Code No. : 12223 AS N/O

# VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
*Accredited by NAAC with A++ Grade*

## B.E. II-Semester Advanced Supplementary Examinations, September-2023

### Basic Electrical Engineering

(Common to **N** : CSE, AIML & ECE **O** : Civil, Mech. & IT)

Time: **3 hours**

Max. Marks: **60**

*Note: Answer all questions from Part-A and any FIVE from Part-B*

### Part-A (10 × 2 = 20 Marks)

| Q. No. | Stem of the question | M | L | CO | PO |
|---|---|---|---|---|---|
| 1. | List the differences between ideal independent voltage source and current source? | 2 | 1 | 1 | 1,2 |
| 2. | Kirchhoff's current law is based on the law of conservation of charge. Justify? | 2 | 1 | 1 | 1,2 |
| 3. | Determine form factor and peak factor for the current waveform shown below?  | 2 | 2 | 2 | 1,2 |
| 4. | List the advantages of three phase AC circuits compared to single phase AC circuits? | 2 | 1 | 2 | 1,2 |
| 5. | Draw the speed-torque characteristics of DC shunt motor? | 2 | 1 | 3 | 1,2 |
| 6. | Give the classification of DC generators based on excitation? | 2 | 1 | 3 | 1,2 |
| 7. | Describe the purpose of earthing in electrical systems? | 2 | 1 | 4 | 1,2 |
| 8. | In a house, 4 light bulbs of 40 W each is used for 12 hours, 4 fans of 60 W each is used for 18 hours. Determine the energy consumed per two days in units? | 2 | 1 | 4 | 1,2 |
| 9. | A 3-phase 440 V, 2 pole, 50 Hz induction motor has 4% slip. Calculate the speed of rotor? | 2 | 2 | 5 | 1,2 |
| 10. | List any two applications of stepper motor? | 2 | 1 | 5 | 1,2 |

### Part-B (5 × 8 = 40 Marks)

| | | M | L | CO | PO |
|---|---|---|---|---|---|
| 11. a) | Find $V_0$ and power dissipated in all resistors in the circuit shown below using Nodal analysis?.  | 4 | 3 | 1 | 1,2 |

| | | | M | L | CO | PO |
|---|---|---|---|---|---|---|
| | b) | State maximum power transfer theorem. Derive the condition for the maximum power transfer to the load circuit? | 4 | 2 | 1 | 1,2 |
| 12. | a) | In single phase series RLC circuit, derive the expression for current, impedance, active power consumed and power factor of the circuit? | 4 | 2 | 2 | 1,2 |
| | b) | In a series RC circuit, the values of R = 200 $\Omega$ and C = 10 $\mu$F. A sinusoidal voltage of 50 Hz is applied and the voltage across the capacitance is 45 V. Calculate the voltage across the resistor and active power consumed by the circuit? | 4 | 3 | 2 | 1,2 |
| 13. | a) | Explain the constructional details of a DC machine with a neat sketch? | 4 | 2 | 3 | 1,2 |
| | b) | A 230 V DC shunt motor takes 5A current at no-load and runs at 1000 rpm. Calculate the speed when loaded and taking a current of 30 A. The armature and field resistances are 0.2 $\Omega$ and 230 $\Omega$ respectively. | 4 | 3 | 3 | 1,2 |
| 14. | a) | Explain the operating principle of transformer. Draw the phasor diagram of a practical transformer at lagging load? | 4 | 2 | 4 | 1,2 |
| | b) | Describe the significance of power factor in electrical circuits and explain static capacitor method of power factor improvement method in detail? | 4 | 3 | 4 | 1,2 |
| 15. | a) | Explain the production of rotating magnetic field in a three phase induction motor? | 4 | 2 | 5 | 1,2 |
| | b) | Describe the construction and working of BLDC motor with a neat schematic diagram? | 4 | 2 | 5 | 1,2 |
| 16. | a) | Find $V_0$ in the circuit shown below using Thevenin's Theorem? | 4 | 3 | 1 | 1,2 |



| | | | M | L | CO | PO |
|---|---|---|---|---|---|---|
| | b) | Determine the relation between phase and line quantities in three phase balanced star connection? | 4 | 3 | 2 | 1,2 |
| 17. | | Answer any *two* of the following: | | | | |
| | a) | Show that torque developed by DC motor depends on flux and armature current using appropriate derivation? | 4 | 3 | 3 | 1,2 |
| | b) | In a 50 kVA transformer, the iron loss is 500 W and full load copper loss is 800 W. Find the efficiency of the transformer with 0.8 p.f. lagging load for the following load conditions (a) full load and (b) half load? | 4 | 3 | 4 | 1,2 |
| | c) | Explain torque-slip characteristics of three phase induction motors. | 4 | 2 | 5 | 1,2 |

M : Marks;    L: Bloom's Taxonomy Level;    CO; Course Outcome;    PO: Programme Outcome

| | | |
|---|---|---|
| i) | Blooms Taxonomy Level – 1 | 20% |
| ii) | Blooms Taxonomy Level – 2 | 40% |
| iii) | Blooms Taxonomy Level – 3 & 4 | 40% |

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