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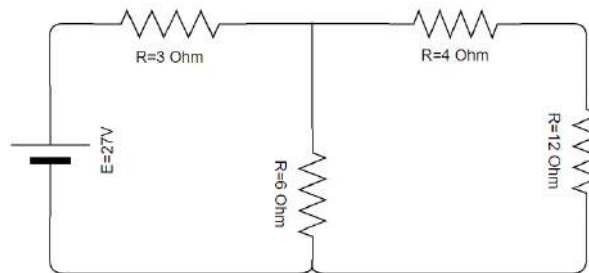
Class: -F.Y.B.Sc.	Subject: - Physics - II
Semester:- II	Course code: -USPH202
Exam Event:- Summer 2024 (FH)	Marks: -75
Date:- 24/04/2024	Duration:- 2.30 Hours

Q1. Attempt any Four of the following. (20)

- 1) Explain AC circuit containing pure R along with necessary diagram.
- 2) Find the reactance of a coil of inductance 100mH and frequency 50 Hz and 1000 Hz.
- 3) Write a note on power in AC circuit.
- 4) Describe the concept of Maxwell's bridge.
- 5) Find the balancing condition of De Sauty's capacitance bridge
- 6) Draw circuit diagram of Wein's bridge. In a Wein's bridge $R_1=R_2=10k\Omega$, $C_1=C_2=0.1\mu F$ then find the frequency of AC input voltage.

Q 2. Attempt any Four of the following. (20)

- 1) Define rectifier circuit and explain half wave rectifier.
- 2) What is ripple factor? Calculate ripple factor for full wave rectifier.
- 3) Describe capacitor filter along with necessary diagram.
- 4) For the given circuit, calculate the load current through the load resistor $R_L=12\Omega$ using Thevenin's theorem.



- 5) Explain Kirchhoff's current law and Kirchhoff's voltage law.
- 6) Find the value of series resistance connected in series with 6V. zener diode produce 140mA zener current when it connected to 20V input supply.

Q 3. Attempt any Four of the following. (20)

- 1) Convert following binary number in to decimal number
 i) $(101011)_2$ ii) $(11111)_2$ iii) $(110.110)_2$
- 2) Convert following hexadecimal number into binary number
 i) $(4BAC)_{16}$ ii) $(2B.A4)_{16}$
- 3) Convert following decimal number into binary number
 i) $(51)_{10}$ ii) $(45)_{10}$
- 4) Why NAND gate and NOR gate are called as universal gate? Explain both gates with symbol and truth table.
- 5) Explain Full adder with necessary diagram.
- 6) Write the De Morgan's theorem and find the complement of the following expression.

$$Y = \bar{A} + (B\bar{C} + \bar{B}C)$$

Q4. A) Select correct answer. (Solve any 8 out of 12)

(08)

1) In a pure resistive circuit

- a) current lags behind the e.m.f. by 90° b) current leads the e.m.f. by 90°
c) current is in phase with the e.m.f. d) none of these

2) When the load resistance equals the source resistance, source to a load. will be delivered by a

- a) minimum power b) maximum power c) zero power d) none of these.

3) Average power dissipated in purely resistive AC circuit is _____

- a) $P = e_{\text{rms}} \times i_{\text{rms}}$ b) $P = e_{\text{rms}} \times i_{\text{rms}} \times \cos\theta$
c) $P = e_{\text{rms}} \times i_{\text{rms}} \times \sin\theta$ d) $P = e_{\text{max}} \times i_{\text{max}}$

4) Maxwell's inductance bridge is primarily used for the measurement of _____.

- a) Resistance b) Inductance c) Capacitance d) Impedance

5) Rectifier is device which converts

- a) d.c. to ac b) ac. to dc c) voltage into current d) current unto voltage

6) Calculate the maximum power transferred to a load resistor of 8 ohms in a circuit with a Thevenin voltage of 24 V and a Thevenin resistance of 6 ohms.

- a) 18 W b) 36 W c) 72 W d) 144 W

7) Thevenin's theorem states that any linear electrical network containing only voltage and current sources and resistances can be replaced by an equivalent circuit consisting of a single voltage source and a single _____.

- a) Inductor b) Capacitor c) Resistor d) Transformer

8) The efficiency of full wave rectifier is

- a) 40.6% b) 90% c) 81.2% d) 100%

9) What is the binary representation of the decimal number 25?

- a) 11001 b) 10011 c) 10101 d) 11100

10) What is the output of an Ex-OR gate when both inputs are HIGH (1)?

- a) LOW (0) b) HIGH (1) c) Undefined d) Cannot be determined

11) The only function of NOT gate is to

- a) stop a signal b) invert input signal c) act as universal gate d) none of the above

12) In Boolean algebra, the bar sign (-) indicate

- a) OR gate b) AND gate c) NOT gate d) none of the above

Q4. B) Answer in one sentence (Solve any three out of five)

(03)

- 1) What is capacitive reactance?
- 2) What is the balancing condition of Maxwell's L/C bridge?
- 3) Write on advantage of bridge type full wave rectifier.
- 4) Write symbol and truth table of Ex OR gate.
- 5) State De Morgan's first theorem.

Q4. C) Fill in the Blanks (Solve any four out of six)

(04)

- 1) In a circuit containing pure inductance L, the current _____ the voltage by a phase angle of 90 degrees.
- 2) In a series LCR circuit, resonance occurs when the impedance is _____.
- 3) Algebraic sum of current at the junction is always _____.
- 4) Ripple factor of full wave rectifier circuit is _____.
- 5) In binary to decimal conversion, each digit in the binary number represents a power of _____.
- 6) A half adder consists of _____ gates for sum and carry outputs.