

KATHMANDU UNIVERSITY
End Semester Examination
September 2024

Marks Scored:

Level : B.E.

Year : I

Exam Roll No. :

Time: 30 mins.

Registration No.:

Course : EEG 103

Semester : II

F. M. : 10

Date : 09 SEP 2024

SECTION "A"

[20Q. \times 0.5 = 10 marks]

Choose and encircle the most appropriate answer. Symbols have their usual meanings.

- If the value of resistor is $10\text{ k}\Omega$ with tolerance 5%, the combination color code will be ____
a. Black Brown Red Gold. b. Brown Black Orange Gold.
c. Black Brown Orange Gold. d. Brown Black Red Silver.
- What is the energy consumption by a vacuum cleaner that use 2 A current with $100\ \Omega$ load for 5 hours ____.
a. 400 Watt b. 2000 Watt c. 400 units d. 2 units
- In dc/ac network, Kirchoff's current law is applied in ____.
a. Mesh analysis. b. Nodal analysis
c. Norton's theorem. d. Superposition theorem.
- In Fig 1, the value of the current (I_m) will be ____.
a. 4 A. b. -4 A. c. 1 A. d. -1 A.

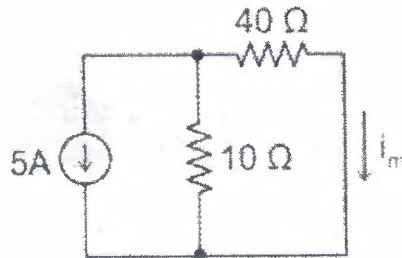


Fig 1

- If a $6\ \Omega$, $2\ \Omega$, and $4\ \Omega$ resistors are connected in delta, the equivalent star connection values will be ____
a. $1\ \Omega$, $2\ \Omega$, $3\ \Omega$ b. $1\ \Omega$, $2\ \Omega$, $2/3\ \Omega$ c. $1\ \Omega$, $2/3\ \Omega$, $3\ \Omega$ d. $1/3\ \Omega$, $2\ \Omega$, $3\ \Omega$
- If two bulbs, one of 200 W and the other of 100 W are connected in series with a 100 V battery, then ____ brightness.
a. 100 W bulb will have more b. 200 W bulb will have more
c. both bulbs have equal d. Can't say
- The approximate period of the voltage $2\ \cos 377t$ will be ____.
a. 16.67 ms b. 16.67 s c. 1.667 ms d. 0.1667 s
- The rms voltage and the frequency for $v = 100\ \sin 628t$ will be ____.
a. 100 V b. 70.7 V c. 50 V d. 141.42 V

9. In Fig 2. the maximum emf induced in the coil is _____.

- a. $N\phi_{max}$
- b. $w\phi_{max}$
- c. $N\phi_{max}\sin wt$
- d. $wN\phi_{max}$

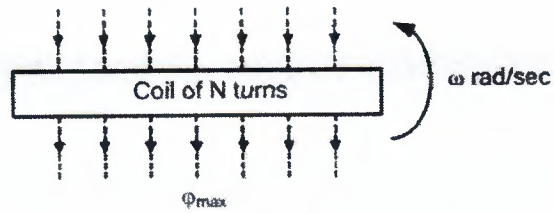


Fig. 2

10. If $v_1 = A\sin wt$, and $v_2 = B\sin(wt - \phi)$, then _____.

- a. v_2 lags v_1
- b. v_1 leads v_2
- c. v_2 lags v_1 by ϕ angle
- d. All are correct

11. A polyphase system is generated by _____.

- a. having two or more generator windings separated by equal electrical angle.
- b. having generator windings at equal distances
- c. both a. and b. are correct
- d. both a. and b. are incorrect

12. A transformer _____.

- a. steps up or down dc voltages
- b. changes ac into dc
- c. steps up or down ac voltages
- d. changes dc to ac.

13. Pentavalent impurity is also known as _____.

- a. Ionic impurity
- b. donor impurity
- c. acceptor impurity
- d. None of the above

14. Normally, Zener diode is used in _____ circuits.

- a. oscillator
- b. rectifier
- c. filter
- d. regulator

15. In a transistor, $I_C = 100\text{ mA}$, and $I_E = 100.4\text{ mA}$, then value of β is _____.

- a. 400
- b. 350
- c. 250
- d. 50

16. In _____ types of MOSFET, the channel gets formed while $+V_{GS}$ at the gate.

- a. P-Channel DMOSFET
- b. N-Channel DMOSFET
- c. P-Channel EMOSFET
- d. N-Channel EMOSFET

17. In Fig. 3, the output Q is _____.

- a. $A + B$
- b. $\bar{A} + \bar{B}$
- c. $\bar{A} + B$
- d. $A + \bar{B}$



Fig. 3

18. The universal gates are _____.

- a. NOR and NAND gates
- b. OR and NOR gates
- c. AND and NAND gates
- d. all of above

19. A 0 – 250 V voltmeter has a guaranteed accuracy of 2% of full-scale reading. The percentage of error if it measures 150 V is _____.

- a. 5%
- b. 1%
- c. 2.6%
- d. 3.33%

20. A signal has minimum and maximum values of -5V and +5V respectively. To record of 0.01 V change of signal value, the required bit length of A/D converter is _____.

- a. 4 bit
- b. 8 bit
- c. 10 bit
- d. 16 bit

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SECTION "B"
[5Q. × 8 = 40 marks]

Attempt *ANY FIVE* questions. Assume suitable data if necessary, Symbol has their usual meaning.

- 1.
- a. Discuss Kirchoff's current law and voltage law with mathematical expression. [4]
 - b. Determine the unknown resistors $R_1, R_2,$ and R_3 in Fig 1, given that $R_2 = 5R_1$ and $R_3 = 0.5R_1$. [4]

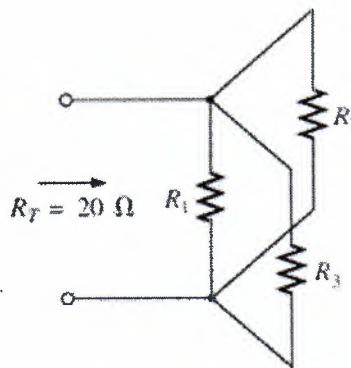


Fig. 1

- 2.
- a. In Fig. 2, calculate the unknown values: I_2, I_6, I_8, V_4 and V_8 [4]

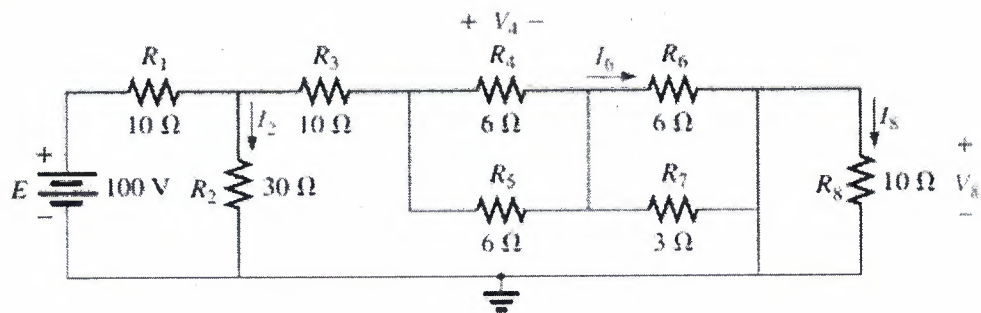


Fig 2

- b. The equation of AC voltage is given as $v = V_{max} \sin \omega t$. Now, derive the magnitude for v_{rms} and v_{avg} in terms of v_{max} . [2+2=4]
- 3.
- a. Discuss the working principle of full wave bridge rectifier diode with its waveforms and derive its efficiency. [2+2=4]
 - b. Explain the operation of NPN transistor. Also, justify "transistor works as switch" with necessary figure and explanation. [2+2=4]

P.T.O.

4.

- a. In the given Fig 3, determine branch current i_1 , if $i_s = 20 \sin(\omega t - 60^\circ)$, $i_2 = 6 \sin(\omega t + 30^\circ)$. Also sketch the plot in time domain. [2+2=4]

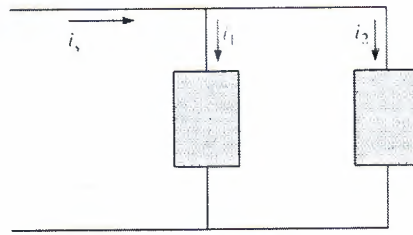


Fig. 3

- b. Discuss the working principle of AC generator with neat figure, with its applications. [4]

5.

- a. Discuss n-channel DMOSFET, its working principle and transfer characteristics. [4]
b. What is the Boolean expression means? Reduce, $F = \overline{(A + \overline{B})}(AB) + (A + B)\overline{(AB)}$. [1+3=4]

6.

- a. Draw a circuit diagram of an energy meter system, and explain its working principle. [2+2=4]
b. Mention the major differences on single phase and three phase AC systems. [4]