Total No. of Questions – [4] Total No. of Printed Pages: 4

G.R. No.	

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DECEMBER 2021 (INSEM+ ENDSEM) EXAM

F.Y. B. TECH. (SEMESTER - I)

COURSE NAME: BASIC ELECTRICAL ENGINEERING

COURSE CODE: ET 10203A

(PATTERN 2020)

Time: [2Hr] [Max. Marks: 60]

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data where ever required**

Q.1 **Solve the following**

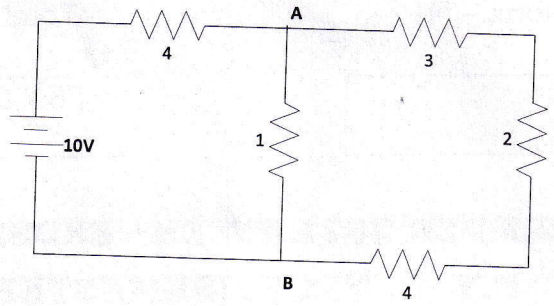
i) Norton's current source represents….. [2]
(a) current through load resistance
(b) short circuit current through load resistance
(c) current carried by equivalent resistance
(d) maximum current through load resistance

ii) Thevenin's voltage source represents….. [2]
(a) voltage of the source in series with load resistance
(b) open circuit voltage across load resistance
(c) short circuit voltage across load resistance
(d) highest voltage drop across elements

iii) Superposition theorem cannot be applied in case of…..
(a) multisource resistive network [2]
(b) ac linear circuit
(c) diode rectifier circuit
(d) linear circuit with dual power supply

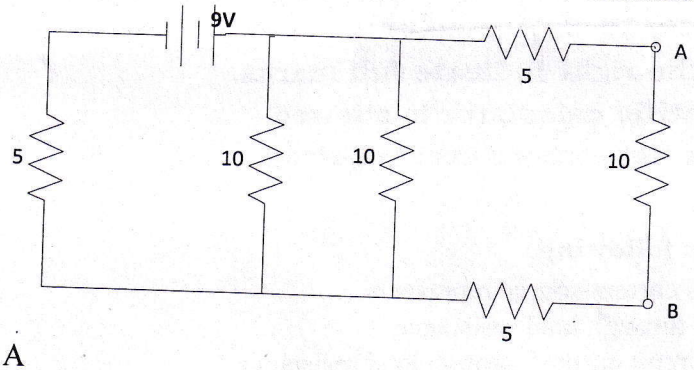
iv) Kirchhoff's Voltage Law is concerned with…… [2]
(a) IR drops
(b) battery emfs
(c) junction voltages
(d) both (a) and (b)

v) What is the equivalent resistance across terminals A and B for the circuit shown in figure below? All resistance values are in Ω. [2]



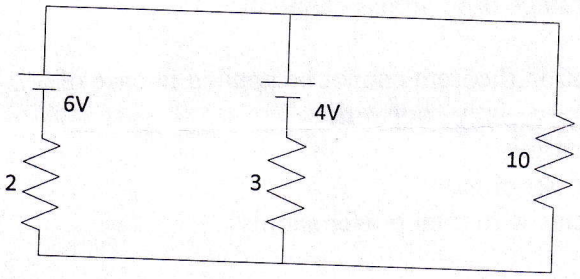
(a) 13 Ω
(b) 1 Ω
(c) 2.8 Ω
(d) 0.9 Ω

vi) What is the current delivered by the 9 V battery when terminals A and B are open circuited in case of the circuit shown in figure below? All resistance values are in Ω. [2]



(a) 1.11 A
(b) 0.9 A
(c) 0.6 A
(d) 0.45 A

vii) What is the current delivered by 4 V source acting alone while another source remains short circuited for the circuit shown in figure below? All resistance values are in Ω. [2]



(a) 1.33 A
(b) 0.4 A
(c) 0.86 A
(d) 0.27 A

viii) A capacitor of 1μF is charged through resistance of 5MΩ from a source of 200V. The charging current after 2 seconds is [2]

(a) 0
(b) 13.406 μA
(c) 26.812 μA
(d) 40 μA

ix) An alternating current is given by i = 10 sin314t. The time taken to generate two cycles of current is---------- [2]

(a) 0.02 S
(b) 0.01 S
(c) 0.04 S
(d) 0.05 S

x) A 100 V peak AC is as effective as---------DC. [2]

(a) 100 V
(b) 50 V
(c) 70.71 V
(d) 141.42 V

xi) A 20 V AC is applied to a circuit consisting of a resistance and a coil with a negligible resistance. If the voltage across the resistance is 12 V, the voltage across the coil is---------- [2]

(a) 10 V
(b) 8 V
(c) 6 V
(d) 16 V

xii) In a series RLC circuit, the voltages read at resonance across R, L and C are 40 V, 60 V and 60 V respectively. Then the applied voltage is--------- [2]

(a) 160 V
(b) 60 V
(c) 40 V
(d) $\sqrt{(40^2+120^2)}$

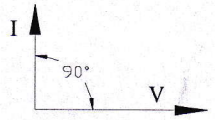
xiii) Two sine waves are said to be in phase with each other if they achieve their_____ [2]

(a) zero value at the same time
(b) maximum value at the time
(c) minimum value at the same time
(d) all of the above

xiv) An alternating current of 50 Hz frequency and 100 A maximum value is given by_____ [2]

(a) $i = 200\ sin628t$
(b) $i = 100\ sin314t$
(c) $i = 100\sqrt{2}\ sin314t$
(d) $i = 100\sqrt{2}\ sin157t$

xv) The phasor diagram of voltage and current quantities shown in figure below is applicable to---------- [2]



(a) pure resistance
(b) pure inductance
(c) pure capacitance
(d) pure capacitance and pure inductance

Q2 **Solve any three out of four**

a) A 25 KVA, 2200V/220V, 50Hz single phase transformer has primary winding resistance of 1.8 Ω and secondary winding resistance of 0.02 Ω. Iron loss of transformer is 1000 W. Calculate the efficiency of transformer operating at full load and unity power factor. [5]

b) Derive the emf equation of a single phase transformer and hence draw the phasor diagram in case of an ideal transformer. [5]

c) Name the material used in making core and winding of a transformer. Draw the B-H characteristics of these materials. [5]

d) The iron losses of 80 KVA, 1000V/250V, 1-ph, 50Hz, transformer are 500 Watt. Copper loss when primary carries 50A is 400 Watt. Find **i)** Area of cross-section of limb if working flux density is 1T, and there are 1000 turns on primary **ii)** primary full load current **iii)** efficiency at full load 0.8 p.f. lagging [5]

Q.3 **Solve any three out of four**

a) Derive the relationship between the line current and phase current, line voltage and phase voltage for 3 phase star connected balanced load with the help of phasor diagram. [5]

b) An electric pump lifts 64 m^3 of water per hour to a height of 20 m. If its overall efficiency is 80 %, find the input power of motor. If the pump is used for 2 hours a day, find the daily cost of energy at the rate of Rs. 6/- per unit. [5]

c) Calculate the line current and total power absorbed by a three phase star-connected inductor bank of impedance (15+j10) Ω/phase; supplied by 400V, 3-Phase, 50 Hz AC. [5]

d) What is energy conservation? State and explain any four measures for energy conservation in residential sector. [5]