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10ELN15/25

First/Second Semester B.E. Degree Examination, June/July 2013
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 the correct answers for the following : **(04 Marks)**

i) When forward – biased, a diode
A) blocks current B) conducts current
C) has a high resistance D) drops a large voltage

ii) The knee voltage of a Silicon diode is
A) 0.3 V B) 0.5 V C) 0.7 V D) None of these

iii) The ripple factor of half wave rectifier is about ____
A) 40.6 B) 0.46 C) 1.21 D) 81.2

iv) The rms value of a load current in case of a full wave rectifier is
A) $\frac{\pi}{2}$ B) $\frac{Im}{2}$ C) $\frac{Im}{\sqrt{2}}$ D) $\frac{Im}{\pi}$

b. Deduce the following for HWR
i) I_{rms} ii) I_{dc} **(04 Marks)**

c. With a neat circuit diagram, explain the working principles of full wave bridge rectifier. **(06 Marks)**

d. Draw the circuit of full wave rectifier and show that the ripple factor = 0.48 and efficiency = 81%. **(06 Marks)**

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

i) The current relationship between two current gain in a transistor is
A) $\beta = \frac{\alpha}{1-\alpha}$ B) $\beta = \frac{1+\alpha}{1-\alpha}$
C) $\beta = \frac{1-\alpha}{1+\alpha}$ D) $\beta = \frac{\beta+1}{\beta}$

ii) The β_{dc} of a transistor is its
A) current gain B) voltage gain
C) power gain D) internal resistance

iii) In a transistor the current conduction is due to _____ carries.
A) majority B) minority
C) both (A) and (B) D) None of these

iv) In a transistor circuit,
A) $I_E = I_C$ B) $I_E > I_C$ C) $I_E < I_C$ D) $I_E << I_C$

b. Draw input and output characteristics of an NPN transistor in common base configuration and explain. **(08 Marks)**

c. Calculate the value of I_C , I_E and β_{dc} for a transistor with $\alpha = 0.99$ and $I_B = 110\ \mu A$. **(04 Marks)**

d. Obtain the relation between 'α_{dc}' and 'β_{dc}'. **(04 Marks)**

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

i) The intersection of a dc load time and the output characteristics of a transistor is called

A) Q – point B) Quiescent point

C) Operating point D) All of these

ii) For an emitter follower, the voltage gain is

A) unity B) greater than unity

C) less than unity D) zero

iii) The best biasing stability is achieved by using ____ biasing circuit.

A) fixed B) collector to base

C) voltage divider D) None of these

iv) In self bias or emitter bias circuit _____ is connected between emitter and ground

A) inductor B) capacitor

C) resistor D) transformer

b. Explain the concepts of base bias techniques using NPN transistor. **(10 Marks)**

c. Calculate the Q – point values for the circuit of collector to base circuit. Given $R_B = 100\ K\Omega$, $R_C = 10\ K\Omega$, $V_{CC} = 12\ V$ and $\beta_{dc} = 100$. **(06 Marks)**

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

i) A SCR has _____ number of layers

A) one B) two C) three D) Four

ii) The minimum point in VI characteristic of UJT is known as ___ point

A) negative B) valley C) latching D) conducting

iii) The FET is a _____ controlled device

A) current B) voltage C) power D) None of these

iv) The relaxation oscillator uses

A) MOSFET B) SCR C) BJT D) UJT.

b. Draw two transistor equivalent circuit of SCR. Also plot V – I characteristics and explain various regions of operations. **(10 Marks)**

c. Explain with suitable diagram and waveforms, how UJT can be used as a relaxation oscillator. **(06 Marks)**

PART – B

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

i) Oscillator uses _____ type of feedback

A) positive B) negative C) both D) None of these

ii) A phase shift oscillator has

A) three RC circuits B) three LC circuits C) a T - type circuit D) a π type circuit

iii) The frequency of Hartley oscillator is f = _____

A) $\frac{1}{2\pi\sqrt{LC}}$ B) $\frac{1}{2\pi\sqrt{RC}}$ C) $\frac{1}{2\pi\sqrt{C}}$ D) $\frac{1}{2\pi LC}$

iv) The upper and lower critical frequencies are sometimes called the

A) power frequencies B) half power frequencies

C) 6 dB points D) None of these

b. Explain with a neat diagram, the working of single stage RC coupled amplifiers with its frequency response. **(08 Marks)**

c. Give any four advantages of negative feedback in amplifier. **(04 Marks)**

d. In a colpitts oscillator, if the desired frequency is 800 KHz, determine the values of L and C_{eq} if $C_1 = C_2 = 10$ picofarad. **(04 Marks)**

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

i) The CMRR is given by ____

A) $A_d \times A_c$ B) A_c / A_d C) A_d / A_c D) 20 log A_c / A_d

ii) The gain of the inverting amplifier using $R_f = 10\ K\Omega$ and $R_1 = 1\ K\Omega$ is _____

A) – 10 B) – 11 C) 10 D) 11

iii) The gain of the voltage follower is ____

A) zero B) infinite C) negative D) unity

iv) The screen of CRT is coated with _____

A) chromium B) phosphor C) carbon D) germanium

b. Calculate the output voltage of a three input summing amplifier : Given $R_1 = 200\ K\Omega$, $R_2 = 250\ K\Omega$, $R_3 = 500\ K\Omega$ and $R_f = 1\ M\Omega$, $V_1 = -2V$, $V_2 = 2V$ and $V_3 = 1\ V$. **(06 Marks)**

c. Show, how an op amp can be used as an integrator. Derive an expression for output voltage. **(06 Marks)**

d. Give any four applications of CRO. **(04 Marks)**

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

i) The modulating frequency is _____ carrier frequency

A) lower than B) higher than C) equal to D) None of these

ii) The modulation is done in ____

A) transmitter B) receiver

C) none of the above D) between transmitter and receiver.

iii) The 2's complement of 1010 gives

A) 1111 B) 0110 C) 0010 D) 0101

iv) In binary numbers, shifting the binary point one place to right

A) divides by 2 B) decreases by 10

C) increases by 10 D) multiplies by 2

b. With suitable block diagram, explain the function of superheterodyne receiver. **(08 Marks)**

c. Convert $(ABCD)_{16} = (\quad)_2 = (\quad)_8 = (\quad)_{10} = (\quad)_{BCD}$. **(04 Marks)**

d. Subtract : $(28)_{10} - (19)_{10}$ using both 1's complement and 2's complement methods. **(04 Marks)**

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

i) When demorganis theorem applied to $\overline{(A+B)}$, we get ____

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

ii) $Y = \overline{A}B + \overline{B}A$ is a Boolean expression for _____

A) EX - OR B) EX – NAND

C) EX – NOR D) none of these

iii) The example for universal gate is _____

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

iv) The expression for half adder carry 'C' with inputs 'A' and 'B' is given by

A) $A + B$ B) AB C) $\overline{A}\ \overline{B}$ D) none of these

b. i) Realize the NAND gate using minimum number of NOR gates

ii) Simplify $M = XYZ + X\overline{Y}Z + \overline{Z}XY$ and realize using of NOR gates. **(08 Marks)**

c. Realize a full adder using two half adders and an OR gate with truth table. **(08 Marks)**

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