

Mid-West University
Examinations Management Office
End-Semester Examinations -2080

Bachelor level/ B.E. Computer/ 3rd Semester

Time: 3 hours

Subject: Electrical Machine (EL431/EL502)

Full Marks: 50

Pass Marks: 25

- *Attempt all the questions*
- *Figures in the margin indicate full marks.*
- *Assume suitable values, with a stipulation, if necessary.*
- *Candidates are required to answer the questions in their own words as far as possible.*

- 1 (a) Define hysteresis loss and eddy current loss. A wrought iron bar 30cm long and 2cm in diameter is bent in to a circular shape with air gap of 2mm and cross-section area of $2.14 \times 10^{-4} \text{ m}^2$. It is wound with 800 turns of wire. Calculate the current required to produce a flux of 0.7 mwb in the magnetic circuit. Assume the value of $\mu_r = 6000$. [2+3]
- (b) What are instrument transformer and explain their types and also explain the operation principle of auto Transformer. [2+3]
- 2 (a) A 220V dc shunt motor draw an armature current of 30 amp at full load and run with a speed of 1500 rpm. Calculate the value of resistance required to be inserted in the armature circuit so that the speed drop to 900 rpm at a constant load. Given that $R_a = 0. \Omega$ and $R_f = 80 \Omega$. [5]
- (b) A 150 KVA, 2000 / 400V, 50HZ single phase transformer gave following results. [5]
Open circuit test: 400V, 1500 watt, 9Amp on L.V side with H.V open
Short circuit test: 30V, 2000 watts and 300 Amp on H.V side with L.V side short circuited.
Calculate the equivalent circuit parameters referred to secondary side and draw the equivalent circuit Diagram.
- 3 (a) Explain how rotating magnetic field is produced in a three phase induction motor. Also explain how this rotating Magnetic fields help the motor to rotate. [2.5+2.5]
- (b) An 10– pole, 50HZ, 3 phase induction motor develops a starting torque of 90N. The rotor winding has an impedance of $(0.6 + j3) \Omega$ per phase. Calculate the maximum torque developed by induction motor and also calculate at what speed rotor will developed maximum torque. [5]
- 4 (a) Explain Torque equation of DC motor. Explain the operating principle of dc motor. [2+3]
- (b) Define pole pitch and coil pitch. Derive the emf equation of synchronous generator. [1+1+3]
- 5 (a) Define excitation current. Explain the effect of excitation current in synchronous motor also draw v curve and Inverted v curve. [1+3+1]
- (b) Write short notes on:
i) Single phase induction motor.
ii) Alternating current series motor. [2.5+2.5]

The End