## I Semester B.Sc. Examination, March/April 2022

 (CBCS) (Repeaters) (2014-2015 and Onwards)
## ELECTRONICS - I

Basic Electronics
Time : 3 Hours
Max. Marks : 70
Instructions : i) Answer all questions from Part - A, any five questions from Part - B and any four questions from Part - C.
ii) Answer all questions of Part - A in any one page, the same questions answered multiple times will not be considered for evaluation.
PART - A

Answer all the subdivisions.

1. i) Internal resistance of an ideal voltage source is
a) Infinity
b) High
c) Zero
d) None of these
ii) When AC is applied to a pure resistor the phase difference between voltage and current is $\qquad$ degrees.
a) 90
b) -60
c) 0
d) 45
iii) The below circuit symbol represents $\qquad$ switch.

a) SPST
b) SPDT
c) DPST
d) DPDT
iv) The sequence of the color band on a carbon composition resistor is orange, orange, red and gold. The value of the resistor is
a) $33 \Omega \pm 5 \%$
b) $3300 \Omega \pm 5 \%$
c) $330 \Omega \pm 5 \%$
d) $3.3 \Omega \pm 5 \%$
v) According to Kirchhoff's Voltage Law, the algebraic sum of all I.R. drops and e.m.fs in a closed path (or a loop) is
a) Positive
b) Negative
c) Zero
d) None of the above
P.T.O.

## QP - 219

vi) The number of free electrons is less than the number of holes in
a) Intrinsic semiconductor
b) P-type Semiconductor
c) N-type Semiconductor
d) All of the above
vii) The knee voltage of an ideal diode is
a) 0.3 V
b) 0.7 V
c) OV
d) 1 V
viii) In a full wave rectifier the ideal value of, the ripple factor is
a) 1.21
b) 0.482
c) 0
d) None of the above
ix) The gate source junction of a JFET should be
a) always forward biased
b) always reverse biased
c) no biasing
d) none of the above
x) In a bipolar junction transistor base region is
a) thin and heavily doped
b) thin and lightly doped
c) thin and moderately doped
d) none of the above
xi) When the transistor is operating in the saturation region then
a) $V_{C E}=O V$
b) $\mathrm{V}_{\mathrm{CE}}=0.2 \mathrm{~V}$
c) $V_{C E}=V_{C C}$
d) None of the above
xii) Identify the symbol.

a) Darlington pair transistor
b) JFET
c) $B J T$
d) None of the above
xiii) The value of radix in decimal number system is
a) 2
b) 8
c) 10
d) 1
xiv) Invalid number in Excess-3 code is
a) 1001
b) 0110
c) 0010
d) 1100
xv) The largest decimal number that can be represented by a four bit binary number is
a) 3
b) 7
c) 15
d) 31

PART - B
Answer any five questions.
2. a) Explain the inter conversion of voltage source and current sources.
b) Explain with the circuit diagram the growth of current in a series RL circuit. Show it graphically and define time constant.
3. a) Plot a curve showing the variations of circuit current and impedance with frequency in series resonance circuit.
b) State and explain the steps to apply Maximum Power Transfer theorem.
4. Draw the circuit diagram of a centre tapped full wave rectifier. Draw the $i / p$ and o/p waveform. Mention its advantages over half wave rectifier.
5. a) What is a filter ? Draw the circuit diagram of a capacitor filter applied to half wave rectifier.
b) With circuit diagram explain the working of a zener diode voltage regulator.
6. a) Define $\alpha$ and $\beta$ of a transistor.
b) With a relevent circuit diagram explain the working of a NPN transistor.
7. With the necessary diagrams explain the working of $n$-channel JFET and define parameters rd, gm and $\mu$.
8. a) Explain with examples the method to convert a decimal number into binary equivalent. Consider the integer and fractional part of a binary number.
b) Write a short note on Gray code.
9. Explain the steps involved in binary subtraction using 2's complement method with an example.

Answer any four questions.
10. A series resonant circuit has the following constants, $L=220 \mu \mathrm{H}, \mathrm{C}=470 \mathrm{pF}$, $R=20 \Omega$. The supply voltage is 10 V . Calculate
a) Resonant Frequency
b) Impedance at resonance
c) Current at resonance
d) Voltage at resonance
11. Determine the value of $R_{L}$ for maximum power transfer in the given circuit. Also calculate the maximum power transferred to the load.

12. Calculate the Q -point values for the voltage divider biasing circuit.
$R_{1}=33 \mathrm{k} \Omega, R_{2}=3.3 \mathrm{k} \Omega, \mathrm{R}_{\mathrm{C}}=10 \mathrm{k} \Omega, \mathrm{R}_{\mathrm{E}}=560 \Omega, \beta=200 \mathrm{~V}_{\mathrm{CC}}=15 \mathrm{~V} ; \mathrm{V}_{\mathrm{BE}}=0.7 \mathrm{~V}$

13. Calculate the efficiency and PIV of a halfwave rectifier circuit with an input voltage of 220 Vrms and load $\mathrm{R}_{\llcorner }$of $100 \Omega$. Given $\mathrm{r}_{\mathrm{d}}=5 \Omega$ and turns ratio of a transformer is $5: 1$.
14. Convert the following :
a) $E F_{(16)}=$ ? ${ }_{(2)}=$ ? ${ }_{(10)}$
b) $456_{(10)}=$ ? ${ }_{(2)}=$ ? ${ }_{(16)}$
15. a) Convert the following gray code to binary code
i) 1110
ii) 10101
b) Convert the binary code 1110 to gray code.

