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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION-Sep.2018

B.Tech.-III Semester (ECE, Civil)

COURSE CODE: 10B11EC311 MAX. MARKS: 15

COURSE NAME: Electrical Machines and Instruments

COURSE CREDITS: 04 MAX. TIME: 1 Hr

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Q.1 a) What do you mean by magnetic leakage and fringing as applied to electrical machines? (2)

b) A ring having a mean diameter of 20 cm and a cross-sectional area of 10 cm^2 is made up of semicircular sections of cast iron and cast steel with each joint having reluctance equal to an air gap of 0.1 mm, as shown in Fig. 1. Determine the ampere turns required to produce a flux of 0.9 mWb. The relative permeability of cast iron and cast steel are 166 and 800, respectively. Neglect fringing and leakage effects. (3)

Q2. a) State the conditions to be satisfied by a transformer to be 'ideal'. How is concept of an 'ideal transformer' useful in understanding the behavior of a practical transformer? (2)

b) In a 40-kVA, 11-kV/200-V, single-phase transformer, the iron and copper losses are 300W and 400 W, respectively under rated conditions. Calculate (i) the efficiency at unity power factor at full load, (ii) the load for maximum efficiency, and (iii) the iron and copper losses for this load. (3)

Q.3 a) Derive the condition for maximum voltage regulation of the single-phase transformer. (2)

b) Derive the emf equation of the DC generator. Also describe the armature reaction. (3)

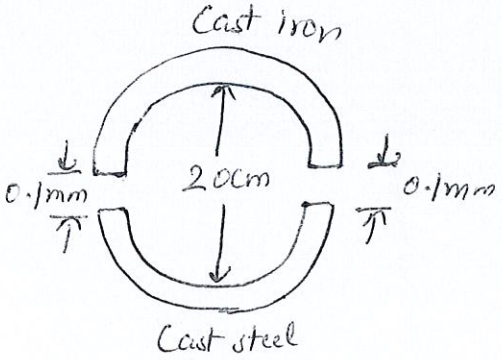

Fig. 1