



ADITYA UNIVERSITY

B.Tech – I Semester End Examinations Supplementary – APR 2025

BASIC ELECTRICAL GADGETS AND INSTRUMENTS (Agricultural Engineering)

Time: 3 hours

Max. Marks: 50

Answer ONE question from each unit

All Questions Carry Equal Marks

All parts of the questions must be answered at one place only

UNIT-I

- 1 a Explain the concept of resonance in a parallel RLC circuit. Derive the condition for resonance. L2 CO1 [5M]
b In a parallel RLC circuit, $R=50\ \Omega$, $L=0.25\ \text{H}$ and $C=100\ \mu\text{F}$. If the supply frequency is $f=60\ \text{Hz}$, find Inductive reactance and capacitive reactance. Also check whether the resonance will occur or not. L3 CO1 [5M]
- (OR)**
- 2 a Derive the expression for Q-factor and explain its significance. L2 CO1 [5M]
b A series RLC circuit has $R=10\ \Omega$, $L=0.5\ \text{H}$ and $C=20\ \mu\text{F}$. Find, Resonance frequency and Impedance at resonance. L3 CO1 [5M]

UNIT-II

- 3 a Compare the star and delta configurations of three-phase systems in terms of: i) Phase current and line current ii) Applications and advantages. L2 CO2 [5M]
b Explain the method of measuring three phase power using single-wattmeter method L2 CO2 [5M]
- (OR)**
- 4 a Derive the formula for the power in a three-phase system using the two-wattmeter method. L2 CO2 [5M]
b Explain the practical applications of three-phase star and delta connections in power distribution and motor systems. L2 CO2 [5M]

UNIT-III

- 5 a With neat diagrams, explain how a capacitor filters out the AC ripples from the output of a rectifier. L2 CO3 [5M]
b Explain the operation of Full wave Rectifier with neat diagrams L2 CO3 [5M]
- (OR)**
- 6 a Explain the operation of a Zener diode as a voltage regulator. Draw the circuit diagram and derive the conditions for voltage regulation. L2 CO3 [5M]
b Explain the advantages and limitations of using a Zener diode as a voltage regulator. L2 CO3 [5M]

UNIT-IV

- 7 a Explain the structure and working principle of an Operational Amplifier (OP-AMP). L2 CO4 [5M]
b Discuss the ideal characteristics of an OP-AMP and explain how practical OP-AMPs deviate from these ideal characteristics. L2 CO4 [5M]

(P.T.O)

(OR)

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| 8 | a | Explain the process of minimization of logic circuits using K-maps. | L2 | CO4 | [5M] |
| | b | Discuss the working of an Exclusive-OR (XOR) gate and Exclusive-NOR (XNOR) gate. | L2 | CO4 | [5M] |

UNIT-V

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| 9 | a | Explain the working principle of a thermistor for temperature measurement. | L2 | CO5 | [5M] |
| | b | Discuss the advantages and limitations of thermistor compared to other temperature sensors. | L2 | CO5 | [5M] |

(OR)

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| 10 | a | Explain the working of Thermocouple. | L2 | CO5 | [5M] |
| | b | Explain the working of LVDT. | L2 | CO5 | [5M] |
