First/Second Semester B.E. Degree Examination, Dec.2015/Jan.16
Basic Electronics

Time: 3 hrs. 　　　　　　　　　　　　　　　　　　　　Max. Marks:100

Note: 1. *Answer any FIVE full questions, choosing at least two from each part.*
　　　2. *Answer all objective type questions only in OMR sheet page 5 of the answer booklet.*
　　　3. *Answer to objective type questions on sheets other than OMR sheet will not be valued.*

PART – A

1　a. Choose the correct answers for the following : 　　　　　　　　　(04 Marks)
　　　i)　Ripple factor of full wave rectifier is _____.
　　　　　A) 1.21　　　　　　B) 0.483　　　　　　C) 0.5　　　　　　D) none of these
　　　ii)　For half-wave rectified sine wave
　　　　　A) $I_{rms} = \dfrac{I_m}{2}$　　B) $I_{rms} = \dfrac{I_m}{\pi}$　　C) $I_{rms} = \dfrac{I_m}{\sqrt{2}}$　　D) none of these
　　　iii)　Ripple factor γ for full wave rectifier with capacitor filter is _____.
　　　　　A) $\gamma = \dfrac{1}{2\sqrt{3}fcR_L}$　　B) $\gamma = \dfrac{1}{4\sqrt{3}fcR_L}$　　C) $\gamma = \dfrac{1.19}{LC}$　　D) none of these
　　　iv)　A junction diode can be used as _____.
　　　　　A) voltage regulator　B) limiter　　　C) rectifier　　　D) amplifier
　　b. Explain the operation of full wave rectifier with centre tap. Sketch output waveform.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(06 Marks)
　　c. Explain the operation of Zener regulator. 　　　　　　　　　　　(06 Marks)
　　d. If the input voltage for a bridge rectifier is 50 V and each diode has a forward resistance of
　　　25 Ω. Find the current through a load resistance of 2950 Ω and the dc voltage.　(04 Marks)

2　a. Choose the correct answers for the following : 　　　　　　　　　(04 Marks)
　　　i)　Current gain β = _____.
　　　　　A) $\dfrac{\Delta I_C}{\Delta I_E}$　　B) $\dfrac{\Delta I_C}{\Delta I_B}$　　C) $\dfrac{\Delta I_E}{\Delta I_B}$　　D) $\dfrac{\Delta I_B}{\Delta I_C}$
　　　ii)　The most widely used transistor configuration is _____.
　　　　　A) CB　　　　　B) CE　　　　　C) CC　　　　　D) none of these
　　　iii)　The CB transistor is used in _____.
　　　　　A) impendence matching　　　　　B) high frequency applications
　　　　　C) buffer circuit　　　　　　　　D) audio frequency applications
　　　iv)　If $\alpha = 0.95$, $I_E = 1$ mA, the transistor base current is _____.
　　　　　A) 0.05 mA　　　B) 0.95 mA　　　C) 1.0 mA　　　D) 1.95 mA
　　b. Explain input and output characteristics of npn transistor in common base mode.　(06 Marks)
　　c. Explain Quiscent point and load line with respect to transistor characteristics. Mark Active,
　　　cut offs and saturation region with respect to characteristics.　　　　(06 Marks)
　　d. Given $I_E = 2.5$ mA, $\alpha = 0.98$ and $I_{CBO} = 10$ µA, calculate I_B and I_C.　(04 Marks)

3　a. Choose the correct answers for the following : 　　　　　　　　　(04 Marks)
　　　i)　Most widely used bias circuit is _____.
　　　　　A) fixed bias　　　B) collector to base　　C) voltage divider　　D) none of these

ii) Power gain in decibels is equal to

A) $20\log\frac{P_{out}}{P_{in}}$ B) $10\log\frac{I_{out}}{I_{in}}$ C) $20\log\frac{V_{out}}{V_{in}}$ D) none of these

iii) In self bias circuit R_E resistor gives _____
A) positive feedback   B) negative feedback
C) positive-negative   D) none of these

iv) Thermal stability problem is poor in _____.
A) voltage divider bias   B) fixed bias
C) collector-to-base bias   D) none of these

b. Explain fixed bias circuit. Mention its advantages and disadvantages.   (06 Marks)
c. Explain voltage-divider bias with neat circuit diagram. Write design formulas.   (06 Marks)
d. Give comparison of basic bias circuits.   (04 Marks)

4 a. Choose the correct answers for the following :   (04 Marks)
i) FET is _____ device.
A) Bipolar   B) unidirectional   C) unipolar   D) bidirectional
ii) SCR is _____.
A) amplifier   B) oscillator   C) switch   D) none of these
iii) UJT is used as _____.
A) switch   B) oscillator   C) amplifier   D) rectifier
iv) FET has high _____.
A) output impedance B) input impedance   C) gain   D) none of these

b. Explain VI characteristics of SCR.   (06 Marks)
c. Explain transfer and output characteristics of FET.   (06 Marks)
d. Explain UJT characteristics.   (04 Marks)

PART – B

5 a. Choose the correct answers for the following :   (04 Marks)
i) An oscillator converts _____ energy of the desired frequency.
A) AC to DC   B) DC to DC   C) AC to AC   D) DC to AC
ii) Closed loop gain of an amplifier with positive feedback is given by

A) $A_F = \frac{A_v}{1-\beta A_v}$ B) $A_F = \frac{A_v}{1+\beta A_v}$ C) $A_F = \frac{1}{1-\beta A_v}$ D) $A_F = \frac{1}{1+\beta A_v}$

iii) The condition $\beta A = $ _____ is termed as Barkausen criterion for oscillation.
A) 0   B) 1   C) >1   D) <1
iv) Wein Bridge oscillator is _____ oscillator.
A) video   B) audio   C) RF   D) none of these

b. Explain the advantages of negative feedback amplifier.   (06 Marks)
c. Explain the frequency response of single-stage CE amplifier with neat circuit diagram.
      (06 Marks)
d. Explain the circuit operation of crystal oscillator.   (04 Marks)

6 a. Choose the correct answers for the following :   (04 Marks)
i) Ideally the voltage gain of an OP-AMP is _____.
A) 0   B) 1   C) ∞ D) very high
ii) Slew rate of OP-AMP is _____.

A) $\frac{\Delta V_o}{\Delta t}$ B) $\frac{\Delta V_o}{\Delta I_o}$ C) $\frac{\Delta V_c}{\Delta V_i}$ D) none of these

iii) CMRR of OP-AMP is

A) $\dfrac{A_c}{A_d}$ B) $\dfrac{A_d}{A_c}$ C) $1+\dfrac{A_d}{A_c}$ D) 0

iv) In non-inverting OP-AMP, the closed loop gain is

A) $-\dfrac{R_F}{R}$ B) 0   C) $1+\dfrac{R_F}{R}$ D) $1+\dfrac{R}{R_F}$

b. Mention ideal characteristics of OPAMP. **(06 Marks)**
c. Explain the working of OP-AMP as summer circuit. **(06 Marks)**
d. Explain an OP-AMP as voltage follower. What are its special features and where it is used? **(04 Marks)**

7 a. Choose the correct answers for the following : **(04 Marks)**

i) _____ is the process of getting back the modulating signal from the modulated carrier.

A) detection   B) clipping   C) modulation   D) rectification

ii) The total power contained in AM is _____.

A) $P_T = P_C\left(1+\dfrac{m^2}{2}\right)$ B) $P_T = \dfrac{P_C m^2}{2}$ C) high   D) none of these

iii) 125_8 to binary is _____.

A) 001011101   B) 001010101   C) 001010101   D) 001001101

iv) 8000_{10} to hexadecimal is _____.

A) $1C40_{16}$ B) $1A40_{16}$ C) $1F40_{16}$ D) $2A40_{16}$

b. Explain with block diagram, basic communication system. **(06 Marks)**
c. Convert: (i) $1C00_{16}$ to decimal; (ii) $342.56_{10} = (?)_2 = (?)_8$. **(06 Marks)**
d. Use 1's complement to perform the binary subtraction (i) $01111 - 11010$ repeat by 2's complement method. **(04 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) $A \oplus 1 =$

A) A B) $\bar{A}$ C) 1   D) 0

ii) Bubbled AND is equivalent to _____ Gate.

A) NOR   B) NAND   C) EX-OR   D) NOT

iii) Complement of $A + BC$ is _____.

A) $A(\bar{B}+\bar{C})$ B) $\bar{A}(B+C)$ C) $\bar{A}(\bar{B}+\bar{C})$ D) none of these

iv) Simplifying $A(A + B) =$ _____.

A) B   B) A   C) AB   D) AB

b. Simplify $ABC + \bar{A}BC + A\bar{B}C + ABC$. **(06 Marks)**

c. Simplify $AB + \bar{A}\,\bar{B}$ using De Morgan's theorem. **(06 Marks)**

d. Write logic circuit using basic gates for the simplified expression $\overline{(A+B)(B+C)(A+C)}$. **(04 Marks)**

* * * * *