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Question Paper Code: R2404

B.E./B.Tech. DEGREE EXAMINATION, NOV/DEC 2024

First Semester

Electronics and Communication Engineering

R21UEC204 BASIC ELECTRICAL AND INSTRUMENTATION ENGINEERING

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (5x 1 = 5 Marks)

1. The secondary winding of which of the following transformers is always kept closed? CO1-U
(a) Current transformer (b) Voltage transformer
(c) Power transformer (d) Step down transformer
2. Universal motors are used in CO1-U
(a) conveyor. (b) food mixer. (c) elevator (d) refrigerator
3. A 10 mA PMMC ammeter reads 4 mA in a circuit. Its bottom control spring snaps suddenly. The meter will now show _____ CO5-App
(a) 10 mA (b) 8 mA (c) 2 mA (d) Zero
4. Which of the following can be used to produce a square waveform? CO2-U
(a) Wien bridge oscillator (b) T oscillator (c) Hartley oscillator (d) Multivibrators
5. What is the purpose of sampling in DSO operation? CO2-U
(a) Control time base signal (b) Convert analog signal to digital
(c) Convert digital signal to analog (d) Visualize the signal on screen

PART – B (5 x 3= 15 Marks)

6. A capacitor having a capacitance of $10\mu\text{F}$ is connected in series with a non-inductive resistance of $120\ \Omega$ across a 100V, 50 Hz supply. Calculate current flowing in the circuit. CO3-App
7. List the applications of Synchronous motors. CO1-U

8. What is D' Arsonval movement? What are its features? CO2-U
9. What is Function Generator? CO2-U
10. How is the vertical axis of an oscilloscope deflected? How does this differ from the horizontal axis? CO2-U

PART – C (5 x 16= 80 Marks)

11. (a) (i) A resistance of $5\ \Omega$, an inductance of 10 mH and a capacitor of $200\ \mu\text{F}$ are connected in series and the combination is connected across a 230V, 50Hz supply. Calculate the current flowing through the circuit and the power factor. CO3-App (16)
- (ii) A coil of power factor 0.6 is in series with a $100\ \mu\text{F}$ capacitor. When connected to 50 Hz supply, the power drawn across the coil is equal to power drawn across the capacitor. Find the resistance and Inductance of the circuit.
- Or
- (b) In a series circuit containing pure resistance of $2.6\ \Omega$ and current and voltage are expressed as $i(t)=5\ \sin(314t+2\pi/3)$, $V(t)=15\ \sin(314t+5\pi/6)$. Find, CO3-App (16)
- a) impedance of the circuit
- b) inductance
- c) average power down by the circuit
- d) power factor
12. (a) Identify different stepping modes of stepper motor, compare the stepping modes and apply the concepts to choose the right step mode for the stepper motor for various applications. CO4 -App (16)
- Or
- (b) Apply the constructional features of synchronous motors suitable for Industrial applications. CO4-Ap (16)
13. (a) The ohmmeter uses a $5\ \Omega$ basic movement requiring a full scale current of 1mA. The internal battery voltage is 3V. The desired scale marking for half scale deflection is $2000\ \Omega$. Calculate (i) the values of current limiting resistor and zero adjust resistor (ii) maximum value of R_2 to compensate for a 10% drop in battery voltage (iii) the scale error at the half scale mark when zero adjust resistor is set as in (ii). CO 5-App (16)

Or

- (b) A basic d'Arsonval movement has an internal resistance, $R_m = 100\Omega$ and full scale current, $I_{fsd} = 1\text{mA}$. Convert into a multirange dc voltmeter with voltage ranges of 0-10V, 0-50V, 0-250V and 0-500V. CO5-App (16)
14. (a) Explain the construction of sine wave generator that generates sine waves with necessary diagram. CO2-U (16)
- Or
- (b) Explain the construction of pulse and square wave generator and derive the expressions for the time constants. CO2-U (16)
15. (a) Explain the internal structure and electrostatic focusing system of Cathode ray tube. CO2-U (16)
- Or
- (b) Explain any one of the special oscilloscope with neat block diagram. CO2-U (16)

