

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3302

Roll No.

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B.Tech.

(SEM. II) THEORY EXAMINATION 2010-11

ELECTRONICS ENGINEERING

Time : 3 Hours

Total Marks : 100

- Note :-** (i) Attempt **ALL** questions.
 (ii) Marks for each question is indicated.
 (iii) Draw necessary circuit diagrams.

SECTION—AAttempt **ALL** parts of the questions.

1. This question contains ten objectives type/fill in the blanks type questions. Select most appropriate options :—

10×2=20

- (a) If capacitor value increases in a capacitor filter, then the ripple factor
- (i) Increases (ii) Becomes zero
 (iii) Decreases (iv) None of these
- (b) Transistor is in saturation when
- (i) $I_B = I_C$ (ii) $I_B > I_C/\beta_{dc}$
 (iii) $I_B = 0$ (iv) $I_B < I_C/\beta_{dc}$
- (c) In a CS amplifier, $V_{ds} = 4.2 V_{rms}$ and $V_{gs} = 140 mV_{rms}$ the voltage gain is
- (i) 4.2 (ii) 42
 (iii) 30 (iv) 3

- (d) The voltage follower is commonly used as
- Switch
 - Isolator
 - Regulator
 - None of these
- (e) Oscilloscope is basically a
- Voltmeter
 - Ammeter
 - Wattmeter
 - Energy meter
- (f) The essential elements of an electronic instrument is a/an
- Transducer
 - Signal conditioner
 - Indicating device
 - All of the above
- (g) The transition capacitance of a reverse biased p-n junction having uniform doping on both sides, varies with junction voltage (V_B) as
- $1/V_B$
 - V_B
 - $V_B^{-1/2}$
 - V_B^2
- (h) In approximate analysis _____ and _____ parameters are neglected.
- (i) JFET Amplifiers have _____ input impedance
- (j) The clipper circuits are also called _____.

SECTION—B

Attempt any **THREE** parts of the following. (3×10)

2. (A) (i) Draw the circuit diagram to obtain the characteristics of BJT in CE configuration. Draw output characteristic curves and indicate the different regions of operation.
- (ii) An n-p-n transistor with $\alpha = 0.98$ is operated in the CB configuration, if the emitter current is 3 mA and reverse saturation current is 10 μ A. What are the Base current and collector current.

- (B) Write short notes on any **TWO** of the following :—
- Digital voltmeter.
 - CS FET Amplifier
 - Early Effect in transistors.
- (C) Draw the circuit diagram of full wave rectifier with shunt capacitor filter and explain its operation with relevant waveforms. Derive the expression for ripple factor for the shunt capacitor filter.
- (D) (i) Write down the characteristics of an ideal OP-AMP. Design an inverting amplifier with a gain of -5 and input resistance of 10 K ohm.
- (ii) Draw the circuit diagram of difference amplifier using OP-AMP. Derive the expression for output voltage.
- (E) (i) Explain how JFET can be used as a voltage variable Resistor.
- (ii) Determine the following for the network of Fig. 1 :

- (i) V_{GSQ} (ii) V_{DS} (iii) V_D (iv) V_G (v) V_S .

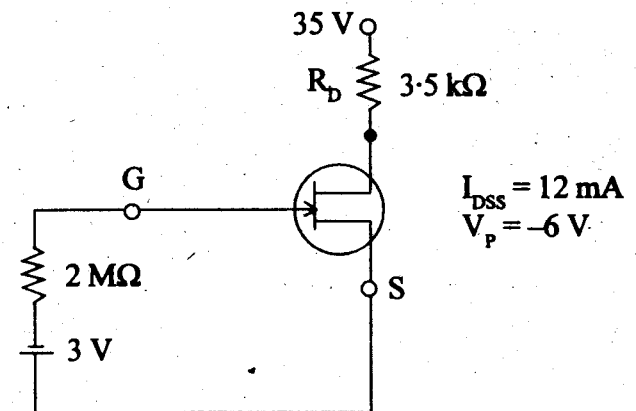


Fig. 1

SECTION—C

Attempt **all** questions. All questions carry equal marks.

(5×10)

3. Attempt any **TWO** parts of the following :— (2×5=10)

- (a) Discuss the physical mechanism of break down in diodes. For the circuit shown in Fig. 2, determine V_L , V_R , I_Z and P_Z .

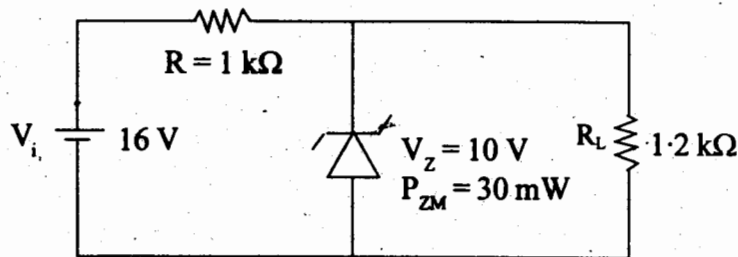


Fig. 2

- (b) In a half wave rectifier show that the maximum dc output power occurs when load resistance equals the diode forward resistance:
- (c) Derive the expression for the dynamic resistance of a diode. At what voltage the reverse current flowing through a Ge diode will reach 80% of its saturation value at room temperature.

4. Attempt any **ONE** of the following :— (1×10)

- (a) (i) What are the advantages of hybrid parameters. Draw the h parameter model of a transistor amplifier in CE configuration.
- (ii) A CE transistor amplifier is characterised by $h_{ie} = 2 \text{ K } \Omega$, $h_{re} = 2 \times 10^{-4}$, $h_{fe} = 50$ and $h_{oe} = 20 \times 10^{-6} \text{ A/V}$ if load resistance is $4 \text{ k}\Omega$

and the source resistance is 200 ohms. Determine the R_i , R_o , A_v , A_i and A_p .

- (b) Define “Load line” and “Operating point” of BJT. Mention the criteria for selection of operating point.

A Ge transistor with $\beta = 49$ has self biasing arrangement as given in the Fig. 3. Given $V_{CC} = 10 \text{ V}$, $R_L = 1 \text{ K } \Omega$, $V_{CE} = 5 \text{ V}$, $I_C = 4.9 \text{ mA}$ and $V_{BE} = 0.2 \text{ V}$ the stability factor S is desired to be 10. Obtain the values of R_1 , R_2 and R_E .

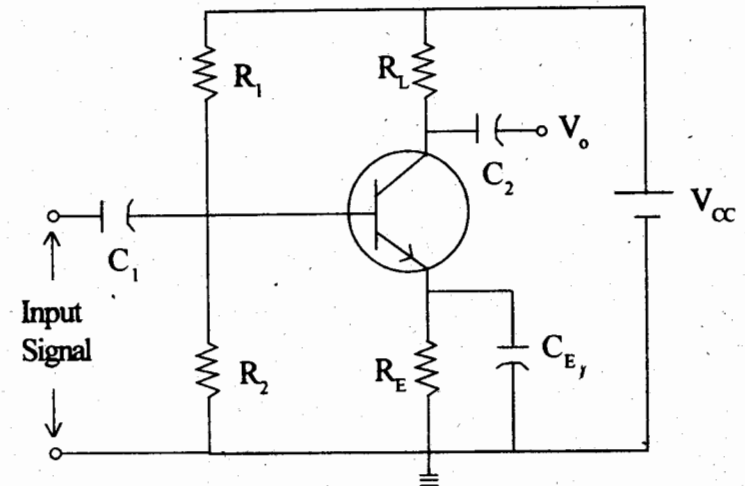


Fig. 3

5. Attempt any **ONE** of the following :— (1×10)

- (a) Why JFET is called voltage controlled device. Draw the structure and output characteristics of P channel JFET indicate different regions in the characteristic and explain its significance.

(b) (i) Explain the terms used regarding an OP-AMP :

(i) C.M.R.R.

(ii) Slew Rate

(iii) Input bias current

(iv) Virtual ground

(v) Output offset voltage.

(ii) A sinusoidal signal with peak value 6 mV and 2 kHz frequency is applied to the input of an ideal OP-AMP Integrator with $R_{in} = 100 \text{ K ohm}$ and $C_F = 1 \mu\text{F}$. Find the output voltage.

6. Attempt any TWO parts of the following :— (2×5=10)

(a) (i) Convert followings are directed :

(i) $(6089.25)_{10}$ into octal

(ii) $(A6B.F5)_{16}$ into Binary

(iii) $(375.37)_8$ to Binary

(ii) Perform each of the following decimal addition in 8421 BCD Code :

$$24 + 18, \quad 48 + 58.$$

(b) Simplify the following logic expressions using Boolean Algebra :

(i) $F = AB + A(B + C) + B(B + C)$

(ii) $F = A\bar{B}\bar{C}D + \bar{A}\bar{B}D + B\bar{C}\bar{D} + \bar{A}B + \bar{B}\bar{C}$.

(c) Simplify the following function using K Map :

$$F(A, B, C, D) = \sum m(1, 3, 4, 6, 8, 9, 11, 13, 15) + \sum d(0, 2, 14).$$

7. Attempt any ONE of the following :— (1×10)

(a) Draw the block diagram of C.R.O. and explain the function of each block. How C.R.O. can be used to measure

(i) Voltage

(ii) Frequency

(iii) Phase difference.

(b) Draw the block diagram of digital multimeter. Mention its advantages and applications.