



KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Agrl. Engg.) 2023 & Previous admissions
III Semester Final Examination – January 2025

Fpme.2105

Electrical Machines and Power Utilization (2+1)

Marks: 50
Time: 2 hours

- I Fill in the blanks (10x1=10)**
1. For a given DC generator, the voltage induced is directly proportional to the RPM and _____ per pole.
 2. The voltages induced in each winding of a 3-phase machine is called _____.
 3. The synchronous speed of a given induction machine is directly proportional to the _____ of the supply.
 4. The device that converts mechanical energy into electrical energy in terms of electrical machines is called _____.
 5. In _____ winding, the conductors are joined in such a way that their parallel paths and poles are equal in number.
- State True or False**
6. The theoretical speed of a DC series motor is infinite under no load
 7. Under series resonance, the phase difference between current and voltage across a purely resistive element is 90 degrees.
 8. Transformers have a lower efficiency than DC machines.
 9. The armature always carries AC current.
 10. Shaded pole motors are inherently self-starting.
- II Write short notes on ANY FIVE of the following (5x2=10)**
1. Electromotive Force.
 2. Types of Transformer losses.
 3. Condition for maximum efficiency of DC machine.
 4. What is back EMF of a DC Machine?
 5. What is armature reaction?
 6. Slip.
 7. Power Factor.
- III Answer ANY FIVE of the following (5x4=20)**
1. A single phase transformer has 500 primary and 1000 secondary turns. The net cross-sectional area of the core is 50 cm². If the primary winding is connected to a 50 Hz supply at 400 V, compute:
 - (a) Peak value of the flux density in the core
 - (b) Voltage induced in the secondary winding.
 2. Explain the theory of rotating magnetic field in AC machines.
 3. Explain the Torque-Slip Characteristic of an Induction Motor.
 4. Give a few differences between Squirrel-cage and Wound Rotor induction motor.
 5. Explain Regenerative Braking in the context of DC motors.
 6. What are Polyphase Circuits? Explain the advantages of using them.
 7. Explain the concept of Series and Parallel Resonance and highlight the difference between the two.

IV

Write an essay on ANY ONE of the following

(1x10=10)

1. Write in detail about the types of DC motors and their voltage equation.
2. Explain in depth how Short Circuit test is used to determine copper losses in the transformer at full load.
