Seat No. : _____

XS-119

April-2013

B.Sc. (Sem.-II)

Ele-103 : Electronics

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

Instructions : (1) **All** questions carry equal marks.
(2) Symbols are used have their meanings as usual.

1. (a) Explain current gains (α and β) in common base and common emitter configurations. Find the relation between α and β. **7**

OR

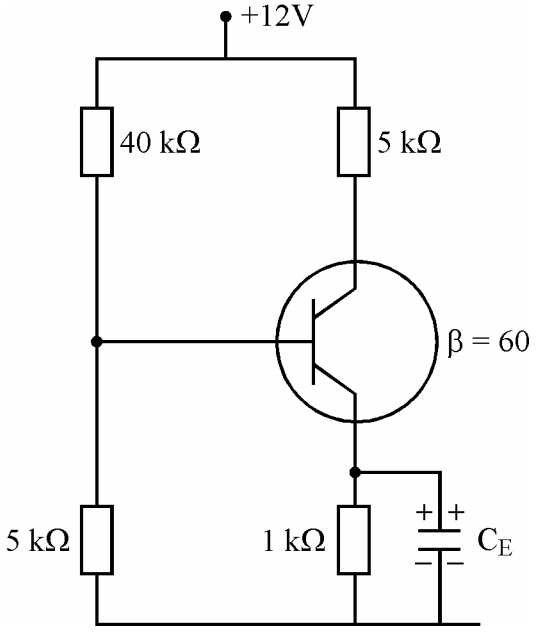
(a) (i) When the emitter current of a transistor changes by 1 mA its collector current changes by 0.995 mA, calculate α and β. **4**

(ii) The current gain of a transistor in common emitter (CE) configuration is 49. What will be the current gain of the same transistor in Common Base (CB) configuration ? **3**

(b) Draw the circuit diagram of a transistor under fixed bias. Discuss the disadvantages of this circuit. **7**

OR

Calculate the dc bias voltage and currents for the circuit given below. Assume V_{BE} = 0.3 V and β = 60 for the transistor used.



2. (a) Draw a low frequency h-parameter equivalent circuit of a CE transistor amplifier. Derive expressions for input resistance, output resistance, current gain, voltage gain and power gain. **7**

OR

What are h-parameters ? Define h-parameters of a CE transistor. State advantages of using h-parameters.

(b) The hybrid parameters of a transistor used as an amplifier in CE configuration are $h_{ie} = 800\ \Omega$, $h_{fe} = 46$, $h_{oe} = 80 \times 10^6$ mho and $h_{re} = 5.4 \times 10^{-4}$. If the load resistance is 5 kΩ and effective source resistance is 500 Ω. Calculate current gain, input resistance and voltage gain. **7**

OR

The h-parameters of a transistor amplifier in CB configuration are as follows :

$h_{ib} = 21\ \Omega$, $h_{rb} = 3 \times 10^{-4}$, $h_{fb} = -0.98$ and $h_{ob} = 5 \times 10^{-7}\ \Omega^{-1}$

Determine the current gain, input impedance and voltage gain for a load resistance of 8 kΩ.

3. (a) Define phenomena of series resonance with suitable current diagram and derive following relations : **7**

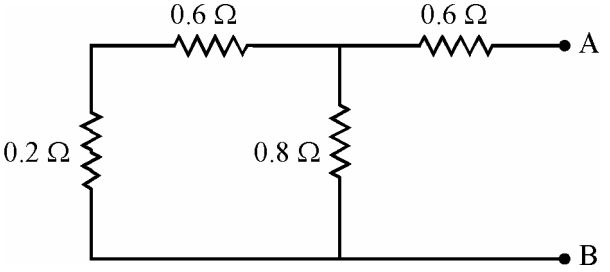
(i) $f_r = \dfrac{1}{2\pi\sqrt{LC}}$

(ii) $Q = \dfrac{1}{R}\sqrt{\dfrac{L}{C}}$

OR

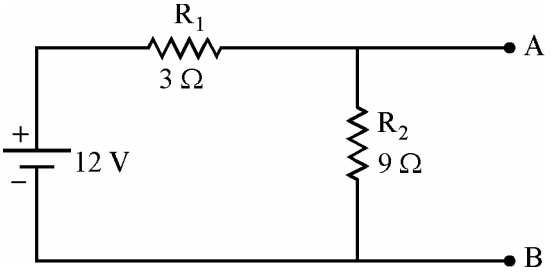
(a) Define bandwidth of series resonance and drive formula for bandwidth = $\dfrac{2}{Q} f_r$.

(b) State and explain Thevenin theorem. Find Thevenin equivalent resistance between the points A and B of the circuit shown below : **7**



OR

(b) State and explain Norton's theorem. Give Norton's equivalent circuit for the following circuit :



4. (a) Simplify the following Karnaugh map, draw its equivalent NAND-NAND circuit. **7**

	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	0	0	1	0
$\bar{A}B$	1	1	1	0
AB	0	1	1	1
$A\bar{B}$	0	1	0	0

OR

Draw Karnaugh map for logic equation.

$Y = F(A, B, C) = \Sigma m(1, 2, 3, 6, 7)$

(b) What is called Multiplexer ? Give the circuit diagram and logic circuit for 4-to-1 multiplexer. **7**

OR

What is called encoder ? Give truth table and logic circuit for Decimal-to-BCD encoder.

5. Answer the following questions in short : **14**

(1) Why Q point should be in the middle of load line ?

(2) What are saturation and cut-off regions ?

(3) Sketch the segments of seven-segment indicator.

(4) What is Karnaugh Map ?

(5) On a Karnaugh map what are adjacent 1s called ?

(6) What a logic circuit with one output and many inputs known as ?

(7) Give Schematic symbols for PNP and NPN transistors.

(8) What name is given to Q in connection with resonance circuit ?

(9) Which is the smallest of four h-parameters of a transistor ?

(10) What factors Q of resonance circuit depends upon ?

(11) How many fundamental products are there for two variables ?

(12) What on a Karnaugh map called quad ?

(13) What is LED ?

(14) What does the abbreviation BCD stand for ?