Seat No. : _____

AL-107

April -2018

B.Sc., Sem.-II

CC-3, Paper-103 : Electronics

Time : 3 Hours] **[Max. Marks : 70**

1. (a) Explain transistor as an amplifier. **7**

OR

Discuss relation between α and β. And prove that $\alpha = \beta/(1+\beta)$. Draw the different transistor circuit configuration.

(b) Draw the circuit of collector to base bias and obtain stability factor S. **7**

OR

Draw the circuit of voltage divider bias and obtain stability factor S.

2. (a) Derive the expression for current gain, voltage gain, input resistance, output resistance and power gain of a transistor amplifier operating in the CE mode. **7**

OR

Define the following parameters with their names :

(i) h-parameters

(ii) Y-parameters

(iii) Z-parameters

(b) Derive the general formula for voltage gain, current gain, input impedance and output impedance of a linear circuit in terms of h-parameter. **7**

OR

Draw the circuit diagram of two stage R-C coupled amplifier. Derive an expression for the voltage gain in mid frequency region.

3. (a) Define series resonance, draw its complete circuit diagram and prove that $Z = R[1+jQ\delta(2-\delta)]$ **7**

OR

Derive the conversion formulas directly from impedance of π-network to T-network and T-network to π-network.

(b) State and prove Maximum Power Transfer theorem. **7**

OR

What is antiresonant ? Draw its circuit diagram and prove that

(1) $f_{ar} = \frac{1}{2\pi}\sqrt{\frac{1}{LC}}\sqrt{1-\frac{1}{Q^2}}$

(2) $X_L = X_C(1 - 1/Q^2)$

(3) $R_{ar} = L/CR$

4. (a) Solve the Boolean expression $\bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}D + \bar{A}BCD + A\bar{B}\bar{C}\bar{D} + A\bar{B}C\bar{D}$ by preparing truth table and thereby Karnaugh Map. Encircle all octets, quads, and pairs. 7

OR

What is BCD-TO-Decimal decoders? Draw a logic circuit diagram of a 1-of-10 decoder and explain its working with the help of 4-input logic levels.

(b) Define demultiplexer. Draw the logic circuit diagram of a 1-to-16 demultiplexer, draw the pin diagram of its IC 74154 and prepare its truth table. 7

OR

Draw a logic diagram of a two-input exclusive OR gate using basic logic gates. Explain its working and give its symbol. Explain how to prepare four input Ex-OR gate from two input Ex-OR gate.

5. Answer in short : **14**

(1) Define stability in biasing circuit.

(2) In which region transistor is heavily doped?

(3) In which configuration amplifier has lowest voltage gain?

(4) Which is the best method for biasing the transistor?

(5) Draw the symbol of P- N- P and N- P- N transistor.

(6) Which is the smallest of h- parameter of transistor.

(7) Draw the seven-segment display.

(8) Define the figure (factor) of merit, Q.

(9) What is power factor?

(10) What are Z_{1oc}, Z_{1sc}, Z_{2oc} and Z_{2sc} ?

(11) What do you mean by don't care condition?

(12) State D'Morgan's theorems.

(13) Define bandwidth of a resonant circuit.

(14) Give names of four basic method of coupling.