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END TERM EXAMINATION- DEC. 2018

B.Tech. III Sem.

COURSE CODE: 10B11EC311

MAX. MARKS: 35

COURSE NAME: ELECTRICAL MACHINES AND INSTRUMENTS

COURSE CREDIT: 04

MAX. TIME: 2 HR.

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

- Q1.** (a) Explain, why the transformer is having highest efficiency among the electrical machines. [1]  
(b) In a magnetic circuit, define the leakage factor. Also explain in brief, Kirchhoff's law for magnetic circuits. [2]  
(c) A 11-kV/400-V distribution transformer takes a no-load primary current of 1 A at a power factor of 0.24 lagging. Find: (i) core-loss current and magnetizing current, (ii) the iron loss. [2]
- Q-2.** (a) What are merits and demerits of spring control over the gravity control method for obtaining controlling torque in the instrument? [2]  
(b) Describe the method of extending the range of voltmeter and ammeter? A moving coil instrument gives a full-scale deflection of 10 mA when a potential difference of 10 mV is applied across its terminals. Show how will you use the instrument to measure (i) currents up to 100 A, and (ii) voltage up to 500 V [3]
- Q3.** (a) What is relevance of damper winding in the working of 3-phase synchronous machine? [2]  
(b) A 4-pole, 200-W, 220-V, 50-Hz capacitor-start single-phase induction motor takes a full-load line current of 4.6 A at a power factor of 0.6 (lagging) while running at 1440 rpm. Determine (a) its slip at full-load, (b) its efficiency, and (c) its full-load torque. [3]
- Q-4.** (a) In what way accuracy and precision can be differentiated? Suppose two resistors  $R_1$  and  $R_2$  are connected in series. Individual resistance measurements using digital multimeter give  $R_1=99.745 \Omega$  and  $R_2=180.6 \Omega$ . Calculate the total resistance to the appropriate number of significant figures. [2]  
(b) What do you understand with voltmeter loading? Explain with an example. [3]
- Q-5.** (a) What are Lissajous patterns? How these patterns can be used for the measurement of ratio of input signal frequencies and relative phases? [3]  
(b) Explain, why starting torque in a single phase induction motor is zero. Explain the double field revolving theory for the explanation of its working. With the help of double field revolving theory, give the torque-speed curve of single phase induction motor. [4]
- Q-6.** (a) Explain in brief the working and applications of stepper motor. Describe with neat diagrams the full step operation of VR-stepper motor when moving in clockwise direction. [4]  
(b) Explain the working principle and construction of the following:  
(i) Thermocouple (ii) Strain gauge (iii) Radiation Pyrometers (iv) LVDT Transducer [4]