BACHELOR OF ENGINEERING IN

COMPUTER SCIENCE AND ENGINEERING EXAMINATION, 2019

(2nd Year, 1st Semester)

ELECTRICAL TECHNOLOGY

Time: Three Hours   Full Marks: 100

(Part-I carries 34 marks)

Use a separate Answer-script for each Part

PART-I

Answer *any two* questions

Two marks are reserved for neat and well organized answer script

1. a)   Compare and contrast between electric and magnetic circuit. Explain what do you understand by the terms "leakage" and "fringing" related to magnetic flux.   8

   b)   Fig. 1 shows the dimensions of a cast steel frame.
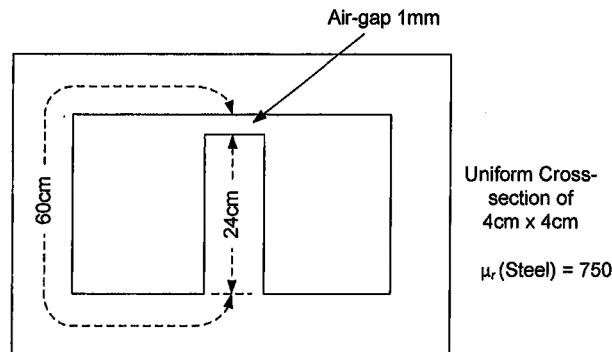

Fig. 1

   Find the current required for a 1000 turns coil wound around the central limb to produce a total flux of 1.6mWb in the air-gap.   8

2. a)   In a three-phase alternating current supply prove that, in a particular case, $I_L = \sqrt{3}I_{PH}$, where the symbols have usual meanings.   4

   b)   Give the principle of power measurement in a balanced three phase three wire system by using two wattmeters. Accompany your answer with a neat circuit and phasor diagram.   6

   c)   Three star-connected impedances $Z_1 = 20 + j40\ \Omega$ per phase are in parallel with three delta-connected impedances $Z_2 = 30 - j150\ \Omega$ per phase. The line voltage is 400V. Find the line current, power-factor and true power taken by the combination.   6

[Turn over

3. a)   With a neat drawing, explain the construction and working principle of (i) DC and (ii) AC/DC deflecting type measuring instrument.   10

   b)   A PMMC instrument has a resistance of 1000Ω and FSD for a current of 100μA. Draw a schematic in order to make a multi-range ammeter of 10, 20, 40 and 80A. Calculate the value of shunt resistances.   6
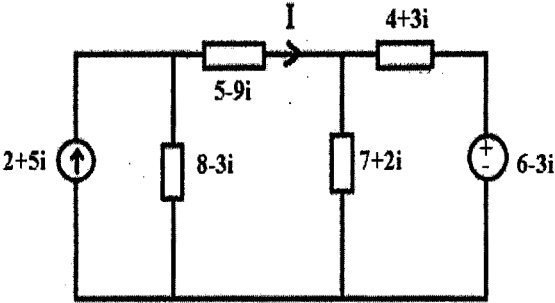
—— O ——

Ex/CSE/Etech/EE/T/216A/2019

B.E. COMPUTER SCIENCE ENGINEERING SECOND YEAR FIRST SEMESTER EXAMINATION, 2019

SUBJECT: ELECTRICAL TECHNOLOGY

Time :Three hours

Full Marks 100
Part I : 34Marks
Part II: 66 Marks

Use a separate Answer-Script for each part

No. of question	Part II (66 Marks) Answer any *FOUR* questions. Two marks reserved for neatness and well organized answer.	Marks
1.a)	Define Transformer. Explain the working principle of transformer.	2+2
b)	A 5 kVA, 1000/200 V, 50 Hz single phase transformer gave the following test results: OC test: 200V, 1.2A, 90W SC test: 50V, 5A, 110 W Determine the equivalent circuit parameters of the transformer as referred to the low voltage side.	8
c)	Draw the phasor diagram for a single phase practical transformer on lagging load.	4
2.a)	State and explain Thevnin's theorem.	1+2
b)	Prove Maximum Power transfer theorem for DC electrical network.	3
c)	Find the value of "I" in the circuit given below.	10
3.a)	Derive the torque equation of a DC motor.	3
b)	Explain with proper circuit diagrams the different methods of excitation of DC machines.	4
c)	A 6 pole wave connected DC machine has 300 conductors and runs at 1800 rpm. The useful flux per pole is 0.015 Wb. The current through the armature is 160A. Find the emf and torque developed.	4
d)	A 250V DC shunt motor has armature resistance of 0.5 Ohm and field resistance of 250 Ohms. When driving a constant torque load at 600 rpm, the motor draws 21A. What will be the new speed of the motor if an additional 250 Ohm is inserted in the field circuit?	5
4.a)	Show that a rotating magnetic field of constant magnitude is generated if a balanced three phase supply is applied to balanced three phase windings.	5
b)	Explain the principle of operation of three phase induction motor.	3
c)	For a three phase induction machine, maximum torque is twice the full load torque and starting torque is 1.6 times the full load torque. In order to get a full load slip of 5%, calculate the percentage reduction in rotor circuit resistance. Neglect stator impedance.	4
d)	What are the different methods of starting a three phase induction motor? Explain any one method in brief.	4

[Turn over

B.E. COMPUTER SCIENCE ENGINEERING SECOND YEAR FIRST SEMESTER EXAMINATION, 2019
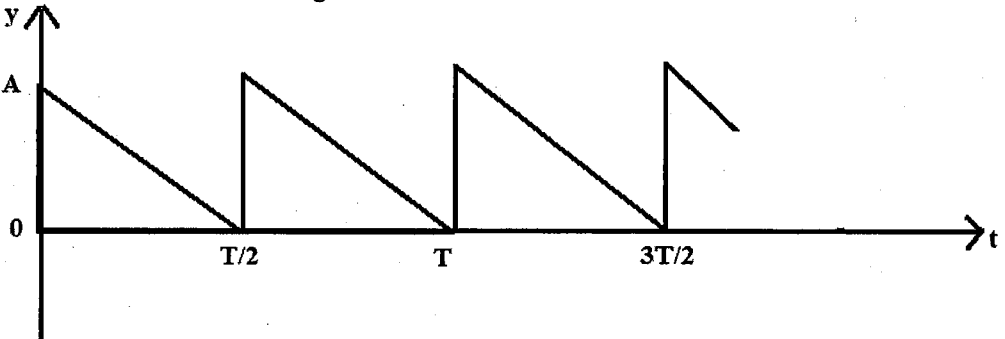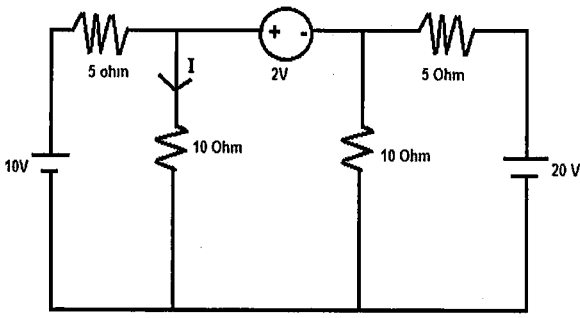
SUBJECT: ELECTRICAL TECHNOLOGY

Time :Three hours

Full Marks 100

Part I : 34Marks

Part II: 66 Marks

Use a separate Answer-Script for each part

5.a)	Derive the EMF equation of an ideal two winding single phase transformer.	4
b)	A 4 pole three phase induction motor is running at 4% slip at full load. If the speed of motor is 720 rpm, find the supply frequency.	3
c)	Draw No-Load, external, armature and load characteristics of a separately excited DC generator.	4
d)	A 230V DC shunt machine has armature resistance of 0.5 Ohm and field resistance of 115 Ohms. Find the ratio of speed as a generator to the speed as a motor. Line current is 40A.	5
6.a)	Define RMS value and average value of an alternating quantity.	2+2
b)	Define peak factor and form factor of an alternating quantity. Find out the peak factor and form factor of the waveform given below:	2+5
c)	Find out the value of current "I" in the given circuit.	5