Bihar Engineering University, Patna
End Semester Examination - 2022

Course: B.Tech. | *Semester: III* | *Time: 03 Hours*
Code: 100302 | *Subject: Analogy Electronics Circuits* | *Full Marks: 70*

Instructions:-

(i) The marks are indicated in the right-hand margin.
*(ii) There are **NINE** questions in this paper.*
*(iii) Attempt **FIVE** questions in all.*
(iv) Question No. 1 is compulsory.

Q.1 ***Choose the correct answer of the following (Any seven question only):*** **[2 x 7 = 14]**

(a) For a base current of 10μA, what is the value of collector current in common emitter if β_{dc}= 100?
(i) 10 μA (ii) 100 μA
(iii) 1mA (iv) 10mA

(b) If an amplifier with gain of -1000 and feedback factor β= -0.1 had a gain change of 20% due to temperature, the change in gain of the feedback amplifier would be
(i) 10% (ii) 5%
(iii) 0.2% (iv) 0.01%

(c) A trivalent impurity has ..... Valence electrons.
(i) 4 (ii) 5
(iii) 6 (iv) 3

(d) Zener diodes are used primarily as .....
(i) Amplifiers (ii) Voltage regulators
(iii) Rectifiers (iv) Oscillators

(e) Peak inverse voltage of diode used in Half-wave rectifier is
(i) 2Vm (ii) Vm/2
(iii) Vm (iv) Vm/3

(f) For every 10^0C increase in temperature, the reverse saturation current of a p-n junction will be increased by:
(i) 10 times (ii) 2 times
(iii) 4 times (iv) Remain same

(g) A BJT transistor operates in which region when the base-emitter junction is forward-biased and the base-collector junction is reverse-biased?
(i) Active region (ii) Saturation region
(iii) Cutoff region (iv) Reverse active region

(h) In an RC phase shift oscillator, the phase shift provided by each RC stage is :
(i) 30 degree (ii) 45 degree
(iii) 60 degree (iv) 90 degree

(i) If the PIV rating of a diode is exceeded
(i) the diode conducts poorly (ii) the diode is destroyed
(iii) the diode behaves as Zener diode (iv) None of the above

(j) For I_{DDS} = 9 mA and V_p = - 3.5V, I_D for V_{GS} = 0V is
(i) 8 mA (ii) 9 mA
(iii) 10 mA (iv) 11 mA

Q.2 (a) Define the following: [7]
(i) Common mode rejection ratio (CMRR)
(ii) Gain bandwidth product
(iii) Slew rate of op-amp

(b) State the Barkhausen condition for an electronic system to oscillate with feedback. [7]

Q.3 (a) Derive the expression for stability factor for fix bias circuit with respect to I_{CO}, V_{BE} and β. [7]

(b) A voltage divider biased circuit has R_1=39kΩ, R_2=82kΩ, R_C=3.3kΩ, R_E=1kΩ and CC=18V. The silicon transistor has used β = 120. Find Q - point and stability factor. [7]

Q.4 (a) With the help of block diagram, explain the concept of feedback. [7]

(b) Discuss with the help of circuit example, the purpose of providing - [7]

(i) negative feedback;

(ii) positive feedback in amplifier.

Q.5 (a) With a neat circuit diagram and waveforms, explain the working of full wave bridge rectifier and show that its ripple factor is 0.48. [7]

(b) Describe in detail the avalanche and Zener breakdown mechanism in Zener diode. [7]

Q.6 (a) Derive the expression for output voltage of an instrumentation amplifier. Also write its advantages and disadvantages [8]

(b) For an N-channel MOSFET the parameters given as $\mu C_{ox}\frac{w}{L} = \frac{0.2mA}{V^2}$, $V_{DS} = 0.2V$, and $V_t = 0.7V$. Find the region of operation and the drain current. [6]

Q.7 (a) Differentiate between JFET and BJT indicating the advantages and disadvantages. [7]

(b) What is faithful amplification? Explain the conditions to be fulfilled to achieve faithful amplification in transistor amplifier. [7]

Q.8 (a) Draw and explain the pin configuration of a 741 Op-Amp. Also explain the internal structure of an Op-Amp with the help of block diagram. [7]

(b) For the circuit shown below. Assume zener voltage to be 4.78v and voltage drop across the forward biased zener to be 0.7v. Find the peak voltage of output. [7]

Q.9 (a) State the characteristics of an ideal transformer. [2]

(b) Define *rms* value, form factor, peak factor, complex power and half power frequency. [5]

(c) Two two-port network a and b, with open-circuit impedances Z_a and Z_b are connected in series. Drive the Z-parameter equations. [7]

Circuit of Question No. 8(b)