Mid-Western University

Examinations Management Office

Birendranagar, Surkhet

End Semester (Take- Home) Examinations -2077

Bachelor level/ B.E. Computer /3rd Semester — Full Marks : 60

Time: 8 hrs — Pass Marks : 30

Subject Electrical Machine (EL502)

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks. You have to send electronic copy of your answer sheet in PDF format to the email ***comp.ccer.exam@mwu.edu.np.***

Question Set-B

A. Objective questions: **[10X1=10]**

Please tick (✓) the best alternative

1. Permeability in a magnetic circuit corresponds to……..in an electrical circuit.
   a. Conductivity.
   b. Resistance.
   c. Resistivity.
   d. Conductance.

2. In a magnetic materials hysteresis loss take place primarily due to.
   a. Flux density lagging behind magnetizing force.
   b. It high retentively.
   c. Molecular friction.
   d. Rapid reversal of its magnetization.

3. In a transformer the energy is conveyed form primary to secondary.
   a. Through cooling coil.
   b. By the flux.
   c. Through air.
   d. All of the above.

4. The efficiency of a transformer, under heavy loads, is comparatively low because.
   a. Copper loss becomes high in proportion to the output.
   b. Voltage drop both in primary and secondary becomes large.
   c. Iron loss is increased considerably.
   d. Secondary output is much less as compared to primary input.

5. In a D.C generator, current to the external circuit form armature is given through.
   a. Solid connection.
   b. Slip rings.
   c. Commentator.
   d. None of the above.

6. In a D.C shunt motor, speed is.
   a. Inversely proportional to the armature current.
   b. Directly proportional to the armature current.
   c. Independent of armature current.
   d. Proportional to the square of the current.

7. In a D.C series motor, if the armature current is reduced by 50%, the torque of the motor will be equal to.
   a. 25% of the previous value.
   b. 100% of the previous value.
   c. 10% of the previous value.
   d. 50% of the previous value.

8. The frequency of the induced emf in an induction motor is.
   a. Lesser then the supply frequency.
   b. Same as the supply frequency.
   c. Greater than the supply frequency.
   d. None of the above.

9. Back emf in case of synchronous motor depends on the.
   a. Speed.
   b. Excitation given to the field winding.
   c. Both (a) and (b)
   d. None of the above.

10. Synchronous motors are generally not self-starting because.
   a. The direction of instantaneous torque reverses after half cycle.
   b. The direction of rotation is not fixed.
   c. Starts cannot be used on these machines.
   d. Starting winding is not provided on the machines.

B Short questions (Attempt any FOUR) [4x5= 20]

11. Explain the purpose of using iron core in a transformer. Also, explain the working principle of a single phase transformer.

12. Define hysteresis loss and eddy current loss. Mention the factors on which hysteresis loss depends. A magnetic circuit consists of a circular iron core having mean length of 14cm and cross–sectional area of 150mm^2. The air gap

is 4mm and the core has 850 turns of winding calculate the magnitude of current to be passed through the winding to produced air gap flux of .5 tesla . Given $\mu_0 = 6000$.

13. What is back emf. How does back emf play an important role in dc motor. Also explain speed torque characteristics of dc shunt motor.

14) Explain with necessary vector diagram how rotating magnetic field is produced in a three phase induction motor. Also explain how this rotating magnetic field helps the motor to rotate.

15. Why single phase induction motors are not self starting .Explain any two types of single phase induction motor.

C Long question (Attempt any TWO) [2x15=30]

16. a) Differentiate between three phase induction motor and synchronous motor. Drive the power – angle equation of synchronous machine having cylindrical rotor. (3+4)

b) Open circuit and short circuit test on a 50 KVA, 200 / 40V, 50HZ single phase gave following results :

No load test : 200V, 100 watt, 1Amp
Short circuit test : 15V, 25 watts and 10 Amp

i) Draw the equivalent circuit referred to primary and secondary sides.
ii) Calculate efficiency of transformer at half load with 0.76 lagging power factor. (8)

17. a) A 250V compound generator has armature, series field, shunt field winding of 0.6Ω, 0.4 Ω And 145Ω respectively. If this generator supplies 14KW at rated voltages, find the emf generated in the Armatures , armature current and efficiency of this generator when the machine is connected a) long shunt b) short shunt. Ignore armature reaction and consider the brush drop 1.5Vper brush. per brush. (7)

b) Define armature reaction .Explain its effect when the load is resistive and inductive in synchronous generator.(2+6)

18. a) Define efficiency and regulation of a transformer. Show for any loaded condition, net flux in the core Always remain constant on transformer. (2+4)

b) Explain the construction of synchronous machine and explain why synchronous motor is not a self starting Motor and also explain any one starting method of synchronous motor. (3+4+2)

THE END