

First / Second Semester B.E. Degree Examination, December 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.

PART – A

- 1 a. Choose the correct answers for the following : (04 Marks)
- i) The voltage at which forward current through the diode starts increasing rapidly is called as _____
 A) Saturation voltage B) Breakover voltage C) cut in voltage D) cut off voltage.
 - ii) Dynamic zener resistance is _____ in reverse breakdown condition.
 A) very high B) high C) zero D) very small
 - iii) Smaller the ripple factor, the output will have higher _____ components.
 A) AC B) DC C) Both AC and DC D) Pulse
 - iv) The transformer utilization factor of a bridge type full wave rectifier is _____
 A) 0.287 B) 0.812 C) 0.864 D) 0.48
- b. Draw the AC equivalent circuit of a diode. (04 Marks)
- c. With a circuit diagram, explain the working of a centre – tapped FWR. (06 Marks)
- d. Prove that ripple factor of a HWR is 1.21. (06 Marks)
- 2 a. Choose the correct answers for the following : (04 Marks)
- i) The current conduction in bipolar junction transistor is because of _____
 A) Electrons B) Holes C) Both electrons and holes D) Current
 - ii) In cut off region both base – to – collector and base to emitter junctions are _____
 A) forward biased B) ON C) Reverse biased D) None of these
 - iii) In a transistor $I_B = 30$ mA and $I_E = 10$ mA. What is the value of α ?
 A) 0.92 B) 0.99 C) 0.98 D) 0.96
 - iv) In CB– mode of a transistor when the reverse bias voltage increases, the width of depletion region also increases, which reduces the electrical base width called as _____
 A) Depletion width B) Early effect
 C) cut in D) punch through effect
- b. What are the advantages of transistor over vacuum tube? (04 Marks)
- c. Draw and explain the input and output characteristics of CE configuration of a transistor. (06 Marks)
- d. For the CE – circuit shown in Fig. 2(d), draw the DC load line and obtain Q–point values. Assume $\beta = 100$ and $V_{BE} = 0.7$ V. (06 Marks)

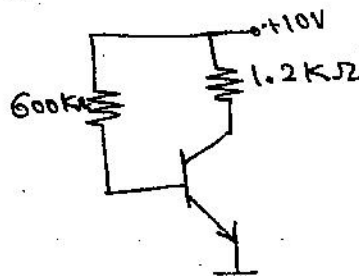


Fig. Q2(d)

- 3 a. Choose the correct answers for the following : (04 Marks)
- Ideally stability factor should be zero to get _____ Q-point.
A) Unstable B) Centre of the cutoff
C) Stable D) None
 - Which of the following factor affects the Q-point stability?
A) I_{CO} B) Coupling capacitor
C) Emitter resistor D) Bypass capacitor.
 - In what biasing circuit voltage shunt negative feed back is provided?
A) Voltage divider biasing B) Fixed bias
C) Collector to base bias D) Emitter bias.
 - Fixed bias circuit provides _____ stability
A) Poor B) High
C) Better D) Very good
- b. For the circuit shown in Fig. Q3(b), $I_C = 2 \text{ mA}$, $\beta = 100$, and $V_{CE} = 3 \text{ V}$. Calculate R_1 and R_C . Assume $V_{BE} = 0.6 \text{ V}$. (08 Marks)

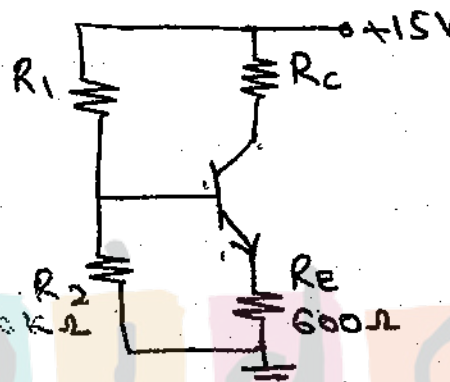


Fig. Q3(b)

- c. What factors cause instability of a Q-point? Explain it. (08 Marks)
- 4 a. Choose the correct answers for the following : (04 Marks)
- JFET is a _____ device
A) Bipolar B) Unipolar C) Uni-Bipolar D) None of these
 - PNPN device is an _____
A) UJT B) SCR C) MOSFET D) BJT
 - The UJT relaxation oscillator is used to generate _____
A) Square wave signal B) Rectangular wave signal
C) Sine wave signal D) Triggering pulse
 - The holding current in SCR is _____ latching current
A) More than B) Less than C) Equal to D) None of these
- b. Draw the equivalent circuit of a UJT and mention its applications. (04 Marks)
- c. What are the applications of SCR? (04 Marks)
- d. Draw the drain characteristics of a n-channel JFET and explain it. (08 Marks)

PART - B

- 5 a. Choose the correct answers for the following : (04 Marks)
- If the voltage gain of the amplifier is 0.001, what is the value of gain in dB's?
A) -60 B) -62 C) 60 D) 100
 - With negative feedback, the bandwidth of an amplifier _____
A) Decreases B) Increases C) Both A & B D) Constant

- iii) In oscillator circuit _____ feedback is used
 A) Voltage series B) Positive C) Negative D) Both +ve and -ve
- iv) In RC - phase shift oscillator each section of RC - network produces phase shift of -
 A) 60° B) 30° C) 180° D) 90°

- b. With a neat diagram, explain the operation of a Colpitt's oscillator. (08 Marks)
- c. Explain the operation of single stage RC coupled amplifier and draw its frequency response. (08 Marks)

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

- i) For a differential amplifier $A_d = 10000$ and $CMRR = 10^8$. What is the value of A_c ?
 A) 10^{-4} B) 10^{-6} C) 10^4 D) 100
- ii) For an inverting op-amp if $R_1 = R_f$ then circuit is called _____
 A) Sign changer B) Sign multiplier C) +ve sign D) None of these
- iii) The ideal bandwidth of an op-amp is _____
 A) Zero B) Infinity C) High D) Medium
- iv) Buffer and level shifter is usually a
 A) Current follower B) Collector follower
 C) Resistance follower D) Emitter follower

- b. Define the following terms with respect to op-amps
 i) Slew rate ii) Power supply rejection ratio iii) CMRR. (06 Marks)
- c. Derive the expression of output voltage of a op-amp differentiator. (05 Marks)
- d. Determine the output voltage for the op-amp adder circuit shown in Fig. Q.6(d). (05 Marks)

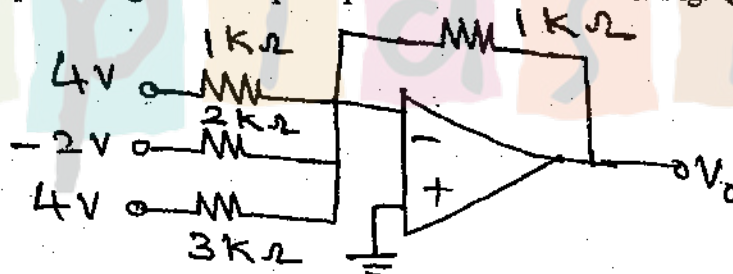


Fig. Q.6(d)

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

- i) The carrier frequency is _____ modulating frequency
 A) Lower than B) Higher than C) Equal to D) None of these
- ii) The bandwidth of AM wave is _____
 A) $2f_m$ B) f_m C) $f_m/2$ D) None of these
- iii) Find the decimal equivalent of $(10AB)_{16}$.
 A) 3267 B) 4265 C) 4268 D) 4267
- iv) What is the binary equivalent of $(1126)_8$?
 A) 001 001 010 110 B) 100 001 010 110
 C) 110 110 001 001 D) 001 001 110 010

- b. Draw the block diagram of superheterodyne receiver and explain the function of each block (08 Marks)
- c. Convert $(BCDE)_{16} = ()_2 = ()_8 = ()_{10}$. (03 Marks)
- d. Subtract $(57)_{10}$ from $(43)_{10}$ using 2's complement from. (05 Marks)

- 8 a. Choose the correct answers for the following : (04 Marks)
- i) For NAND- Gate both inputs are high, then output will be _____
 A) High B) Low C) Tristate D) None of these
- ii) $Y = \overline{AB} + AB$ is a Boolean expression for
 A) EX - OR B) EX - NAND C) EX - NOR D) None of these
- iii) $A+(B+C) = (A+B)+C$ is a _____ property
 A) Associative B) Commutative C) Distributive D) None of these
- iv) The expression $Y = AB + \overline{BC} + BC$ when simplified is _____
 A) $B + C$ B) AB C) $A + \overline{B}$ D) $AB+C$
- b. Simplify the following Boolean expressions
 $Y = \overline{ABC} + \overline{ABC} + \overline{ABC} + \overline{ABC}$
 $Y = (\overline{AB} + \overline{AC})(BC + \overline{BC})(ABC)$ (06 Marks)
- c. Draw the logic circuit of a full adder and also write its truth table with sum and carry expressions. (06 Marks)
- d. Realize the expression $F = \overline{(X + Y(Z + \overline{Y}))}$ using only NAND - Gates. (04 Marks)

 $(AC + (B+E))$

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