

Dec-24-0090 (CBCS/NEP)
EEPC-311 (Electrical Machines-I)
(Common EEEPC-313)

B.Tech. 3rd

Time : 3 Hours

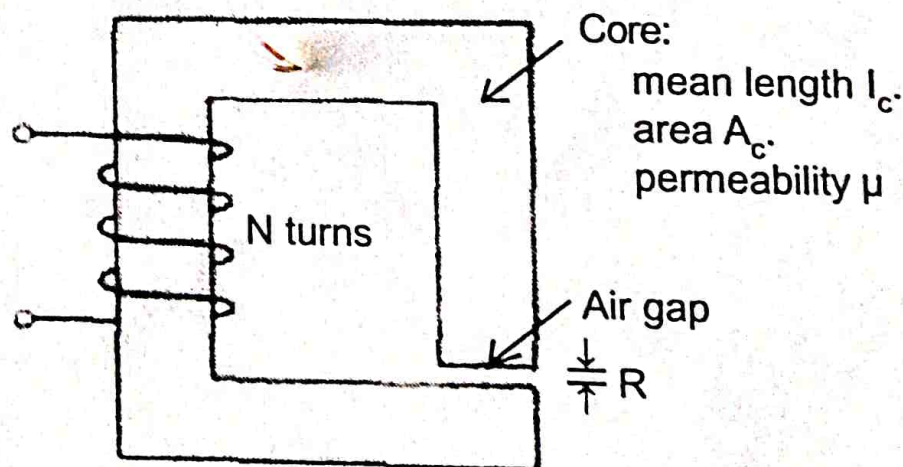
Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Candidates are required to attempt five questions in all selecting one question each from sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculator is allowed.

SECTION - A

1. Consider the magnetic circuit as shown in figure below. Assuming infinite core permeability, calculate (a) the number of turns required to achieve an inductance of 12 mH and (b) the inductor current which will result in a core flux density of 1.0 T. (10)



2. Define magnetic reluctance. Draw the typical normal magnetization curve of ferromagnetic material. (10)

SECTION - B

3. Explain commutation with appropriate diagrams. (10)
4. A 100kW, 250 V, 400 A, a long shunt compound generator has an armature resistance of 0.025 ohms. There are 1000 shunt field turns per pole and 3 series field turns per pole. The series field is connected in such a fashion that positive armature current produces direct-axis MMF which adds to that of the shunt field. Compute the gross MMF at the rated terminal current when shunt field current is 4.7A and speed is 1150 rpm. (10)

SECTION - C

5. A 200 V, DC motor has an armature resistance of 0.5 ohm. It is drawing an armature current of 20 A drawing a certain load. Calculate the induced emf in the motor under this condition. (10)
6. Explain the braking methods in DC motors. (10)

SECTION - D

7. Explain, in detail, the short circuit and open circuit tests in a transformer, along with appropriate equivalent circuits. (10)
8. A 460-V:2400-V transformer has a series leakage reactance of 37.2Ω as referred to the high-voltage side. A load connected to the low-voltage side is observed to be absorbing 25 kW, unity power factor, and the voltage is measured to be 450 V. Calculate the corresponding voltage and power factor as measured at the high-voltage terminals. (10)

SECTION - E (Compulsory)

9. (a) Write the advantages of auto-transformers.
(b) Define slip and write its formula.

[P.T.O.]

- (c) What is transformer ratio?
- (d) Explain the applications of dc series motor.
- (e) Write two differences between single phase and auto transformers.
- (f) What is the role of laminations in a transformer?
- (g) Write two differences in open circuit and short circuit test in a transformer.
- (h) Mention two essential parts of a transformer.
- (i) What is coil pitch, fractional pitch and full pitch coil?
- (j) What is the role of interpole winding? (10×2=20)