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10ELN15

First Semester B.E. Degree Examination, January 2011
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 answer :

i) The rms value of a load current in case of a half wave rectifier is

A) $\pi/2$ B) $I_m/2$ C) $I_m/\sqrt{2}$ D) I_m/π

ii) The peak inverse voltage of a FWR, with centre tap transformer is

A) V_m B) $4\sqrt{V_s}$ C) $2V_m$ D) $2V_s$

iii) In a bridge rectifier, the input is from 230V, 50 Hz; the DC output voltage is

A) 200V B) 207V C) 315V D) 220V

iv) The knee voltage of a Germanium diode is _____ volts

A) 0.3V B) 0.5V C) 0.7V D) None of these

(04 Marks)

b. Discuss the performance of the zener diode, in terms of the source & load effects. **(08 Marks)**

c. Draw the circuit of a bridge rectifier and explain its working. What is the use of the filter? **(08 Marks)**

2 a. Choose the correct answer :

i) The transistor operating point is along the _____.

A) X-axis B) Resistance line C) Load line D) Y-axis

ii) The _____ transistor is used for impedance matching.

A) CB B) CE C) CC D) None of these.

iii) The _____transistor has the highest power gain.

A) CE B) CC C) CB D) None of these.

iv) In a transistor the current conduction is due to _____ carriers.

A) Majority B) Minority C) Both A) and B) D) None of these.

(04 Marks)

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

c. Draw and explain the input and output characteristics of a PNP transistor in common emitter configuration. **(08 Marks)**

d. Given $I_E = 2.5mA$, $\alpha = 0.98$ and $I_{CBO} = 10\mu A$, calculate I_B and I_C. **(04 Marks)**

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3 a. Choose the correct answer :

i) The reverse saturation current doubles for every _____°C rise in temperature.

A) 40 B) 45 C) 10 D) 30

ii) The intersection of DC load line and the output characteristics of a transistor is called

A) Q-point B) Quiescent point C) Operating point D) All of these.

iii) For an emitter follower, the voltage gain is _____.

A) unity B) greater than unity C) less than unity D) zero.

iv) The operating point must be _____ for the proper operation of the transistor.

A) High B) Stable C) Increasing D) Decreasing **(04 Marks)**

b. Explain the circuit operation and analysis of voltage divider bias. **(08 Marks)**

c. Design the collector to base bias circuit for Fig.Q3(c). Given V_{CC} = 20V, V_{CE} = 5V, I_C = 6 mA, h_{fc} = 100. **(04 Marks)**

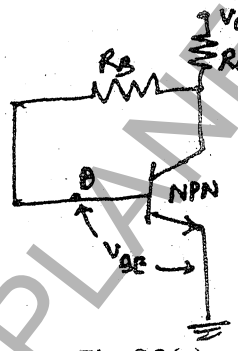


Fig.Q3(c)

d. Explain the DC load line and operating point, with example, related to the transistor. **(04 Marks)**

4 a. Choose the correct answer :

i) A SCR has _____ number of junctions.

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

ii) The FET is a _____ controlled device.

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

iii) The holding current in a SCR is _____ than the latching current.

A) more B) less C) equal D) None of these

iv) A relaxation oscillator uses

A) MOSFET B) SCR C) UJT D) BJT **(04 Marks)**

b. Sketch and explain the V-I characteristics of SCR. **(04 Marks)**

c. Explain the P-channel JFET drain characteristics. **(04 Marks)**

d. Explain the JFET as an amplifier. **(08 Marks)**

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PART – B

5 a. Choose the correct answer :

i) In a mid frequency band, the voltage gain is _____.

A) increasing B) decreasing C) constant D) None of these.

ii) A crystal oscillator finds use, when the _____ stability is required.

A) amplitude B) frequency C) phase D) None of these.

iii) The Colpitt's oscillator is _____ .

A) Audio oscillator B) Radio oscillator C) Microwave oscillator D) None of these.

iv) In an oscillator, we use _____ feedback.

A) positive B) negative C) unity gain D) None of these.

b. With the help of a neat circuit diagram, explain the function of every component in an RC coupled amplifier. **(08 Marks)**

c. Draw and explain the RC phase shift oscillator. **(04 Marks)**

d. Calculate the frequency of oscillations of a Hartley oscillator, having $L_1 = 0.5$ mH, $L_2 = 1$ mH and $C = 0.2$ μF. **(04 Marks)**

6 a. Choose the correct answer :

i) The op - Amp can amplify

A) AC signal only B) DC signal only C) Both AC and DC signals D) None of these.

ii) An op Amp has _____ output impedance.

A) ∞ B) 0 C) 10,000 Ω D) 600 Ω

iii) CMRR should be

A) unity B) zero C) much larger than unity D) much smaller than unity

iv) The inverting amplifier circuit has $R_i = 1$ kΩ and $R_f = 3$ kΩ. The output voltage is _____ when $v_i = 4$V.

A) 6V B) 16V C) 12V D) 18V **(04 Marks)**

b. Explain the term op-Amp. List the characteristics of an ideal op-Amp. **(08 Marks)**

c. Explain clearly how op-Amp can be used as the following type of amplifier:
i) summer ii) integrator iii) differentiator iv) inverting **(08 Marks)**

7 a. Choose the correct answer :

i) The circuit that recovers the original modulating information from an AM signal is known as _____.

A) Modulator B) Mixer C) Demodulator D) Oscillator.

ii) The binary equivalent of decimal number 6 is

A) 100 B) 011 C) 110 D) 1001

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

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

iv) $(11011)_2 = (?)_8$

A) $(33)_8$ B) $(17)_8$ C) $(25)_8$ D) $(28)_8$ **(04 Marks)**

b. Explain the need for modulation. **(04 Marks)**

c. Draw the block diagram of super-heterodyne AM receiver. Explain the function of each block. **(08 Marks)**

d. Write the decimal equivalent of $(10AB)_{16}$. **(04 Marks)**

8 a. Choose the correct answer :

i) $A + AB =$ _____

A) AB B) A C) B D) 1 + A

ii) The output is high only when both the inputs are zero to a gate. The gate is

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

iii) The complement of A+B+1 is

A) 0 B) $A+\overline{B+1}$ C) $\overline{AB+1}$ D) 1

iv) Universal gate is _____

A) NOT B) AND C) OR D) NAND **(04 Marks)**

b. Draw the full adder circuit, with the truth table. **(08 Marks)**

c. Explain the logic circuit of XOR gate with the truth table. **(04 Marks)**

d. Realize the following expression using the NOR gate.

$Y = A(\overline{B}+C)$ **(04 Marks)**

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