AB-3122
Third Year B. Sc. (Physics) (Sem. V) Examination
March/April – 2015
Electronics
(Generic Elective)

Time : 2 Hours] [Total Marks : 50

Instructions :
(1) Fill up strictly the details of sign on your answer book.
Name of the Examination : Third Year B. Sc. (Physics) (Sem. V)
Name of the Subject : Electronics (Generic Elective)
(2) Draw a neat diagram wherever necessary.
(3) Symbols used in the question paper have their usual meaning.
(4) Figures to the right indicate full marks of the question.
(5) Scientific calculator may be used.

1 (a) Give correct answers from multiple choices : 4
(i) The phase difference between output and input current at load of CE amplifier.
(a) 180° (b) 0°
(c) 90° (d) 270°
(ii) In a.c. equivalent circuit of a transistor amplifier, the battery is considered.
(a) Short (b) Open
(c) Partially short (d)
(iii) The lower and upper cut off frequencies are also called frequencies.
(a) Side band (b) Resonant
(c) Half resonant (d) Half power
(iv) The purpose of d.c. condition in a transistor is to-
(a) Reverse bias the emitter
(b) Forward bias the collector
(c) Set up operating point
(d) None of the above.

AB-3122] 1 [Contd...
(b) Answer the following question in short: (any five)
(i) Why the RC and transformer coupling amplifier is not used at extremely small frequency?
(ii) Convert power gain 4 bel in to voltage gain.
(iii) A carrier of 100 V and 1.0 MHz is modulated by a 50 V, 1 kHz sine wave signal. Find the modulation factor.
(iv) A carrier wave of 500 Watts is subjected to 100% amplitude modulated. Determine power in side bands.
(v) What are the types of modulation?
(vi) Define CMRR. What is its ideal value?
(vii) Define the modulation.

2 (a) Explain how the single state CE amplifier produces a phase reversal between input and output voltage with neat circuit.

OR

2 (a) What is main disadvantage of RC coupled amplifier? What modification is required to solve it. Explain that amplifier with neat circuit diagram.

(b) (i) If the overall circuit gain of two stage RC coupled amplifier is 60 dB. If the current gain of first stage 20 dB calculate the current gain of second stage.
(ii) Determine the transformer turn ratio for transforming maximum power to 10Ω load from source that has an output of 1kΩ.

OR

(b) For transistor amplifier having following parameters. \( V_{cc} = 15V, R_1 = 10k\Omega, R_2 = 5k\Omega, R_C = 1k\Omega \)
\( R_E = 2 \quad k\Omega, R_L = 1 \quad k\Omega \) and \( V_{BE} = 0.7V \)
(i) Draw d.c load line
(ii) Determine operating point \( (V_{CE\phi}, I_{C\phi}) \)

3 (a) Explain the working of dual inputs, balance output differential amplifier. Draw necessary diagram.

OR
(a) To perform AC analysis to derive the equation for voltage gain, input resistance and output resistance of differential amplifier.

(b) An emitter biased dual, input-balance output differential amplifier has the following specifications.

\[ |V_{CC}| = |V_{EE}| = 10V, R_c_1 = R_c_2 = 2.7 \, k\Omega \text{ and } R_E = 3.9 \, k\Omega. \]

The gain of each transistor \[ B_{ac} = B_{dc} = 100. \] (Take \( V_{BE} = 0.715V \)) Calculate:
(a) The operating point for each transistor.
(b) The voltage gain.
(c) The input resistance of the circuit.

OR

(b) Explain the common mode gain of differential amplifier. 5

4 (a) What is modulation? Why is modulation necessary in communication system?

OR

(a) Derive an expression for the fraction of total power carried by side bands in amplitude modulation.

(b) A carrier wave of 150 V and 300 kHz is modulated by 70 V, 300 Hz sine wave signal. Find the modulation index, side band frequency and band width.

OR

(b) The r.m.s. value of carrier voltage is 100 V. After amplitude modulation by a sinusoidal a.f. voltage, the r.m.s. value becomes 110 V. Calculate the modulplex index.