

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST-1 EXAMINATION- September 2016
B. Tech III SEM.(ECE/CIVIL)

COURSE CODE: 10B11EC311

MAX. MARKS: 15

COURSE NAME: ELECTRICAL MACHINES AND INSTRUMENTS

MAX. TIME: 1Hr

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

- Q.1 a) Define magnetic permeability, mmf and reluctance in magnetic circuits. Also explain the analogy between electric and magnetic circuits. (3)
- b) An iron ring with a mean diameter of 75 cm has an air gap of 2 mm and a winding of 250 turns. Find the flux density if the relative permeability of the iron is 400 when a current of 2.75 A flows through the winding. (2)
- Q.2 a) A single phase, 20-kVA, 2000-V/200-V transformer has following parameters : $R_1=13 \Omega$, $X_1=20 \Omega$, $R_2=0.5 \Omega$, $X_2=0.25 \Omega$, $R_0=1200 \Omega$ and $X_0=5000 \Omega$. Determine: (i) the equivalent resistance and leakage reactance as referred to the secondary winding, (ii) the input current with secondary terminals open-circuited, and (iii) the input current when the secondary supplies a load current of 25 A at a power factor of 0.8 lagging. (3)
- b) State the conditions to be satisfied by a transformer to be ideal. (2)
- Q.3 a) Derive the emf equation of DC generator. Explain load characteristics of DC generators. (3)
- b) A 8-pole, 500V, dc shunt motor has 750 lap-connected conductors on its armature. The full-load armature current is 50 A and the flux per pole is 0.03 Wb. The armature resistance is 1.2Ω and the contact drop is 1 V per brush. Calculate the full-load speed of the motor. (2)