Printed Pages—4 **TEE201**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2019 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. II) THEORY EXAMINATION 2010-11

ELECTRICAL ENGINEERING

Time : 3 Hours *Total Marks : 100*

Note :—(1) Attempt **ALL** questions.

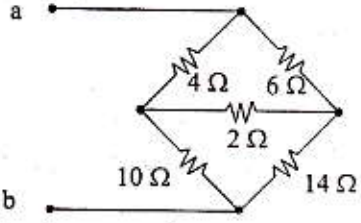
(2) All questions carry equal marks.

(3) In case of numerical problems assume data wherever not provided.

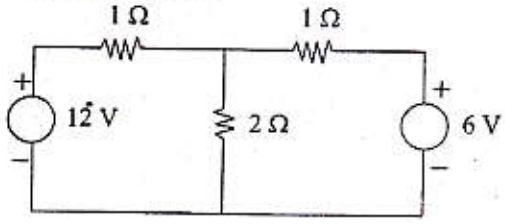
(4) Be precise in your answer.

1. Attempt any **four** parts of the following : **(4×5=20)**

(a) Find the resistance between the terminals a-b of the bridge circuit by using delta-star transformation.

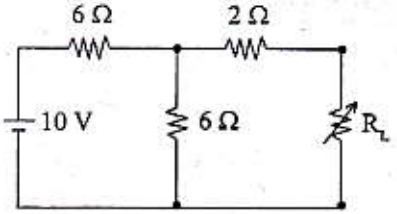


(b) Determine the current through 2 Ω resistor in the network by Thevenin's theorem.



Determine :

(c) State and explain maximum power transfer theorem. Find the value of R_L which will absorb maximum power.



(d) Explain with the aid of a typical B-H curve the meaning of magnetic hystersis.

(e) A magnetic core, in the form of a closed ring, has a mean length of 20 cm and a cross section of 1 cm^2. The relative permeability of iron is 2400. What direct current will be needed in a coil of 2000 turns uniformly wound round the ring to create a flux of 0·2 mwh in the iron.

(f) Explain the terms :

(i) Average value

(ii) RMS value

(iii) Time period

(iv) Form factor

(v) Phase angle.

2. Attempt any **four** parts of the following : **(4×5=20)**

(a) Four voltages are represented by :

$v_1 = 100 \sin 314t$

$v_2 = 250 \cos 314t$

$v_3 = 150 \sin(314\,t + \pi/6)$

$v_4 = 200 \sin(314\,t - \pi/4)$.

Calculate the resultant voltage and **express it** in the form $v = V_m \sin(314\,t \pm \phi)$.

(b) A circuit takes a current $i = 20 \sin(314\ t - \pi/6)$ amperes when the supply voltage is $v = 100 \sin 314\ t$. Calculate the impedance, phase angle resistance and inductance of the circuit.

(c) Explain active, reactive and apparent power.

(d) Three impedances $(6 + j5)\ \Omega$, $(8 - j6)\ \Omega$ and $(8 + j10)$ are connected in parallel. Calculate the current in each branch when the total current is 20 A.

(e) Deduce an expression for the resonant frequency of a series R-L-C a.c. circuit.

(f) In a resonant series RLC circuit show that the total energy is a constant. Derive the quality factor of series RLC circuit at resonance.

3. Attempt any **two** of the following : **(2×10=20)**

(a) Explain moving iron instruments working principle as an ammeter.

(b) A moving-coil instrument of resistance 5 Ω, requires a potential difference of 75 mV to give a full scale deflection. Calculate :

(i) The value of the shunt resistance needed to enable the instrument to work as an ammeter and to give a full scale deflection at 30 A.

(ii) The value of the series resistance to allow the instrument to work as a voltmeter with a full scale reading of 250 V.

Determine :

(c) A 1-phase, 250/500 V transformer gave the following results :

Open circuit test :

250 V, 1 A, 80 W on l.v. side.

Short circuit test :

20 V, 12 A, 100 W on h.v. side.

Calculate the circuit constants and show them on an equivalent circuit.

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) Explain two wattmeter method to measure three phase power with suitable diagram.

(b) Power in a 3-phase circuit is measured by two wattmeters and the reading of the wattmeters are 5 kW and 0·5 kW, the latter reading being obtained after reversal of the current coil connections. Find the total power, and power factor of the circuit.

(c) Explain different types of d.c. machines and derive emf equation.

5. Attempt any **two** parts of the following : **(10×2=20)**

(a) Explain different losses occur in d.c. machines. A shunt generator delivers 50 kW at 250 V when running at 400 r.p.m. The armature and field resistance are 0·02 Ω and 50 Ω respectively. Calculate the speed of the machine when running as a shunt motor and taking 50 kW input a 250 V.

(b) Why single phase induction motor is not self started ? Explain one method of starting.

(c) Explain slip-torque characteristics of three phase induction motor and its application.