[91/A-24]
[Eng]

Seat No :_____

SARDAR PATEL UNIVERSITY
3rd Semester B. Sc.(Under CBCS) Examination-2019
Tuesday, 26thNov-2019
Time: From 2:00pmto5:00 pm
Subject: PHYSICS [US03CPHY02]
[Basic Solid State Electronics]Total Marks: 70

N.B:(i)All the symbols have their usual meanings.

(ii) Figures at the right side of questions indicate full marks.

Q-1 **Answer the following Multiple Choice Questions.**   [10]

(1)   The transistor parameters are _____.
(a) temperature dependent   (b) pressure dependent
(c) P-N junction dependent   (d) None of above

(2)   In the voltage divider biasing network, the Q-point of the transistor can be
made almost independent of _____ .
(a) β (b) α (c) current   (d) voltage

(3)   Transistors are used in _____.
(a)Zener diode (b) Amplifier (c)P-N junction diode (d)None of above

(4)   Which of the following h-parameter gives forward current ratio of a C-E
transistor?
(a) h_{re} (b) h_{fe} (c) h_{ie} (d) h_{oe}

(5)   If v_i and v_o are respective input and output voltages of an amplifier then
the voltage gain A_v is _____.
(a) $v_i + v_o$ (b) $v_i - v_o$ (c) $\frac{v_o}{v_i}$ (d) $\frac{v_i}{v_o}$

(6)   An amplifier circuit of a current gain 100 has 5mA input. The value of
output current is _____.
(a)50 mA   (b) 500 mA   (c)5000 mA   (d) 5 mA

(7)   Which of the following is the demerit of negative feedback amplifier?
(a) Reduction in band with   (b) Reduction in noise
(c)Reduction in gain   (d) Reduction in distortion

(8)   The voltage gain of emitter follower is always _____.
(a) greater then unity   (b) greater than two
(c) less then unity   (d) infinite

(9)   Barkhausen criterion for oscillator is _____.
(a) $A\beta = 1$ (b) $A\beta < 1$ (c) $A\beta > 1$ (d) None of these

(10)   The input impendence of a negative feedback amplifier is increased by
factor ____.
(a) $[A\beta + 1]$ (b) $1/A\beta$ (c) $[A\beta - 1]$ (d) None of above

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(P.T.O)

Q-2 **Answer the following questions in short : (Attempt Any Ten)** [20]
    (1)   What is thermal run away of transistor? Explain with proper diagram.
    (2)   State requirements of a good biasing circuit.
    (3)   Draw neat and clean labeled circuit diagram for simple biasing using PNP transistor.
    (4)   Give the phase relationship between input and output in C-E mode of NPN transistor.
    (5)   A multistage amplifier consists of three stages. The voltage gain of the stages are 30, 50, and 80. Calculate the overall voltage gain in dB.
    (6)   Define small signal amplifier and write its application.
    (7)   Write basic requirements of an oscillator circuit.
    (8)   Give classification of oscillator in terms of generation of waveform.
    (9)   Differentiate between an amplifier and an oscillator.
    (10) Distinguish between positive and negative feedback.
    (11) Draw the block diagram of : (1) Voltage-Shunt feedback (2) Current-Shunt feedback
    (12) Why positive feedback is not used in amplifier circuit?

Q-3 (a)   What is Fixed bias circuit? Explain how operating point of a fixed bias circuit is determined. [06]

    (b)   A collector to base bias circuit having V_{CC} = 10 V , R_B = 500 KΩ ,R_c = 500 Ω and β of the transistor equal to 100. Find its collector current and voltage. Determine position of the operating point. [04]

OR

Q-3 (a)   What is voltage divider biasing circuit? Using approximate analysis, explain how to determine operating point of such circuit. [06]

    (b)   Discuss emitter bias circuit using NPN transistor with proper circuit diagram [04]

Q-4 (a)   Explain the analysis of single stage transistor amplifier with ac equivalent circuit. Also obtain expression for (a) voltage gain (b) current gain (c) power gain. [06]

    (b)   Draw the neat and clean circuit diagram for single stage transistor amplifier. [04]

OR

Q-4 (a)   What are h-parameters? Explain development of h- parameter equivalent circuitfor CE configuration. [06]

    (b)   Define multistage amplifier. Explain its need and obtain an expression for voltage gain of multistage amplifier. [04]

Q-5 (a)   State advantages of negative feedback in amplifier. Explain any one advantage of negative feedback in detail. [05]

    (b)   Discuss RC coupled amplifier withoutbypass capacitor using NPN transistor. [05]

OR

Q-5 (a)   Discuss voltage gain of feedback amplifier using proper circuit diagram. [05]

    (b)   Write a note on "Emitter Follower". [05]

Q-6   Write notes on Hartley oscillator and Colpitt's oscillator. [10]

OR

Q-6   Write basic principles of RC oscillators. Discuss Phase-Shift Oscillator and Wein Bridge Oscillator with proper circuit diagram. [10]

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