	iii.	Describe the construction, operation and V-I characteristics of a P-N diode. What do you mean by cut-in voltage?	**5**
OR	iv.	Draw and explain output characteristic of transistor in CE configuration.	**5**
Q.6	i.	Explain De-Morgan's Theorem.	**2**
	ii.	What are universal gates and why they are called so?	**3**
	iii.	Draw and explain half adder and full adder for binary addition.	**5**
OR	iv.	Convert the following numbers into the respective index given: (a) $(1011.101101)_2 = (\ )_{10}$ (b) $(374.37)_{10} = (\ )_{16}$ (c) $(3AB)_{16} = (\ )_2$ (d) $(36.125)_8 = (\ )_{10}$ (e) $(324.987)_{10} = (\ )_8$	**5**

******

Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2018

EN3ES04 Basic Electrical and Electronics 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.

Q.1	i.	A voltage source of 100V with internal resistance 5Ω may be represented by a current source of (a) A current source of 20A with a resistance of 5Ω in parallel (b) A current source of 40A with a resistance of 2.5Ω in parallel (c) A current source of 500A with a resistance of 5Ω in parallel (d) A current source of 20A with a resistance of 5Ω in series	**1**
	ii.	The efficiency at maximum power transfer is (a) 100% (b) 80% (c) 50% (d) 40%	**1**
	iii.	A current wave represented by $i=I_{max}\sin\theta$, has its 50% of maximum value at, (a) $\theta=45^o$ (b) $\theta=30^o$ (c) $\theta=-210^o$ (d) $\theta=30^o$ and $\theta=150^o$	**1**
	iv.	The unit of flux density is, (a) tesla (b) A/m^2 (c) wb/mm^2 (d) wb/cm^2	**1**
	v.	Copper losses at full load operation are 1600W. If the load on the transformer is reduced to 75% of full load, the copper loss will be, (a) 1600W (b) 1200W (c) 900W (d) 800W	**1**
	vi.	The nature of operating p.f. of 3-phase induction motor is, (a) Always lagging (b) Leading (c) May be leading or lagging (d) Unity	**1**
	vii.	A zener diode is always …… connected. (a) Reverse (b) Forward (c) Either reverse or forward (d) None of these	**1**

viii. The voltage gain of a transistor connected in common collector arrangement is ……... **1**
(a) Equal to 1 (b) More than 10
(c) More than 100 (d) Less than 1

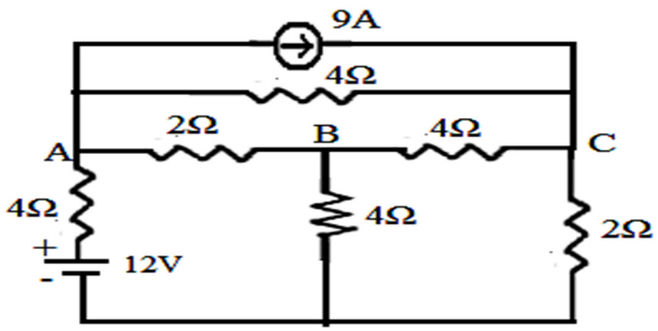
ix. The 2's complement of 1000_2 is **1**
(a) 0111 (b) 0101 (c) 1000 (d) 0001

x. The number 100101_2 is equivalent to octal **1**
(a) 54 (b) 45 (c) 37 (d) 25

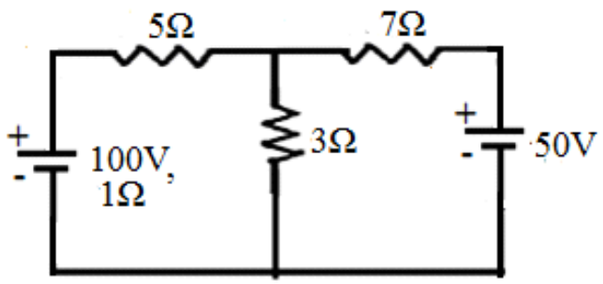
Q.2 i. Explain Kirchhoff's current and voltage law. **2**

ii. State and explain maximum power transfer theorem. **3**

iii. Use Nodal analysis to determine the voltage across BC and the current in the 12V source. **5**



OR iv. State and explain superposition theorem. Use superposition theorem to determine currents in all the branches in given network. **5**



Q.3 i. What are similarities in magnetic and electric circuits? **2**

ii. Drive the condition for resonance in a series circuit. Explain Q factor of series resonant circuit. **3**

iii. A coil of resistance 10Ω and inductance 0.1H is connected in series with a capacitor of 150mF across a 230V, 50Hz supply. Determine : **5**
(a) Impedance (b) Current drawn from supply
(c) Voltage drop across coil (d) Power factor of circuit
(e) Power factor of the coil.

OR iv. A 60Hz sinusoidal voltage v=100sinωt is supplied to a series R-L circuit. Assuming R=10Ω, L=0.001H. Find the steady state current and relative phase angle. Also compute the effective magnitude and phase of voltage drop across each circuit elements. **5**

Q.4 i. Explain the principle of operation of a DC motor. **2**

ii. Show that $\frac{V_2}{V_1} = \frac{E_2}{E_1} = \frac{N_2}{N_1} = \frac{I_1}{I_2} = K$ in a single phase transformer. **3**

iii. Draw and explain the phasor diagram of transformer when it is operating lagging power factor. **5**

OR iv. A 10kVA, 200/400V, 50Hz. Single phase transformer gave the following test results: **5**
Open circuit test-200V, 1.25A, 120W, on low voltage side
Short circuit test- 20V, 25A, 200W, on high voltage side.
Calculate:
(a) OCT circuit parameters
(b) SCT circuit parameters
(c) Full load efficiency at unity p.f.
(d) Half load efficiency at 0.8 lagging p.f.
(e) Iron loss and copper loss

Q.5 i. Justify that full wave rectifier is more efficient that half wave rectifier. **2**

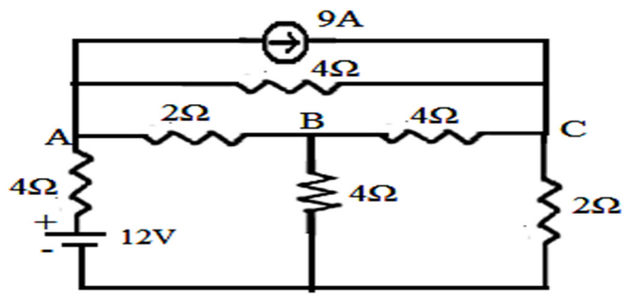
ii. Explain how a Zener diode maintains constant voltage across the load. **3**

Marking Scheme

EN3ES04 Basic Electrical and Electronics Engineering

Q.1	i.	A voltage source of 100V with internal resistance 5Ω may be represented by a current source of (a) A current source of 20A with a resistance of 5Ω in series	**1**
	ii.	The efficiency at maximum power transfer is (c) 50%	**1**
	iii.	A current wave represented by $i=I_{max}\sin\theta$, has its 50% of maximum value at, (d) $\theta=30^o$ and $\theta=150^o$	**1**
	iv.	The unit of flux density is, (a) tesla	**1**
	v.	Copper losses at full load operation are 600W. If the load on the transformer is reduced to 75% of full load, the copper loss will be, (c) 900W	**1**
	vi.	The nature of operating p.f. of 3-phase induction motor is, (a) always lagging	**1**
	vii.	A zener diode is always …… connected. (a) reverse	**1**
	viii.	The voltage gain of a transistor connected in common collector arrangement is …….. (d) less than 1	**1**
	ix.	The 2's complement of 1000_2 is (c) 1000	**1**
	x.	The number 100101_2 is equivalent to octal (b) 45	**1**

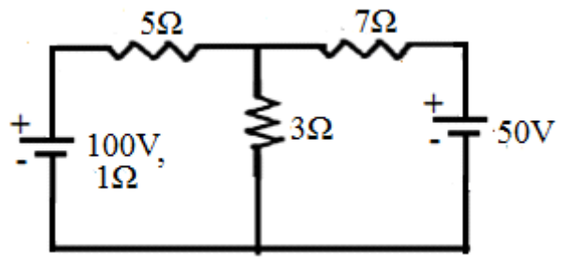
Q.2	i.	Explain Kirchhoff's current Voltage law.	1 mark 1 mark	**2**
	ii.	State and explain maximum power transfer theorem.	1 mark 2 marks	**3**
	iii.	Use Nodal analysis to determine the voltage across BC The current in the 12V source.	2 marks 3 marks	**5**



OR iv. State and explain superposition theorem. 2 marks **5**

Use superposition theorem to determine branch current in given network

1 mark in each branch current (1 mark *3) 3 marks



Q.3	i.	Similarities in magnetic and electric circuits 0.5 mark in each similarities	(0.5 mark *4)	**2**
	ii.	Drive the condition for resonance in a series circuit Q factor of series resonant circuit.	2 marks 1 mark	**3**
	iii.	A coil of resistance 10Ω and inductance 0.1H is connected in series with a capacitor of 150mF across a 230V, 50Hz supply. Determine 1 mark for each (a) impedance (b) current drawn from supply (c) voltage drop across coil (d) power factor of circuit (e) power factor of the coil.	(1 mark *5)	**5**
OR	iv.	A 60Hz sinusoidal voltage $v=100\sin\omega t$ is supplied to a series RL circuit. Assuming R=10Ω, L=0.001H. Find the steady state current and relative phase angle.	2 marks	**5**

		Complete the effective magnitude and phase of voltage drop across each circuit elements. 3 marks		
Q.4	i.	Principle of operation of a DC motor 2 marks		**2**
	ii.	Show that $\frac{V_2}{V_1} = \frac{E_2}{E_1} = \frac{N_2}{N_1} = \frac{I_1}{I_2} = K$ in a single phase transformer. 3 marks		**3**
	iii.	Daigram 3 marks Phasor diagram of transformer when it is operating lagging power factor. 2 marks		**5**
OR	iv.	A 10kVA, 200/400V, 50Hz. Single phase transformer gave the following test results: Open circuit test200V, 1.25A, 120W, on low voltage side Short circuit test 20V, 25A, 200W, on high voltage side. Calculate: 1 mark for each (1 mark *5) (a) OCT circuit parameters (b) SCT circuit parameters (c) Full load efficiency at unity p.f. (d) Half load efficiency at 0.8 lagging p.f. (e) Iron loss and copper loss		**5**
Q.5	i.	Full wave rectifier is more efficient that half wave rectifier.		**2**
	ii.	Zener diode maintains constant voltage across the load. Circuit diagram 1 mark Waveform 1 mark Explanation 1 mark		**3**
	iii.	Construction, 2 marks Operation and VI characteristics of a PN diode. 2 marks What do you mean by cutin voltage 1 mark		**5**
OR	iv.	Diagram 2 marks Output characteristic of transistor in CE configuration. 3 marks		**5**
Q.6	i.	DeMorgan's Theorem		**2**
	ii.	Universal gates 2 marks Why they are called so? 1 mark		**3**
	iii.	Half adder and diagram 2 marks Full adder for binary addition. 3 marks		**5**
OR	iv.	Convert the following numbers into the respective index given: 1 mark for each conversion (1 mark * 5) (a) $(1011.101101)_2 = (\ )_{10}$ (b) $(374.37)_{10} = (\ )_{16}$ (c) $(3AB)_{16} = (\ )_2$ (d) $(36.125)_8 = (\ )_{10}$ (e) $(324.987)_{10} = (\ )_8$		**5**