GALGOTIAS UNIVERSITY

| ADMISSION NUMBER | | | | | | | | | | | | |
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# School of Engineering

**B.TECH Electrical Engineering**
**Mid Term Examination - May 2024**

**Duration : 90 Minutes**
**Max Marks : 50**

## Sem IV - G2UB402B - Electrical Machine I

*General Instructions*
*Answer to the specific question asked*
*Draw neat, labelled diagrams wherever necessary*
*Approved data hand books are allowed subject to verification by the Invigilator*

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|---|---|---|
| 1) | Why the core flux in a transformer is almost independent of load current? | K2 (2) |
| 2) | Define all day efficiency. How this efficiency of a transformer varies with load? | K1 (3) |
| 3) | Derive the condition for maximum efficiency and thus find the load current at which the efficiency is maximum. | K2 (4) |
| 4) | The No-Load current of a 4400/440 V, 1-Φ, 50 Hz transformer is 0.04 A. It consumes power 80 W at no-load when supply is given to LV side and HV side is kept open. Calculate the following: (i) Power factor of no-load current. (ii) Iron loss component of current. (iii) Magnetizing component of current. | K2 (6) |
| 5) | Identify and explain SCOTT connection for phase conversation in transformer. | K3 (6) |
| 6) | Make use of circuit diagram, explain how a two phase supply can be obtained from a three phase supply. Prove that three phase currents will be balanced, for a balanced upf load on 2-phase side. | K3 (9) |
| 7) | Show that open delta connection of a 3-phase transformer delivers only 57.7% of the VA rating of its normal Δ-Δ connection. | K4 (8) |
| 8) | A 20-kVA, 50-Hz, 2000/200-V distribution transformer has a leakage impedance of 0.42 + j 0.52 W in the high-voltage (HV) winding and 0.004 + j 0.05 W in the low-voltage (LV) winding. When seen from the LV side, the shunt branch admittance Y0 is (0.002 – j 0.015) at rated voltage and frequency. Analyze and draw the equivalent circuit referred to (a) HV side and (b) LV side, indicating all impedances on the circuit. | K4 (12) |
| | **OR** | |
| | The parameters of the equivalent circuit of a 150-kVA, 2400/240-V transformer are: R1 = 0.2 Ω, R2 = 2 * 10^–3 Ω X1 = 0.45Ω, X2 = 4.5 *10^–3 Ω Ri = 10 kΩ, Xm = 1.6 kΩ (as seen from 2400-V side) Calculate: (a) Open-circuit current, power and pf when LV is excited at rated voltage (b) The voltage at which the HV should be excited to conduct a short-circuit test (LV shorted) with full load current flowing. What is the input power and its pf? | K4 (12) |