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10ELN15/25

# 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 $\alpha$ ?
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)**

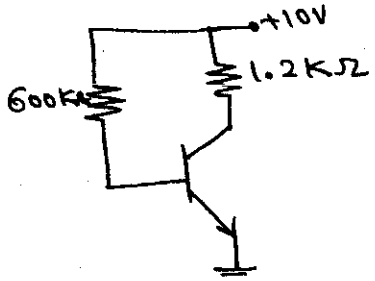


Fig. Q2(d)

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

i) Ideally stability factor should be zero to get ——— Q–point.
A) Unstable B) Centre of the cutoff
C) Stable D) None

ii) Which of the following factor affects the Q–point stability?
A) $I_{CO}$ B) Coupling capacitor
C) Emitter resistor D) Bypass capacitor.

iii) 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.

iv) Fixed bias circuit provides ——— stability
A) Poor B) High
C) Better D) Very good

b. For the circuit shown in Fig. Q3(b), $I_C = 2$ mA, $\beta = 100$, and $V_{CE} = 3V$. Calculate $R_1$ and $R_C$. Assume $V_{BE} = 0.6V$. **(08 Marks)**

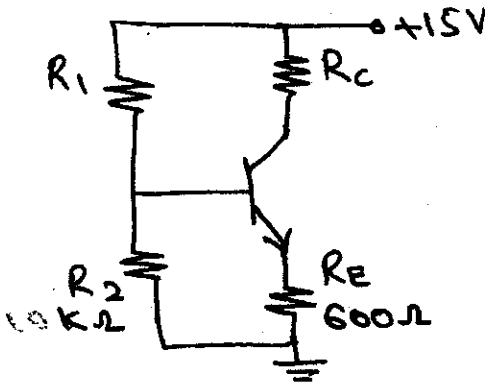


Fig. Q3(b)

c. What factors cause instability of a Q–point? Explain it. **(08 Marks)**

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

i) JFET is a ——— device
A) Bipolar B) Unipolar C) Uni–Bipolar D) None of these

ii) PNPN device is an ———
A) UJT B) SCR C) MOSFET D) BJT

iii) The UJT relaxation oscillator is used to generate _____
A) Square wave signal B) Rectangular wave signal
C) Sine wave signal D) Triggering pulse

iv) 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)**

i) If the voltage gain of the amplifier is 0.001, what is the value of gain is dB's?
A) – 60 B) – 62 C) 60 D) 100

ii) 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)**

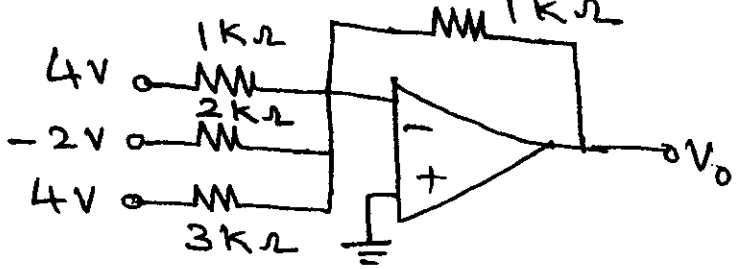


Fig. Q.6(d)

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) 2fm B) fm C) fm/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) $Y = \overline{A}\overline{B} + AB$ 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 $Y = AB + \overline{B}C + BC$ when simplified is _____
A) B + C B) AB C) $A + \overline{B}$ D) AB+C

b. Simplify the following Boolean expressions

$Y = \overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} + A\overline{B}\overline{C} + AB\overline{C}$

$Y = (A\overline{B} + \overline{A}C)(BC + B\overline{C})(ABC)$ **(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 $F = \overline{(X + Y(\overline{Z} + \overline{Y})}$ using only NAND – Gates. **(04 Marks)**

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