Enrollment No.....................................

Faculty of Engineering
End Sem Examination Dec-2023
EN3ES11 Principles of Electrical Engineering
Programme: B.Tech.   Branch/Specialisation: All

**Duration: 3 Hrs.**   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i.   Which of the following parameter remains same for every element in **1** a series circuit?
(a) Current   (b) Voltage   (c) Resistance (d) None of these

ii.   Two resistors of 2-ohm and 3-ohm are connected in series, the **1** equivalent resistance will be-
(a) 2 ohm   (b) 3 ohm   (c) 5 ohm   (d) 1 ohm

iii. If a 6 ohm, 2ohm and 4ohm resistor is connected in delta, find the **1** equivalent star connection?
(a) 1ohm, 2ohm, 3ohm   (b) 2ohm, 4ohm, 7ohm
(c) 5ohm, 4ohm, 2ohm   (d) 1ohm, 2ohm, 2/3ohm

iv.   Application of Thevenin's theorem to a circuit yields?   **1**
(a) Equivalent voltage source and resistance in series
(b) Equivalent current source and resistance in parallel
(c) Both (a) and (b)
(d) None of these

v.   Active power consumed by purely capacitive circuit is-   **1**
(a) Zero   (b) Infinite   (c) 1 Watt   (d) None of these

vi.   Power factor of purely inductive circuit is-   **1**
(a) One (unity)   (b) Zero lagging
(c) Zero leading   (d) None of these

vii. The full-load iron loss of a transformer is 1600 W. At half-load, the **1** iron loss will be-
(a) 1600 W   (b) 6400 W   (c) 400 W   (d) 800 W

viii. Unit of magnetic flux is-   **1**
(a) Ampere-turns/Weber   (b) Ohms
(c) Weber   (d) None of these

ix.   Which of the following is not a characteristic of an ideal transducer?   **1**
(a) High dynamic range   (b) Low linearity
(c) High repeatability   (d) Low noise

x.   Which of the following is an example of electrical safety device?   **1**
(a) Voltmeter   (b) Ammeter
(c) Wattmeter   (d) Fuse

Q.2 i.   Define the following-   **4**
(a) Ideal and practical voltage source
(b) Ideal and practical current source

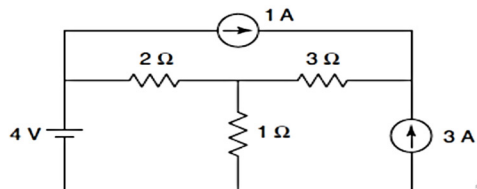ii.   Determine the current flowing through 5-ohm resistor by mesh analysis?   **6**
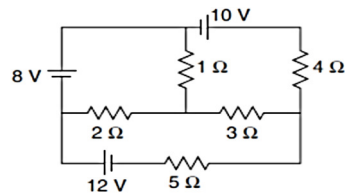
OR iii.   Determine the current flowing in 6-ohm resistor by nodal analysis?   **6**
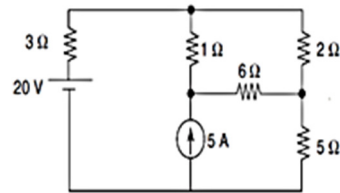
Q.3 i.   State and explain Norton's theorem?   **4**

ii.   Determine the current flowing in 4-ohm resistor by superposition theorem?   **6**
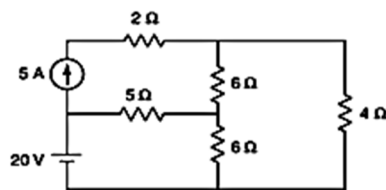
OR iii.   Determine the current flowing in 1-ohm resistor by Thevenin's theorem?   **6**

Q.4 i.   Define the following-   **4**
(a) Form factor   (b) Peak factor
(c) Power factor   (d) Admittance

ii.   A coil of resistance 100 ohms and inductance 100 micro-Henry is connected in series with 100 pico-Farad capacitor. The circuit is connected to a 10 V variable frequency source. Calculate   **6**
(a) Resonant frequency   (b) Quality factor of the circuit
(c) Voltage across L and C at resonance condition.

OR iii.   Three impedances of (70.7+j70.7) ohms, (120+j160) ohms, (120+j90) ohms are connected in parallel across 250 V supply. Determine the following: **6**
(a) Impedance of the circuit
(b) Supply current
(c) Power factor

Q.5 i.   Compare electric circuit and magnetic circuit in brief.   **3**

ii.   What are the ideal properties of a transformer? An ideal transformer with rating 20 kVA and 100/200 V, determine the rated value of primary and secondary current.   **7**

OR iii.   Explain working principle of transformer. Derive the condition for maximum efficiency of a single-phase transformer.   **7**

Q.6   Attempt any two:

i.   Define earthing and necessity of earthing. What are the safety devices used in electrical system?   **5**

ii.   Explain classification of transducer with applications.   **5**

iii.   Explain basic layout of the distribution system.   **5**

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Scheme of Marking

![MEDI-CAPS UNIVERSITY — Knowledge is Power]	Faculty of Engineering
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Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i)	(a)	1
	ii)	(c)	1
	iii)	(d)	1
	iv)	(a)	1
	v)	(a)	1
	vi)	(d)	1
	vii)	(a)	1
	viii)	(c)	1
	ix)	(b)	1
	x)	(d)	1
Q.2	i.	Define Part (a) – 2 marks Define Part (b) – 2 marks	4
	ii.	Each loop equation – 1 mark , 3 equation 3 - marks Ans: Current through 5Ω resistor 2.6A	6
OR	iii.	Each nodal equation – 1 mark, total 3 equations 3 - marks. Ans. Current through 6Ω resistor 0.46A	6
Q.3	i.	State and explain Nortons	4
	ii.	Single source circuit making- 1 marks, total 2 circuit 2-marks, star-delta/delta-star transformation in voltage only circuit 1- marks, Ans. Current through 4Ω resistor(5.12A) 2-marks	6
OR	iii.	To draw Rth circuit 1-mark, calculate Rth 1-mark, Draw Vth circuit 1 mark, calculate Vth 1 marks, draw thevenin's equvalent circuit 1-mark, load current calculation 1 marks Ans: Rth =2 Ω, Vth = 4V, IL=1.3A	6
Q.4	i.	Define each part 1-mark, total 4 part 4-marks	4

	ii.	Draw circuit-1.5 marks (a)1.5marks (b) 1.5 marks (c) 1.5 marks Ans: F0= 1.59 Mhz, Q= 10, V=100V	6
OR	iii.	Draw circuit-1.5 marks (a)1.5marks (b) 1.5 marks (c) 1.5 marks Ans: Zeq= 33.16+j32.44 Ω, I= 5.388A, pf=0.714	6
Q.5	i.	Compare electrical and magnetic circuit	3
	ii.	Ideal properties of transformer: 4-marks Calculate Ip and Is: 3-marks Ans: Ip= 200A, Is=100 A	7
OR	iii.	Working principal of transformer: 4 marks Drive condition for efficiency: 3 marks	7
Q.6			
	i.	Define earthing: 2-marks Necessity of earthing: 1 marks Safety devices: 2 marks	5
	ii.	Classification of transducer: 3 marks Applications: 2 marks	5
OR	iii.	Layout of distribution system: 3 marks Explanation 2 marks	5

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16/12/23.

Seen & Verified.
Anurag Sirvi P.T.O.
16/12/2023