D 20617 (Pages : 4) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION OCTOBER 2011

EE 09 303/PTEE 09 302—ELECTRIC CIRCUIT THEORY

(2009 Admissions)

Time : Three Hours Maximum : 70 Marks

Part A

All question are **compulsory.**

1. Find V_0 in the network in Fig.1.

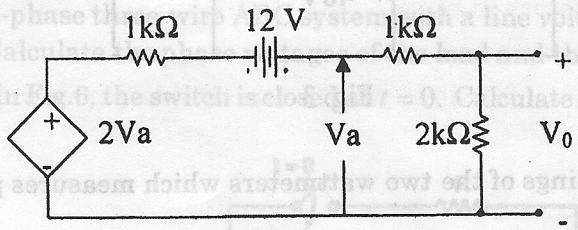

Fig. 1

2. A circuit having a resistance of 10Ω, an inductance of 10 mH, and a capacitor of $1\,\mu F$ in series is connected across 200 V supply. Calculate the resonant frequency.
3. Determine the Laplace transform for $t^2 \sin \omega t$.
4. List out any *four* properties of Hurwitz polynominals.
5. For the graph in Fig.2, find the incidence matrix.

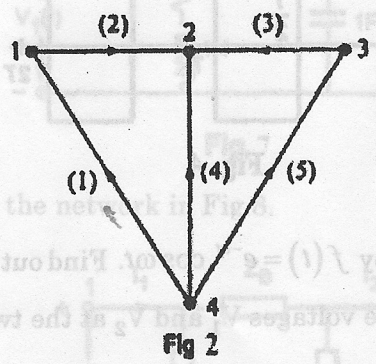

Fig 2

(5 × 2 = 10 marks)

Turn over

Part B

Answer any **four** *questions.*

6. Use Thevenin's Theorem to find V_0 in the circuit in Fig. 3.

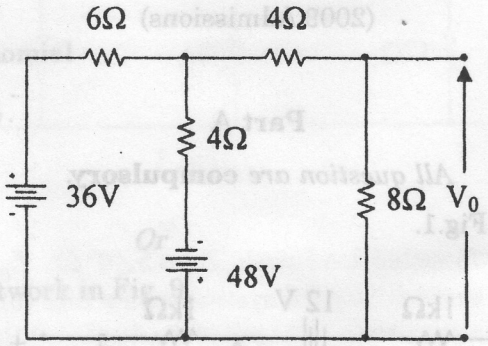

Fig. 3

7. If W_1 and W_2 are the readings of the two wattmeters which measures power in the three-phase balanced system and if $\frac{W_1}{W_2} = a$, show that the power factor of the circuit of the circuit is given by $\cos\phi = \frac{a+1}{2\sqrt{a^2-a+1}}$.

8. Determine the Laplace transform for the periodic square waveform in Fig. 4.

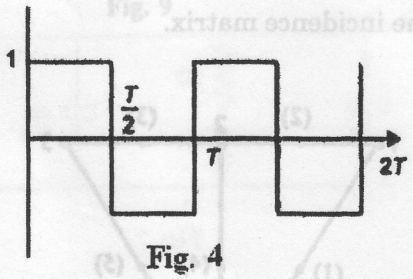

Fig. 4

9. A damped cosine wave is given by $f(t) = e^{-at}\cos\omega t$. Find out the Laplace transform of this signal.

10. The following equations give the voltages V_1 and V_2 at the two-ports of a two-port network.

$V_1 = 6I_1 + 2I_2$ and $V_2 = 3I_1 + I_2$

Calculate the input impedance if the load resistor of 4Ω is connected across the port 2.

11. Synthesize the following LC impedance function $Z(s) = \frac{s(s^2+4)(s^2+6)}{(s^2+3)(s^2+5)}$ using Cauer Form I.

(4 × 5 = 20 marks)

Part C

12. Use Norton's Theorem to find V_0 in the circuit in Fig.5.

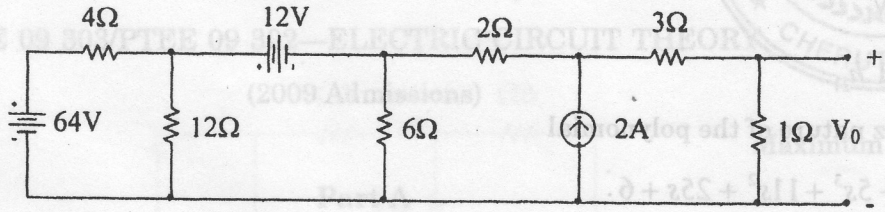

Fig. 5

Or

13. The unbalanced Y-connected load with $Z_A = 5\angle 0° \Omega$, $Z_B = 10\angle 30° \Omega$, and $Z_C = 20\angle 60° \Omega$ is fed by a three-phase three-wire ABC system with a line voltage of 208 V. Obtain the line currents is this case. Calculate the phase voltages of the load and the displacement neutral voltage V_{ON}.

14. In the circuit in Fig.6, the switch is closed at $t = 0$. Calculate the expression of the resulting current.

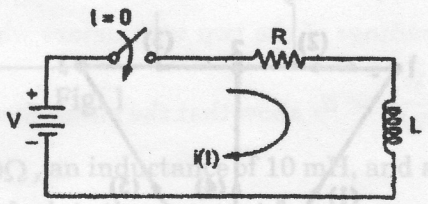

Fig. 6

Or

15. Find the driving point admittance Y(s) for the network in Fig. 7 and plot pole-zero diagram.

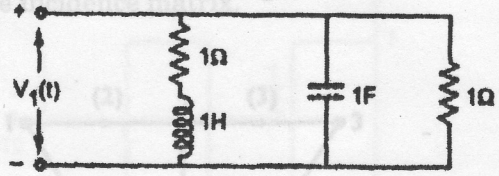

Fig. 7

16. Obtain Z-parameters for the network in Fig.8.

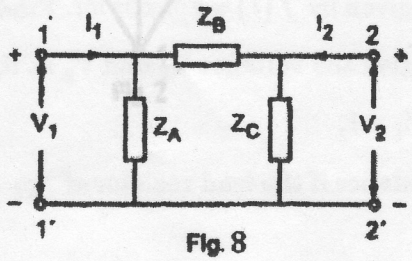

Fig. 8

Or

17. A certain two port is characterized by the following pair of equations.

$2V_1 + 4I_2 = I_1$

$8I_1 = V_2 + 6V_1$

Find y_{11} and h_{21}.

18. Test Hurwitz nature of the polynomial

(a) $S^4 + 5s^3 + 11s^2 + 25s + 6$.

(b) $S^5 + 4.5s^3 + 4.5s$.

Or

19. Find out the following for the network in Fig. 9.

Draw various trees

For a particular tree write fundamental cutest and fundamental loop matrix.

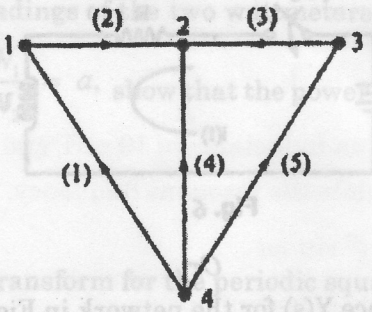

Fig. 9

(4 × 10 = 40 marks)