DEPARTMENT OF

**ELECTRICAL AND ELECTRONICS ENGINEERING**

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| Date | 23 Feb 2023 | Maximum Marks | 10 +50 |
| Course Code | 22ES14D | Duration | 110 Mins |
| Sem | I Semester | CIE-II | |
| Basics of Electrical Engineering | | | |

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| **Q.No** | Part A – Quiz Questions | **Marks** | **COs** | **BT** |
|  | Define apparent power, active power and reactive power. | 2 | 1 | 1 |
|  | In a three phase power measurement by two watt-meter method, the power factor of the load is unity then the readings of the watt-meters are \_\_\_\_\_\_\_\_\_\_\_\_\_ | 1 | 2 | 2 |
|  | A single-phase load of 30 kW at 0.6 power factor lagging is fed from 200 V A.C. supply. Calculate the kVA and kVAr of the load. | 2 | 2 | 2 |
|  | The readings of two wattmeters in a balanced three-phase load are 836W and 224W, the latter reading taken after the current coil connection reversal. Calculate the power consumed by the load and the load power factor. | 2 | 3 | 2 |
|  | A 25 kVA transformer has 500 turns on the primary and 40 turns on the secondary windings. The Primary winding is connected to a 3 kV, 50 Hz ac source. The maximum flux in the core is \_\_\_\_\_\_\_\_\_. | 1 | 3 | 2 |
|  | If the active and apparent powers of an A.C. circuit are equal in magnitude, the power factor is \_\_\_\_\_\_\_\_\_. | 1 | 2 | 2 |
|  | Three equal impedances are first connected in Delta across a 3-phase balanced supply. If the same impedances are connected in Star across the same supply, then the power consumed will be \_\_\_\_\_\_\_\_\_\_\_\_. | 1 | 3 | 2 |

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| **Q.No** | Part B – Test Questions | **Marks** | **COs** | **BT** |
| 1a. | What is an impedance triangle? Draw the impedance triangle for a series *RL* circuit and series *RC* circuit. | 05 | 2 | 2 |
| 1b. | A resistance of 12 Ω, an inductance of 0.15 H and a capacitance of 130 μF are connected in series across a 100 V, 50 Hz supply. Calculate the impedance, current, phase angle and the power factor. | 05 | 2 | 2 |
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| 2a. | Derive an expression for the resonant frequency of a series RLC a.c. circuit. A coil having a resistance of 5 Ω and an inductance of 0.1 H is connected in series with a 50 μF capacitor across a 200 V, variable frequency supply. Determine the frequency at which the current will be a maximum. | 05 | 3 | 3 |
| 2b. | A coil having a resistance of 15 Ω and Inductance of 0.2 H is connected in series with another coil having a resistance of 25 Ω and Inductance of 0.04 H to a 230V, 50 Hz Supply. Determine,   1. The voltage across each coil 2. The power dissipated in each coil 3. The power factor of the whole circuit. | 05 | 3 | 3 |
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| 3a. | With the aid of a phasor diagram, obtain the relationship between the line and phase voltages of a three-phase star-connected System. | 05 | 3 | 3 |
| 3b. | A delta-connected load draws a current of 15 A at a lagging power factor of 0.85 from a 400 V, 3-phase, 50 Hz supply. Find the resistance and inductance of each phase. | 05 | 3 | 2 |
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| 4a. | With appropriate phasors, show that only two wattmeters are sufficient to measure power in a three-phase star-connected balanced load. | 05 | 3 | 3 |
| 4b. | Each of the two-wattmeter connected to measure the input to a 3-phase circuit reads 10kW on a balanced load when the power factor is unity. What does each instrument read when the power factor falls to   1. 0.866 lagging 2. 0.5 lagging,   The total 3-phase power remaining unchanged. | 05 | 3 | 3 |
|  | | | | |
| 5a. | State the differences between a core-type and a shell-type transformer. | 05 | 2 | 2 |
| 5b. | A Transformer installed in commercial complex has following specifications:  1100/230V, 50Hz, single-phase step-down transformer. The net cross sectional area =50 sq.cms. The maximum flux density in the core =1Tesla. Design the number of primary and secondary turns for the above specifications. | 05 | 2 | 2 |

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

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| Marks Distribution | Particulars | | CO1 | CO2 | CO3 | CO4 | L1 | L2 | L3 | L4 | L5 | L6 |
| Test | Max Marks | 2 | 24 | 34 | - | 2 | 33 | 25 |  |  |  |

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