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First Semester B.Sc. Degree Examination, December 2018

(CBCS – Semester Scheme – Freshers)

Electronics

Paper I – BASIC ELECTRONICS

Time : 3 Hours]

[Max. Marks : 70

Instructions to Candidates :

- 1) Answer **ALL** the questions from Part-A, any **FIVE** questions from Part-B and any **FOUR** questions from Part-C.
- 2) It is required to answer all the questions of Part-A in any one page and to be answered only once, answering the same questions multiple times will not be considered for evaluation.

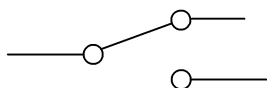
PART – A

1. Answer **ALL** the sub-divisions : **(15 × 1 = 15)**

- (a) The colour band sequence on a fixed carbon resistor are brown, black, green and gold. Its value is

- (i) $1\text{ K}\Omega \pm 10\%$
- (ii) $10\text{ K}\Omega \pm 5\%$
- (iii) $1000\text{ K}\Omega \pm 10\%$
- (iv) $1\text{ M}\Omega \pm 5\%$

- (b) The following circuit symbol represents



- (i) as SPDT switch
- (ii) a DPDT switch
- (iii) a RELAY
- (iv) an MCB

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- (c) Which of the following is not according to Ohm's law?
- (i) Current is directly proportional to voltage
 - (ii) Current is inversely proportional to resistance
 - (iii) Current is directly proportional to the resistance
 - (iv) Current varies with resistance
- (d) According to KVL, the algebraic sum of all IR drops and EMFs in any closed loop of a network is always
- (i) zero
 - (ii) positive
 - (iii) negative
 - (iv) equal to unity
- (e) Norton's equivalent circuit consists of a
- (i) Equivalent current source and impedance in series
 - (ii) Equivalent current source and impedance in parallel
 - (iii) Equivalent impedance
 - (iv) Equivalent current source
- (f) The turn-on voltage of a Silicon diode is nearly,
- (i) 0.3 V
 - (ii) 1 V
 - (iii) 0.7 V
 - (iv) 0 V
- (g) In the reverse bias condition, a diode appears as
- (i) an OFF switch
 - (ii) an ON switch
 - (iii) a relay
 - (iv) MCB
- (h) Theoretical value of ripple factor for a Bridge Full Wave Rectifier is
- (i) 0.482
 - (ii) 0.812
 - (iii) 1.11
 - (iv) 1.21
- (i) Which part of a dc power supply uses a Zener diode as the main component?
- (i) regulator
 - (ii) rectifier
 - (iii) filter
 - (iv) current booster

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- (j) The transistor gets the name BJT as
- (i) the conduction is because of immobile positive and negative ions
 - (ii) the conduction is due to only holes
 - (iii) the conduction is due to both holes and electrons
 - (iv) the conduction is due to only electrons
- (k) Transistor acts as a switch in
- (i) cut off and saturation regions
 - (ii) cut off and active regions
 - (iii) saturation and active regions
 - (iv) none of the above
- (l) In JET, when V_{DS} reaches pinch-off value, the drain current I_D becomes
- (i) zero
 - (ii) low
 - (iii) saturated
 - (iv) reversed
- (m) The next consecutive number in the array of BCD numbers 0111, 1000, 1001
- (i) 1111 0001
 - (ii) 1011 0001
 - (iii) 1110
 - (iv) 0001 0000
- (n) 4 bit representation in Sign magnitude convention for negative number, -7 is
- (i) 0111
 - (ii) 1101
 - (iii) 1111
 - (iv) 1010
- (o) Next consecutive number in the array of Gray code numbers 0000, 0001, 0011 is
- (i) 0010
 - (ii) 0110
 - (iii) 0111
 - (iv) 1110

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PART – B

Answer any **FIVE** questions :

(5 × 7 = 35)

2. (a) Explain the method of conversion of a voltage source into a current source.
(b) Draw the circuit diagram, write the expressions for the growth and decay of current in a series RL circuit and represent graphically. Define 'Time constant' of this circuit. **(2 + 5)**
3. What is resonance? Draw the circuit diagram of a parallel resonance circuit and show its response graphically. Write the condition for resonance and expressions for (a) resonance frequency (b) Q-factor and (c) bandwidth. **(7)**
4. State and prove Maximum power transfer theorem with necessary steps. **(7)**
5. (a) Draw the I and III approximations for a PN diode.
(b) Draw the circuit diagram of center tap full wave rectifier and explain its working. Draw the input and output waveforms. **(2 + 5)**
6. (a) Draw the circuit diagram of series transistor voltage regulator.
(b) With a circuit diagram, explain the operation of a Shunt capacitor filter. **(2 + 5)**
7. (a) Mention the different configuration of a transistor.
(b) With a relevant diagram, explain the working of an NPN transistor. **(2 + 5)**
8. Explain the need for biasing in transistors. Obtain the dc analysis of voltage divider bias circuit. **(7)**
9. (a) Explain with an example, steps to convert a Hexadecimal number into its decimal equivalent. Consider the Integer and fractional parts of Hexadecimal number.
(b) Explain self-complementing property of Excess 3 code with an example. **(4 + 3)**

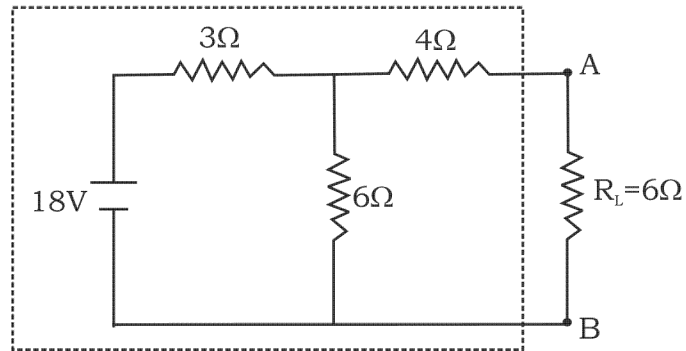
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PART – C

Answer any **FOUR** questions :

(4 × 5 = 20)

10. Find the current through load resistor R_L using Thevenin equivalent circuit.



11. An ac voltage of 135 V and 50 Hz frequency is applied to a series RC circuit having $C = 0.01 \mu\text{F}$ and $R = 10 \Omega$. Calculate the impedance, current and phase angle.
12. Calculate (a) efficiency and (b) PIV of a half rectifier circuit with an input voltage of 200 volt rms and load R_L of 1500 Ω . Given $r_d = 10 \Omega$.
13. Following observations have been recorded in an experiment to plot the characteristics of an NPN transistor in CE mode. Determine r_i , r_o and the current amplification factor β_{ac} .

V_{BE}	I_B	V_{CE}	I_C
(volt)	(μA)	(volt)	(mA)
0.66	60	5	5
0.71	100	5	10
0.71	100	10	10.6

14. (a) Perform the Subtraction of following number using 2's complement method.
- (i) $(F9)_{16} - (2D)_{16}$
- (ii) $1001_{(2)} - 1100_{(2)}$
- (b) Add $3B_{(16)}$ with $A2_{(16)}$.

(4 + 1)

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15. (a) Convert the following binary numbers into Hexadecimal :

(i) $110101001_{(2)}$

(ii) $1100111_{(2)}$

(b) Convert the following decimal numbers into binary :

(i) $27.3_{(10)}$

(ii) $38.60_{(10)}$

(2 + 3)
