



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

Time : 2 Hours]

[Total Marks : 50

Instructions :

(1)

<p>नीचे दृशावेव निशानीवाणी विगतो उत्तरवडी पर अवश्य लपनी. Fillup strictly the details of signs on your answer book.</p> <p>Name of the Examination : Third Year B. Sc. (Physics) (Sem. V)</p> <p>Name of the Subject : Electronics (Generic Elective)</p> <p>Subject Code No. : 3 1 2 2 Section No. (1, 2,.....): Nil</p>	<p>Seat No. : □ □ □ □ □ □</p> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; text-align: center; width: 100%;">Student's Signature</div>
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- (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.

- (b) Answer the following question in short : (any **five**) **10**
- (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. **7**
- 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. **7**
- (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. **3**
- (ii) Determine the transformer turn ratio for transforming maximum power to 10Ω load from source that has an output of $1k\Omega$. **2**
- OR**
- (b) For transistor amplifier having following parameters. $V_{CC} = 15V$, $R_1 = 10k\Omega$, $R_2 = 5k\Omega$, $R_C = 1k\Omega$
 $R_E = 2k\Omega$, $R_L = 1k\Omega$ and $V_{BE} = 0.7V$ **5**
- (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. **7**

OR

- (a) To perform AC analysis to derive the equation for voltage gain, input resistance and output resistance of differential amplifier. **7**
- (b) An emitter biased dual, input-balance output differential amplifier has the following specifications. **5**

$$|V_{CC}| = |-V_{EE}| = 10V, R_{c_1} = R_{c_2} = 2.7k\Omega \text{ and}$$

$$R_E = 3.9k\Omega. \text{ The gain of each transistor}$$

$$B_{ac} = B_{dc} = 100. \text{ (Take } V_{BE} = 0.715V \text{)}$$

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 ? **7**

OR

- (a) Derive an expression for the fraction of total power carried by side bands in amplitude modulation. **7**
- (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. **5**

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 modindex. **5**