KERALA AGRICULTURAL UNIVERSITY
B. Tech. (Agrl. Engg.)
III Semester Final Re - examination – February 2026
2023 & Previous Admissions

Fpme.2105   **Electrical Machines and Power Utilization (2+1)**   **Marks: 50**
Time: 2 hours

I   **Fill in the blanks**   (10x1=10)
1. A transformer is rated in ………….
2. In the speed control method DC shunt motor, the control method that provides speed below the rated speed is ………………
3. In an ideal transformer, the core loss is …………...
4. At series resonance, the power factor is …………….
5. While connecting RYB terminals of motor to RYB terminals of supply, a student connected motor's RYB terminal to YBR of the supply. The direction of the motor is …………..

State True or False
6. Parallel resonant is sometimes referred as rejector circuit.
7. Short circuit test of a transformer determines the constant losses.
8. If the rotor of an induction motor is rotated at the same speed as that of the stator field then there will no induced emf in rotor.
9. A wave wound DC motor will have same number of parallel path as the number of pole.
10. In purely capacitive circuit connected to an ac source, the current lags the voltage by 90^0.

II   **Write short notes on ANY FIVE of the following**   (5x2=10)
1. The total loss of a specimen of steel is found to be 1200 W at 50 Hz. If the flux density is kept constant and frequency is raised to 100 Hz, the loss becomes 3500 W. Calculate the following:
   (i)   Eddy current loss
   (ii) Iron loss
2. Define the following:
   (i)   All day efficiency
   (ii) Voltage regulation
3. Derive the EMF equation of a DC motor.
4. Write six disadvantages of low power factor.
5. The OCC data of a DC generator at 1800 rpm is as below:

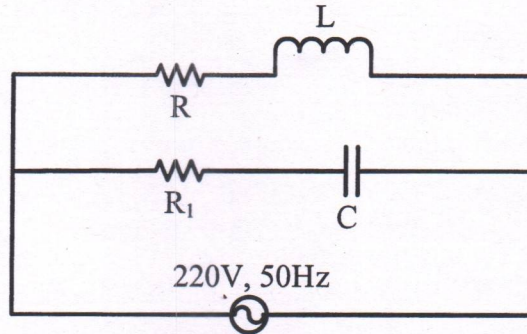| V_{oc} (V)	8	40	74	113	152	213	234	248	266	278
I_f (A)	0	0.5	1.0	1.5	2.0	3.0	3.0	4.0	5.0	6.0

The field of the generator is shunt connected
   (i)   Draw the OCC characteristics of DC generator
   (ii) Find the field resistance and field current for a no-load voltage of 250 V.
6. A 4 pole, 50 Hz 3 phase induction motor when running on full load develops a useful torque of 100 Nm while the rotor emf is observed to make 120 cycles/min. Calculate
   (i)   Slip
   (ii) Speed of the motor
7. An iron choke coil takes 6 A when connected to 24 V DC supply and takes 10 A from 60 V, 50 Hz supply. Determine:
   (i)   Resistance and inductance of the coil
   (ii) The power drawn by the coil

III   **Answer ANY FIVE of the following**   **(5x4=20)**

1. Discuss the open circuit test of a transformer.
2. Explain the construction of an induction motor.
3. A 100 kW, 400 V, separately excited DC motor runs at 600 rpm. It has 800 lap-connected conductors. The full load armature copper loss is 4 kW. Calculate the useful flux/pole.
4. The circuit shown below is at resonance, prove that the resonance frequency is given by $f_r =$

$$\frac{1}{2\pi\sqrt{LC}}\sqrt{\frac{CR^2-L}{CR_1^2-L}}$$

5. Explain the construction of an ideal transformer.
6. Explain the double revolving field theory.
7. State the Flemings Right Hand Rule. What is its significant?

IV   **Write an essay on ANY ONE of the following**   **(1x10=10)**

1. In order to create revolving magnetic field, at least two alternating currents are needed. Justify the statement with relevant type of ac motors to support your answer.
2. With relevant circuit diagram and necessary equations, describe various speed control methods of separately excited DC motor.

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