit by using minimum 29 (series and parallel combination) resistors and 1 DC source. The circuit must have 4 delta-star and 1 stat-delta transformation. Calculate the equivalent resistance and total current? Assume the DC voltage and resistance values. | 10 |
| 2 | (a) | Solve the given network circuit shown in Fig.1 by using Nodal analysis after adding 5 $\Omega$ resistor in series with the 12V supply. Find out node and branch voltages V1, V2, V3 and V4 and also find the current passing through 10$\Omega$ resistor branch? | 5 |



Fig.1
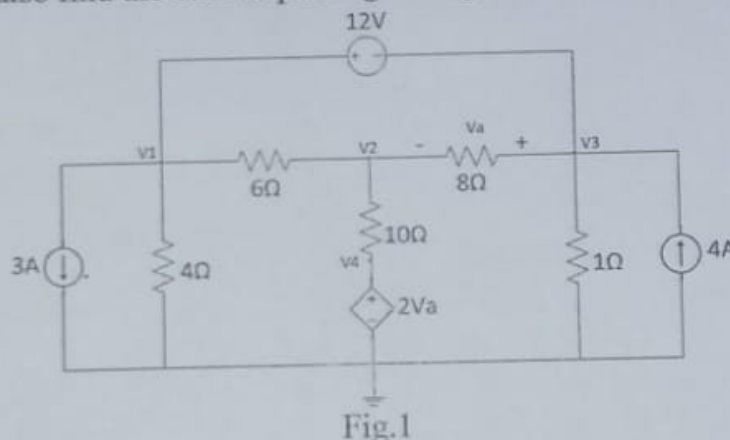
| | (b) | Explain superposition theorem with one suitable numerical (3 sources)? | 5 |
| 3 | | Extract the natural, forced and total response in the second order equation. The input is $x = e^{-2t} \times u(t)$ Conditions: $y(0)=3$, $\frac{dy}{dt}(0)=4$ for the natural response. Assume the second order equation and other missing data. | 10 |
| 4 | | Draw magnetic circuit by using minimum 18 (series and parallel combination) inductors. Calculate the equivalent inductance? Assume the all inductance, dot convention and mutual inductance values. | 10 |
| 5 | | Crystal diodes having an internal resistance of 20$\Omega$. If the applied voltage is 50sin$\omega$t and the load resistance is 800$\Omega$. Find the maximum current, dc current, rms current, ac power input, dc power output, dc output voltage and efficiency? | 10 |

$V = V_0 \sin \omega t$