ARYA COLLEGE OF ENGINEERING,
JAIPUR GUESS PAPERS
(II B. Tech. III Semester 2025- 2026)

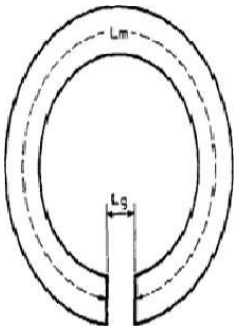
3EE4-07ELECTRICAL MACHINE-1

Unit 1:

Short Answers : (2 Marks Each)

Q. 1 Write biot savart's law and its application areas.
Q. 2What do you mean by following terms: (i)MMF (ii)reluctance
Q. 3 Write Ampere circuital law and its application areas.
Q. 4What is the influence of highly permeable materials on the magnetic flux lines.
Q. 5Explain the effect of air gap on reluctance and machine construction.
Q. 6 Explain how fringing and leakage flux is different from useful flux.

Descriptive Answers: (5 to 20 Marks)

Q. 1A mild steel ring has mean diameter of 20 cm and area of 50 cm2 for μr=800. Calculate: (i) Reluctance, (ii) current required in 200 turn coil to produce a flux of 1mwb in the ring.
Q. 2 With the help of neat circuit diagram draw the magnetic field lines around the bar magnet and current carrying coil.
Q. 3 What are the different types of magnetic materials?
Q. 4 Explain the analogy between electrical and magnetic circuit in brief.
Q. 5 What is energy balance equation in electromechanical system? Also State Ampere's law.
Q. 6 For the iron ring shown in fig below. μr=500, radius of core=2.35cm, flux density is 0.8x103wb .calculate the current required to excite the coil of 500 turns. 

ARYA COLLEGE OF ENGINEERING,
JAIPUR GUESS PAPERS
(II B. Tech. III Semester 2025- 2026)

3EE4-07ELECTRICAL MACHINE-1

Unit 2:

Short Answers: (2 Marks Each)

Q. 1 Through derivation proves that for linear system field energy is equal to co-energy.
Q. 2 Differentiate between linear and nonlinear magnetic circuits.
Q. 3 Draw the B-H curves of magnetic materials- flux-linkage v/s current characteristic of magnetic circuits for linear and nonlinear magnetic circuits.
Q. 4 what does finger and thumb represent in Flemings right hand rule?
Q. 5 Give examples of linear & Non linear magnetic circuits.
Q. 6 Write a short note on lifting magnet along with its working.

Descriptive Answers: (5 to 20 Marks)

Q. 1 Using derivations prove that torque as a partial derivative of stored energy with respect to angular position of a rotating element.
Q. 2 Derive the expression of field energy and electromagnetic torque in singly excited system.
Q. 3 Show that in a singly excited system the mechanical work done is equal to the area enclosed between the characteristics in initial and final position.
Q. 4. Explain the working of galvanometer in brief
Q. 5 Derive the expression of field energy and electromagnetic torque in doubly excited system.
Q. 6 Prove that the force and Torque as a partial derivative of stored energy with respect to position of a moving element.

Unit 3:

Short Answers: (2 Marks Each)

Q. 1 Derive the expression for induced emf in a Dc Generator. Also explain the types of armature windings
Q. 2 A 4 pole wave –wound armature has 720 conductors and is rotated at 1000 rev/min. if useful flux is 20mWb, calculate the generated voltage.
Q. 3 What do you mean by linear commutation? Why it is required for successful commutation.
Q. 4 Explain, why all electric machines, when operating develops torque and generate voltage at the same time.
Q. 5 Explain the classification of various DC generators with circuit diagram.
Q. 6 Explain the air gap flux density distribution with armature reaction.

ARYA COLLEGE OF ENGINEERING,
JAIPUR GUESS PAPERS
(II B. Tech. III Semester 2025- 2026)

3EE4-07ELECTRICAL MACHINE-1

Descriptive Answers: (5 to 20 Marks)

Q. 1 Explain the basic construction of DC machine with circuit diagram and working of each component in brief.
Q. 2 What is armature reaction? Describe the effects of armature reaction on the operation of dc machines. How the armature reaction is minimized.
Q. 3 A series motor has a resistance of 0.5 ohm, it runs at a speed of 1500 RPM. When taking 10A from 200V supply. Find the speed, at which it will run when taking 20 A from the same supply? Assume No Saturation.
Q. 4 Write the derivation of torque equation in DC Motor.
Q. 5 A short shunt compound d.c. generator delivers 100A to a load at 250 V. The generator has shunt field, series field and armature resistance of 130 Ω, 0.1 Ω and 0.1 Ω respectively. Calculate the voltage generated in armature winding. Assume 1 V drop per brush.
Q. 6 What do you mean by commutation? Explain in detail with its need. Also mention the ways to reduce reactance voltage.

ARYA COLLEGE OF ENGINEERING,
JAIPUR GUESS PAPERS
(II B. Tech. III Semester 2025- 2026)

3EE4-07ELECTRICAL MACHINE-1

Unit 4:

Short Answers: (2 Marks Each)

Q. 1Explain the working principle of DC motor.
Q. 2 Mention the application areas of various dc Motor.
Q. 3Explain voltage builds process in dc shunt machine.
Q. 4Draw speed torque characteristics of various types of DC Motor.
Q. 5Explain why series DC Motor is never started in no load condition.
Q. 6Explain the concept of back emf and its role in dc motor.

Descriptive Answers: (5 to 20 Marks)

Q.1 Explain the Hopkinson's method of testing the dc machine. Differentiate this model with Swinburne's method of testing of dc machine. Can this method be applied on dc series machine?
Q.2 A250V DC shunt motor having an armature resistance of 0.25Ω carries an armature current of 50Aandrunsat750rpm. If the flux is reduced by 10 %, find the speed. Assume that the load torque remains the same
Q.3 Explain the 3-point starter with circuit connection. Also state the drawbacks of the same along with comparison with 4- point starter.
Q.4 A shunt generator delivers 50 KW at 250 V when running at 400 rpm. The armature and field resistance are 0.02 and 50 Ω respectively. Calculate the speed of the machine when running as a shunt motor and taking 50 KW input at 250 V. Allow 1 V per brush for contact drop.
Q.5 Explain speed control of DC Motors. (Any two method) in brief.
Q.6 Explain various losses in DC Machine and compute the condition for maximum efficiency.

ARYA COLLEGE OF ENGINEERING,
JAIPUR GUESS PAPERS
(II B. Tech. III Semester 2025- 2026)

3EE4-07ELECTRICAL MACHINE-1

Unit 5:

Short Answers: (2 Marks Each)

Q.1 In what way a practical transformer different from an ideal transformer? Develop an equivalent circuit for practical transformer.
Q.2 Explain the working of single phase transformer with equivalent circuit diagram.
Q.3 A 200 KVA, Single phase transformer with a voltage ratio of 6359/660 V has the following winding resistances and reactances: R1=1.56 Ω; R2=0.016 Ω; X1=4.67 Ω; and X2=0.048 Ω. Calculate the resistance and reactance of the transformer referred to the hv winding.
Q.4 Explain open circuit test in brief.
Q.5 Explain volt ampere relations between two winding transformer and auto transformer.
Q.6 Define transformer efficiency and mention the condition for maximum efficiency.

Descriptive Answers: (5 to 20 Marks)

Q. 1 Write short note on open delta and Scott connection.
Q. 2 Explain voltage regulation with phasor diagram at lagging pf. Also derive the expression for the same.
Q. 3 Explain the double –star connection scheme for 3 phase to 6-phase transformation with phasor diagram.
Q. 4 An 11500/2300 V transformer is related at 100 KVA as a two winding transformer. If the windings are connected in series to form an auto transformer, what will be the possible voltage relations and output power. Also calculate saving in conductor material.
Q. 5 Explain the working Principle, Construction and operation of single phase transformer. Also draw and explain its equivalent circuit with phasor diagram.
Q. 6 Explain parallel operation of single and three phase transformer and condition for parallel operation.