



VIT[®]

Vellore Institute of Technology
Established by Government of Tamil Nadu in 1984

Final Assessment Test - April 2019

Course: EEE1001 - Basic Electrical and Electronics Engineering

Class NBR(s): 3620 / 3629 / 3635 / 3644 / 3647 / 3651 /

3662 / 3664 / 3665 / 3945

Slot: 61

Time: Three Hours

Max. Marks: 100

Answer any FIVE Questions

(5 X 20 = 100 Marks)

1. (a) Find the nodal equations and nodal voltages V_1 , V_2 and V_3 in the circuit shown in Fig. 1

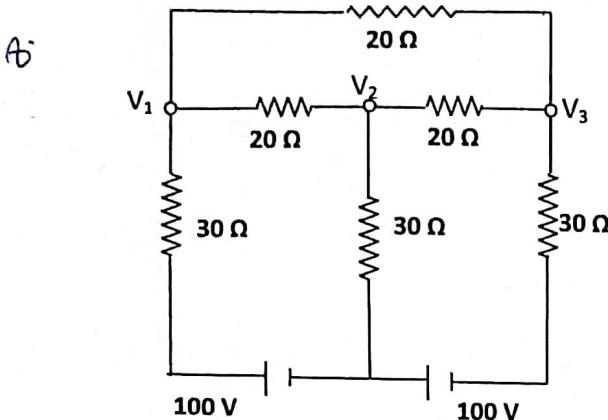


Fig. 1

- 1(b) State Maximum power transfer theorem and find the maximum power consumed by the load for [2+8] the circuit shown in Fig.2.

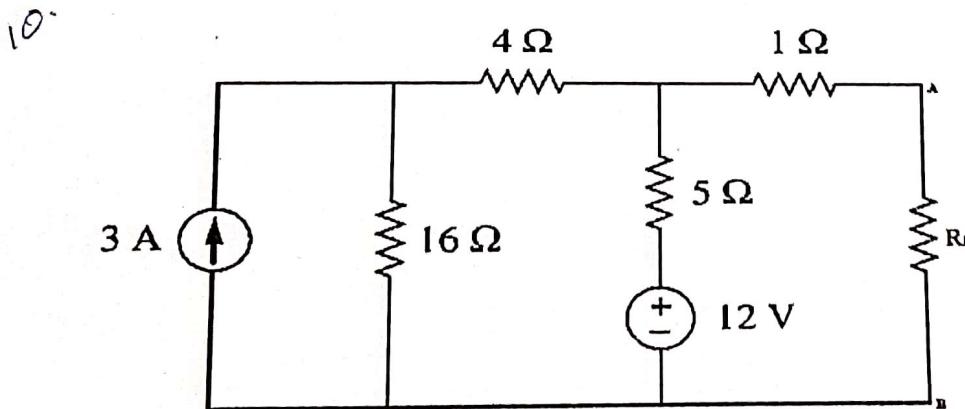


Fig. 2

2. (a) A coil of resistance 20 ohms and inductance 0.2 H is connected in series with a 300 micro farad [5x2=10] capacitor across 400 V, 50 Hz supply. Calculate, the impedance, current, power factor, voltage across the coil and voltage across the capacitor.

- 2(b) A balanced abc-sequence star (Y) connected source with $V_{an} = 120\angle 30^\circ(V)_{rms}$ is connected to [5+5] a delta (Δ) connected balanced load consists of 10-Ohm resistance in series with 20-mH inductance per phase . Calculate the phase and line currents.

3. (a) Explain in detail the working principle of DC generator with necessary diagrams and waveforms. [10]

12. (b) Define stepper motor and explain the principle of operation of variable reluctance stepper motor? [2+8]

4. (a) Convert the following numbers to its equivalent binary number in step by step procedure (without using calculator) [5x2 = 10]

(i) $(25.625)_{10}$

(ii) $(47.321)_8$

(iii) $(3B.6)_{16}$

(iv) $(BEEE)_{16}$

(v) $(BCD)_{16}$

(b) Simplify the given Boolean function using K-map and implement using logic gates. [5+5]

$$F(A,B,C,D) = \Sigma (1,2,3,4,7,9,10,12)$$

5. (a) Describe in detail with neat sketch the operation of the PN junction diode in forward bias and reverse bias and draw its V-I characteristics. [5+5]

(b) Define Amplitude Modulation, Frequency Modulation and Phase Modulation and compare each other. [6+4]

6. (a) Derive the expression for the e.m.f. and voltage transformation ratio of an ideal transformer winding. [5+5]

(b) Explain the operation of single phase half wave and Full wave uncontrolled Bridge rectifier. Draw the necessary circuit diagrams and input and output voltage waveforms. [5+5]





Answer all questions

S. No.

Questions

Marks

1. Find the current through $100\ \Omega$ resistors in the circuit shown in Fig.1 using [10] the mesh current method.

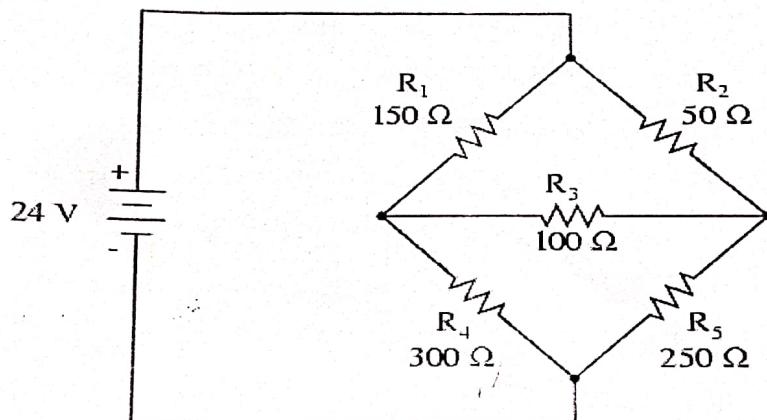


Fig. 1

2. Determine the value of the load resistor in the circuit shown in Fig. 2, if [10] maximum power is transferred. Also calculate the maximum power across the load resistor.

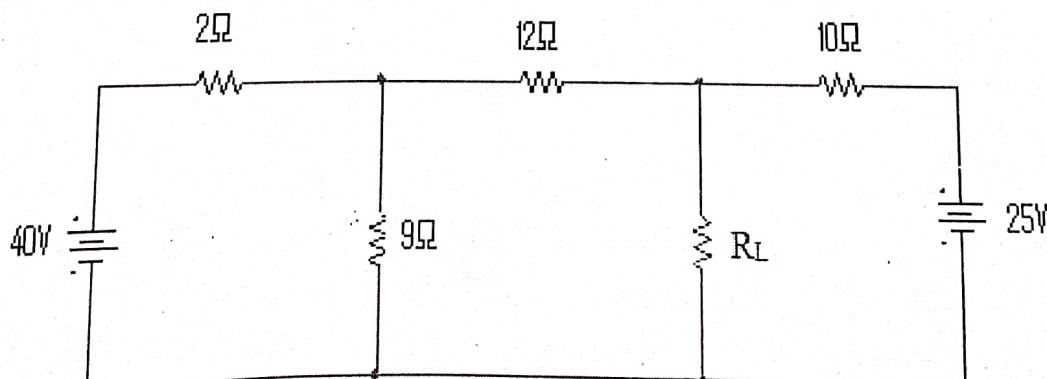


Fig. 2

3. Find the voltage across $30\ \Omega$ resistor in the circuit shown in Fig. 3 using [10] nodal analysis.

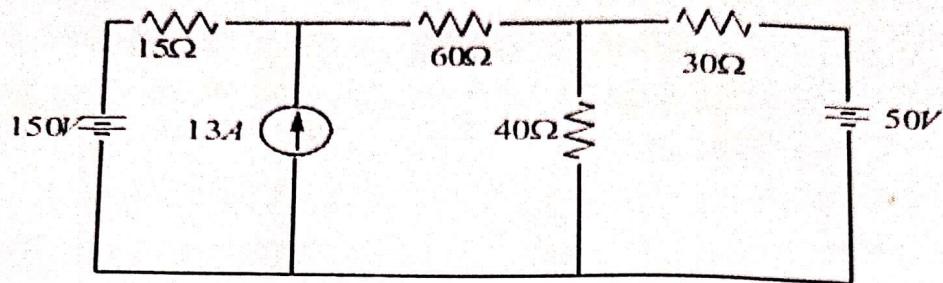


Fig. 3

4. i) Find the equivalent resistance in the circuit shown in Fig. 4. [10]
ii) How much power is delivered by the source?

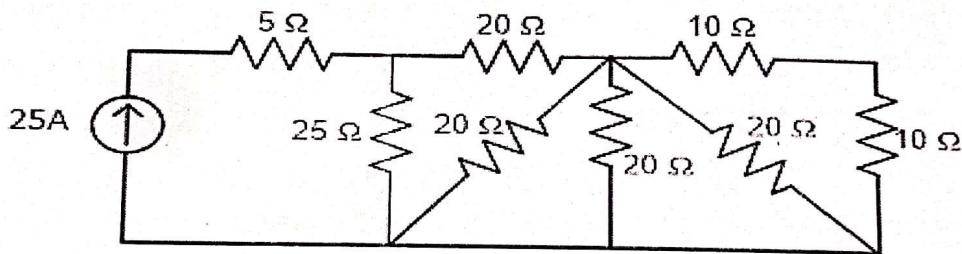


Fig. 4

5. A $20\ \Omega$ resistance and a 30 mH inductance are connected in series and the [10] circuit is fed from 230 V , 50 Hz , AC supply. Find inductive reactance, RMS value of current, voltage across resistance, voltage across inductance and power factor of the circuit. Draw the phasor diagram.



VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Slot - E1

SCHOOL OF ELECTRICAL ENGINEERING

CAT II

Fall Semester 2018-2019

Course Code : EEE1001

Date of Examination : 27.09.18

Course Title : Basic Electrical and Electronics Engineering Max. Marks: 50

Duration

: 1½ hours

- Answer all the questions.***

1 Design a logic diagram which receives four bit binary number as input. The output of the circuit should be divisible by 2 or 5 [10]

2 A load of impedance $Z = 15\angle 45^\circ$ in each branch forms a three phase star connected balanced load which is connected to a 440V, 3 Phase, 50Hz ac supply. Calculate (i) Power consumed (ii) If the same load is now connected as a delta across the same supply, determine the power consumed (iii) Give your inference on the power consumed in both the cases (iv) If the impedance is changed to $3 * |Z|$, Calculate the power consumed when the load is connected in delta and give your inference. [10]

3 A network consists of four switches A, B, C and D. The circuit operates under the following conditions.
A : OFF, B : ON, C & D : Either ON or OFF
A ,B,C : ON, D : OFF
ON condition of the switch is considered as logic "1" and OFF condition of the switch is considered as logic "0"
Circuit operates : Logic "1"
Form the truth table, obtain the minimal Boolean expression using K-Map and implement the logic circuit with reduced expression

4 a Convert the following numbers into binary [3]
(i) CF.18₁₆ (ii) 44.15₈ (iii) 13.135₁₀

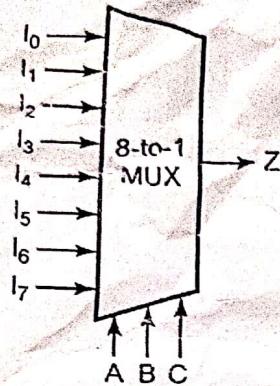
b Design a circuit to add three bit numbers with two circuits adding two bit numbers [7]

$$C \cdot \bar{C} = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}, \quad I = \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix} \quad A + B = \begin{pmatrix} \bar{A} & \bar{B} \\ \bar{C} & \bar{D} \end{pmatrix}$$

5

Design a logic circuit for the truth table given below

[10]



A	B	C	Z
0	0	0	I ₀
0	0	1	I ₁
0	1	0	I ₅
0	1	1	I ₃
1	0	0	I ₇
1	0	1	I ₂
1	1	0	I ₄
1	1	1	I ₆



VIT*

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Slot - G1

**SCHOOL OF ELECTRICAL ENGINEERING
CAT-II**

Subject : Basic Electrical & Electronics Engineering Subject Code : EEE1001
Discipline : B.Tech Semester : Winter 2018-19
Max. Marks : 50 Duration : 90 mins.

Answer all Questions (5 X 10 = 50 Marks)

1. A series combination of 4Ω resistance, inductive reactance of 0.4Ω and $796.18 \mu F$ capacitor in each branch forms a three phase star connected balanced load which is connected to a $440 V$, 3 Phase, and $50Hz$ ac supply. Calculate (i) Power consumed (ii) Current drawn. If the same load is now connected as a delta, determine (i) The power consumed (ii) current drawn (iii) Give your inference on the power consumed in both the cases.

2. a) i) Convert the Decimal value 4267.75010 into its Binary number. (2)
 ii) $F3B16$ into its equivalent binary number. (2)
 iii) 101010111.0110012 into its equivalent decimal number. (2)
 b) Simplify the Boolean function $F = ((XY' + XYZ)' + X(Y + XY'))'$, using Boolean theorems and build the logic circuit for the same. (4)

3. A circuit has four inputs A, B, C and D encoded in natural binary form where D is the least significant bit and A is the most significant bit. The inputs can take the values ranging from 0000 (0 in decimal) to 1011 (11 in decimal) which represents the months of the Year from January (0) to December (11). Input in the range 1100 (12 in decimal) to 1111(15 in decimal) cannot occur. The output of the circuit is high if the month represented by the input has 31 days. Otherwise the output is low. The output for inputs in the range 1100 to 1111 is undefined.

- i. Write truth table to represent the problem and obtain the function F as a Sum of Minterm.
 ii. Use the Karnaugh map to obtain a simplified expression for the function F.
 iii. Construct the circuit to implement the function using logic gates.

4. a) Design and explain a digital switch that accepts multiple inputs from MP3 player, laptop sound card, digital satellite & digital cable TV. and connected to single destination based on the selection lines. (8)

- b) Write the Boolean expression for the output of the logic circuit shown in Fig:1. (2)

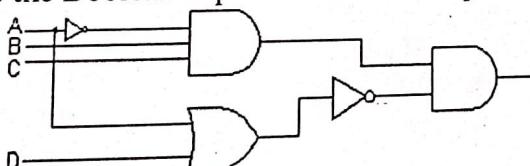


Fig:1.

5. The timing diagram of a logic circuit is given in Fig.2. From the truth table, obtain the minimal Boolean expression and design a logic circuit with minimum number of gates.

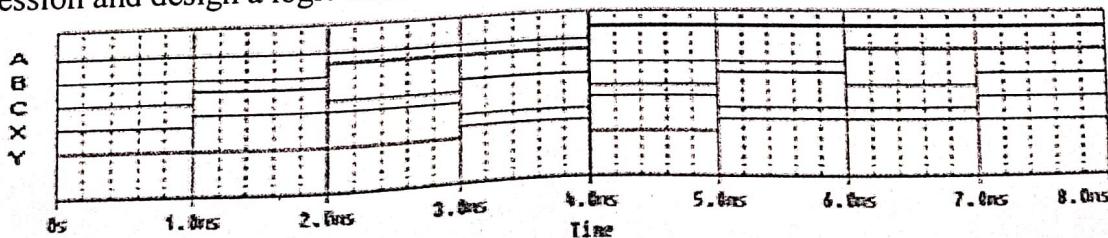


Fig:2.