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10ELN15/25

First/Second Semester B.E. Degree Examination, June 2012
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 on OMR sheet page 5 of the answer booklet.***
3. ***Answer to objective type questions on sheets other than OMR will not be valued.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Choose your answers for the following : **(04 Marks)**

i) Zener diode can be used for rectification. This statement is_____.
A) True B) False
C) Niether True Nor False D) None of these

ii) PIV in case of half wave rectifier for an input signal of $V_m \sin wt$ is_____ .
A) V_m B) $2V_m$
C) $\frac{V_m}{2}$ D) $\frac{V_m}{\sqrt{2}}$

iii) If frequency of input is 60 Hz for a fullwave rectifier, the frequency of ripple is_____.
A) 30 Hz B) 60 Hz
C) 120 Hz D) 180 Hz

iv) If peak to peak voltage is 4 V then RMS voltage is _____ .
A) $\sqrt{2}$ Volts B) 2 Volts
C) 2.82 Volts D) Both (A) and (C).

b. Calculate the reverse saturation current for silicon diode which passes a current of 10 mA at 27°C, for a forward bias of 700 mV. **(04 Marks)**

c. Explain the effect of temperature on the diode characteristics and also on the power rating of the diode. **(06 Marks)**

d. Explain the operation of full wave center tap rectifier with neat circuit diagram and waveforms. **(06 Marks)**

2 a. Choose your answers for the following : **(04 Marks)**

i) Bipolar junction transistor is _____ controlled device.
A) Voltage B) Current
C) Power D) Temperature

ii) Operating point must be _____ for proper functioning of transistor.
A) Increasing B) Decreasing
C) Stable D) High

iii) The DC load line of a transistor is a _____ .
A) Curved line B) '-ve' slope line
C) '+' slope line D) Zero slope line

iv) In a transistor α and β are related by _____ .
A) $\alpha = \frac{1}{1-\beta}$ B) $\alpha = \frac{\beta}{1+\beta}$
C) $\beta = \frac{\alpha}{1+\alpha}$ D) $\frac{1}{1-\alpha}$

b. Explain the characteristics of common base transistor configuration with neat circuit diagram. **(08 Marks)**

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2 c. What is a d.c. load line? Explain with a fixed bias circuit diagram. **(04 Marks)**

d. For the fixed bias circuit shown in Fig. Q2 (d), $V_{BE} = 0.7$ V, $\beta = 60$, find

i) Quiescent values of base and collector currents.
ii) Quiescent value of V_{CE}.
iii) Base-ground and collector-ground voltages.
iv) Base-collector voltage.

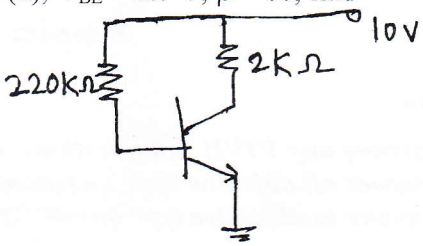


Fig. Q2 (d) **(04 Marks)**

3 a. Choose your answers for the following : **(04 Marks)**

i) In voltage divider bias circuit R_E is used for
A) Stabilization B) As a load
C) As a bypass element D) All of these

ii) For exact analysis of voltage divider bias circuit _____ theorem is used.
A) Nortons B) Thevenins
C) Superposition D) Any one of these

iii) _____ is the linear region of transistor characteristics.
A) Saturation B) Cutoff
C) Active D) Both (A) and (C)

iv) Stability factor of fixed bias circuit is,
A) β B) $\beta - 1$
C) $1 + \beta$ D) None of these

b. List the factors which affect the stability of operating point. **(04 Marks)**

c. With a neat circuit diagram, explain voltage divider biasing circuit and derive the expressions for V_{CE} and I_C using exact analysis. **(08 Marks)**

d. For the circuit shown in Fig. Q3 (d), using silicon transistor with $V_{BE} = 0.7$ V and $\beta = 80$, find V_{CE} and V_B. **(04 Marks)**

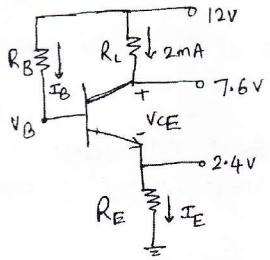


Fig. Q3 (d)

4 a. Choose your answers for the following : **(04 Marks)**

i) The device which has wide application in pulse generator is_____
A) FET B) BJT
C) Diode D) UJT

ii) FET is _____controlled device.
A) Current B) Voltage
C) Power D) Temperature

iii) The device which is known as Thyristor is _____
A) Diode B) FET
C) Transistor D) SCR

iv) In FET the gate source junction is _____
A) Forward biased B) Reverse biased
C) Unbiased D) None of these

4 b. Explain the working of FET with neat circuit diagram and relevant characteristics. Indicate each region of the characteristics. **(08 Marks)**

c. Explain the working of UJT with neat circuit diagram. Indicate all regions in the characteristics. **(08 Marks)**

PART – B

5 a. Choose your answers for the following : **(04 Marks)**

i) The coupling capacitors in RC coupled amplifier affect _____ frequency response.
A) Low B) High
C) Very high D) Above 100 kHz.

ii) The frequency at which oscillator will operate is the frequency for which the phase shift of the loop gain is _____
A) 0° B) 360°
C) 180° D) Both (A) and (B).

iii) In an oscillator the phase shift produced by amplifier is _____
A) 0° B) 180°
C) 90° D) 270°

iv) The oscillator used to generate oscillations in audio frequency range is _____
A) LC oscillator B) RC oscillator
C) Crystal oscillator D) Both (B) and (C)

b. Explain the working of RC phase shift oscillator with neat circuit diagram and waveforms at each stage. **(08 Marks)**

c. List the effects of negative feedback. **(04 Marks)**

d. In a transistor Hartley oscillator, $L_1 = 10\ \mu H$, $L_2 = 10\ \mu H$. Find the value of C required for an oscillating frequency of 150 kHz. Take M = 0. **(04 Marks)**

6 a. Choose your answers for the following : **(04 Marks)**

i) An op-amp has _____ o/p impedance.
A) ∞ B) 0
C) 10000 Ω D) 600 Ω

ii) Voltage follower has _____ gain.
A) High B) Low
C) Unity D) None of these

iii) An op-amp non-inverting amplifier has $R_1 = 1\ k\Omega$ and $R_f = 3\ k\Omega$ when $V_i = -2$ V, the output is _____
A) – 4 V B) 4 V
C) 8 V D) – 8 V

iv) Op-amp configuration used as buffer is _____
A) Inverting amplifier B) Non inverting amplifier
C) Voltage follower D) Adder

b. List the characteristics of ideal op-amp and practical op-amp. **(08 Marks)**

c. The input to the op-amp shown in Fig. Q6 (c), at the non inverting terminal is $10 \sin 10t$ Volts. Draw the output waveform indicating time period and maximum value. **(04 Marks)**

d. Find the output of the op-amp circuit shown in Fig. Q6 (d). **(04 Marks)**

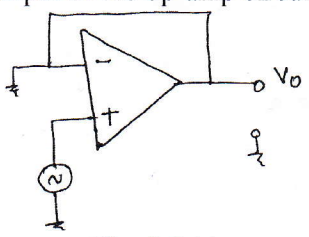


Fig. Q6 (c)

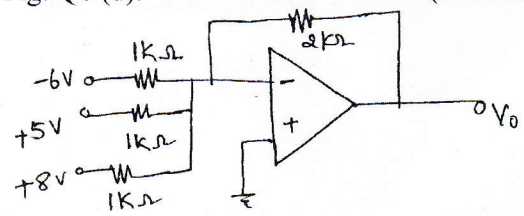


Fig. Q6 (d)

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

i) $(100)_{10} = (?)_{16}$

A) 64 B) 144
C) 46 D) 80

ii) 75 in binary contains _____ number of 1's.

A) 8 B) 4
C) 6 D) 3

iii) $(16)_8 = (?)_{10}$

A) 18 B) 20
C) 14 D) 25

iv) $(ABC)_{16} = (?)_{10}$

A) 3000 B) 4230
C) 2748 D) 2250

b. Perform the following:

i) $(101110)_2 = (?)_8$

ii) $(110011)_2 - (11001)_2 = (?)_2$ using 2's complement method.

iii) $(E10A2)_{16} - (5FF1)_{16} = (?)_{16}$ using 15's complement method.

iv) $(77721)_8 - (66432)_8 = (?)_8$ using 7's complement method.

v) $(2384)_{16} = (?)_8$. **(05 Marks)**

c. Explain the need for modulation. **(05 Marks)**

d. Explain the working of super heterodyne receiver with neat circuit diagram and waveforms at each stage. **(06 Marks)**

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

i) The EX-OR gate in which one input is connected to V_{CC}, operates as _____ gate.

A) AND B) OR
C) NOR D) NOT

ii) The gate whose output is zero only when both the inputs are high is _____ gate.

A) NAND B) NOR
C) OR D) AND

iii) $A + \overline{A}B + A$ is _____

A) A B) B
C) $A + \overline{B}$ D) $A + B$

iv) Universal gates are,

A) NAND and NOR B) AND and NAND
C) OR and NOR D) NOR and EX-OR

b. What is half adder and implement it using universal gates? **(06 Marks)**

c. Simplify and realize the Boolean expressions, using two i/p NAND gates only.

i) $ABCD + A\overline{B}CD$

ii) $AB + ABC + AB\overline{C} + \overline{A}BC$

iii) $ABCD + \overline{A}BCD + ABD$ **(10 Marks)**

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