Form A: Paper-setting Blank

Ref. No. ME/EE/T/114/2019(Old)

B.E. Mechanical Engineering 1st year, 1st semester **Old** **EXAMINATION, 20** 19

(1st/~~2nd~~ Semester/~~Repeat/Supplementary/Annual/Bi-Annual~~)

SUBJECT.... Basic Electrical Engineering .....

(Name in full)

PAPER.....

Time : ~~**Two hours**~~**/Three hours/**~~**Four hours/Six hours**~~

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part-I Answer any five questions (3 × 16=48, 2 marks for organized answers)	Marks
1. a)	What do you mean by magnetic circuit?	2
b)	Explain the significance of hysteresis curve (B-H) for a magnetic material?	4
c)	A toroid is composed of three ferromagnetic materials and is equipped with a coil having 100 turns as depicted in Fig.1 Material a is a nickel-iron alloy having a mean arc length of 0.2 m. Material b is medium silicon steel and has a mean arc length of 0.3 m. Material c is of cast steel having a mean arc length equal to 0.1m. Each material has a cross-sectional area of 0.002 m^2. Fig.2 shows corresponding B-H curves of the materials. (i) Find out the magnetomotive force needed to establish a magnetic flux of 5 X 10^{-4} Wb. (ii) What current must be made to flow through the coil? (iii)Compute the relative permeability and reluctance of each ferromagnetic material. An iron ring of mean length 40 cm has an air gap of 3 mm and a winding of 200 turns. If the permeability of the iron core is 400 when a current of 1 A flows through the coil, find the flux density. If this entire material b is removed and mean arc length of material c has been changed to 0.3 m , then find out (i) to (iii) for the same flux value of 5 X 10^{-4} Wb.	10

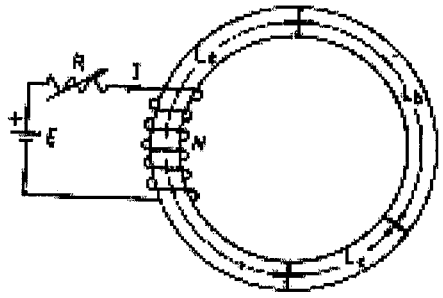


Fig.1

[Turn over

Form A: Paper-setting Blank

Ref. No. ME/EE/T/1.14/2019(Old)

B.E. Mechanical Engineering 1st year, 1st semester **Old** **EXAMINATION, 2019**

(1st/~~2nd~~ Semester /~~Repeat/Supplementary/Annual/Bi-Annual~~)

SUBJECT....Basic Electrical Engineering....

(Name in full)

PAPER.....

Full Marks 100

Time : ~~Two hours~~/Three hours/~~Four hours/Six hours~~

(50 marks for each part)

No. of questions		Marks

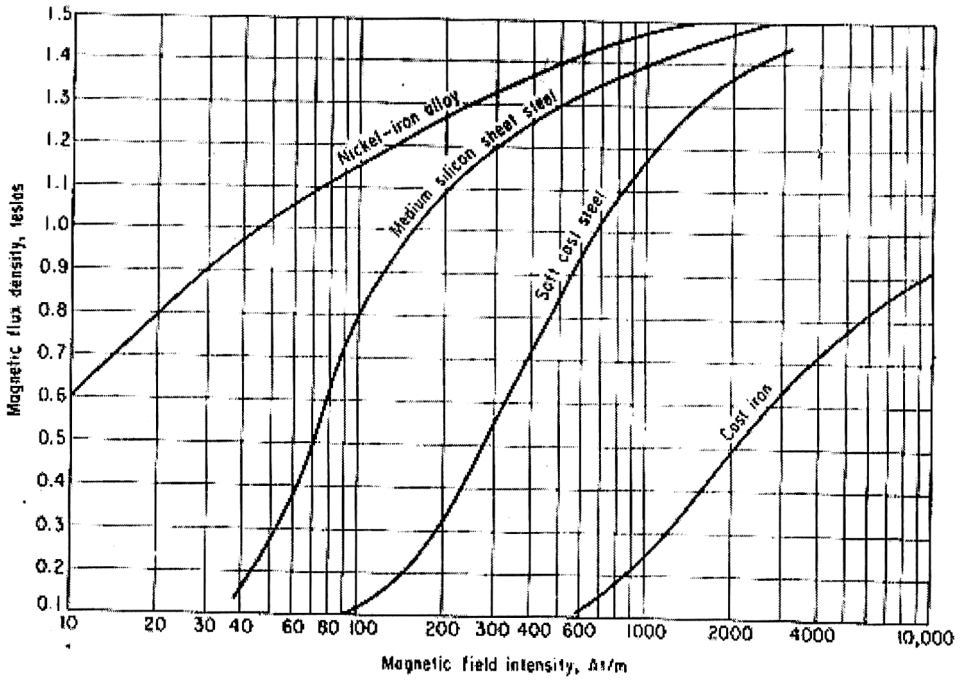


Fig.2

Form A: Paper-setting Blank **Ref. No. ME/EE/T/1.14/2019(Old)**

B.E. Mechanical Engineering 1st year, 1st semester **Old** EXAMINATION, 20 19

(1st/~~2nd~~ Semester /~~Repeat/Supplementary/Annual/Bi-Annual~~)

SUBJECT.... Basic Electrical Engineering .....

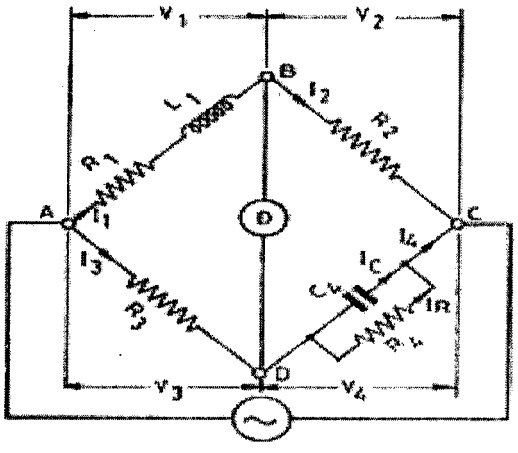
(Name in full)

PAPER.....

Full Marks 100

Time : ~~Two hours~~/Three hours/~~Four hours/Six hours~~ **(50 marks for each part)**

No. of questions			Marks
2.	a)	What do you mean by of power system?	4
	b)	Discuss about the evacuation of electrical power from the thermal power station to the service mains, with the help of a schematic diagram.	12
3.	a)	What do you mean by auxiliary power for a power generating station?	4
	b)	How the auxiliary power is distributed in a conventional coal fired thermal power station?	8
	c)	What is the basic classification of measuring instruments?	4
4.	a)	What are the fundamental parameters considered while characterizing measuring instruments?	6
	b)	Compare between PMMC, moving iron and dynamometer type instruments on the basis of their operating principle, measuring quantity,control and damping torque generation and linearity of scale.	10
5.	a)	A cast steel magnet has an air gap of length 4mm and an iron path of 100 cm. Find the number of ampere turns necessary to produce a flux density of 3 Wb/m^2. The relative permeability of cast steel is 1000. Neglect leakage and fringing.	4
	b)	Compare a Electric Circuit with Magnetic Circuit.	4
	c)	In the shown Maxwell-Wien Bridge findout the expressions of self inductance L_1 & its resistance R_1 as the functions of other bridge parameters. Hence, also find the Q Factor of the coil.	8

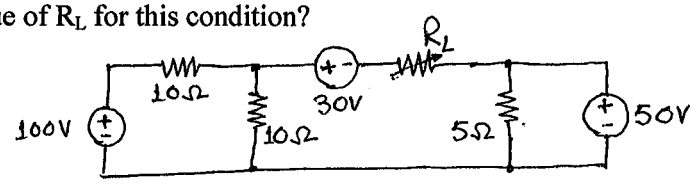
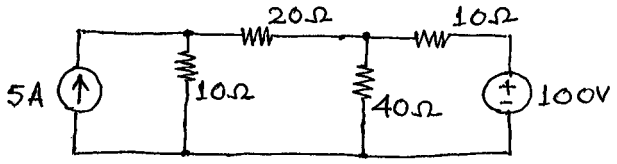
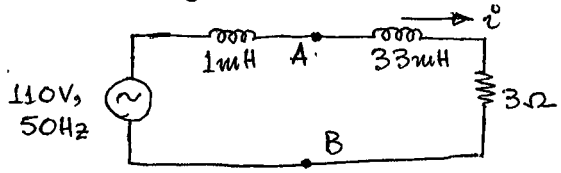


Ref. No.: Ex/ME/EE/T/114/2019 (Old)

B.E. MECHANICAL ENGINEERING FIRST YEAR FIRST SEMESTER EXAM 2019 (Old)
BASIC ELECTRICAL ENGINEERING

Time : 3 hrs | **Full Marks : 100** | **50 for this part**

Part - II
Use Separate Answer scripts for each Part
Answer any **three (03)** questions.
Two (02) marks reserved for neat and well organised answers and answer script.

Ques No		Marks
1.	(a) State and explain Superposition Theorem with suitable example.	8
	(b) Find the maximum power that can be delivered to the resistance marked as R_L. What is the value of R_L for this condition? 	8
2.	(a) Derive the expression to convert a Y-connected resistance network to an equivalent Δ-connected resistance network.	8
	(b) Find the power delivered to the following circuit by each source individually. 	8
3.	(a) Deriving the RMS and average values, for a sinusoidal waveform and find (a) Form factor (b) crest factor	8
	(b) When a voltage source $v(t) = 110\sqrt{2}\sin(100\pi t + 30^\circ)V$ is applied across a network, the current drawn from the source is $i(t)10\sqrt{2}\sin(100\pi t + 90^\circ)A$. Find the (i) impedance (ii) resistance (iii) reactance of the network. Also find the (iv) real power (v) reactive power from the source.	8
4.	(a) What is power factor? Derive the expression for power factor considering both voltage and current to be sinusoidal quantities. Show phasor diagram for this derivation.	8
	(b) For the given network shown below find the capacitor that should be connected across points A & B, such that voltage across A&B and the current 'i' as shown becomes in phase. 	8
5.	(a) Derive the expression for bandwidth of series R-L-C circuit, considering proper assumptions.	8
	(b) A bulb of 110V, 100W is to be connected across a 220V, 50Hz AC source. Find the value of the capacitor that should be connected in series with that bulb such that the bulb will glow, by consuming 100W power. For the capacitor find (i) value of the capacitor (ii) voltage rating (iii) current rating.	8