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SB-3523

M. Sc. (Part - II) Examination

March / April – 2011

Electronics : Paper - III

(Microwave, C & CAD for Electronics)

Time : **3** Hours] [Total Marks :**52**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **M. SC. (PART - 2)**

Name of the Subject :

☛ **ELECTRONICS : PAPER - 3**

☛ Subject Code No. : **3 5 2 3** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Answers to the two sections must be writeen in separate answer books.

(3) figures to the right hand side of each question indicate full marks.

(4) Assume data if required.

(5) Symbols used have their usual meaning.

SECTION - I

1 (a) With a neat diagram, explain the operation of the reflex klystron oscillator. Derive the expression of the round trip transit time in the repeller region. **5**

(b) An X-band pulsed cylindrical magnetron has the following operating parameters : **3**

Anode Voltage V_o = 30 KV

Beam current I_o = 25 A

Magnetic flux density B_o = 0.336 wb/m^2

Diameter of cathode cylinder 2a = 10 cm

Diameter of vane edge to center 2b = 20 cm.

Compute :

(i) The cyclotron angular frequency

(ii) The cut- off voltage for a fixed B_o.

(iii) The cut- off magnetic flux density for a fixed V_o.

2 (a) What is Baritt diode ? Explain the current transport mechanism of M-S-M structure. Show that the current density is $J = qV_s \ N_D \frac{V}{V_{FB}}$. 5

Where V_{FB} is the flat band voltage.

(b) Find out the tunneling probability for triangular potential barrier shown in the following figure. 4

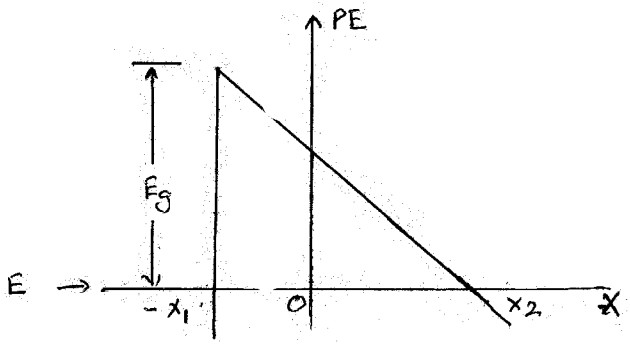

Fig. : Triangular potential Barrier

OR

2 (a) Explain the wavemodes of a helix type traveling wave tube and obtain the values of the four propagation constants Y_1, Y_2, Y_3, and Y_4. 5

(b) Explain the principle of operation of Trapatt diode and derive the equation for the avalanche zone velocity. 4

3 (a) Discuss Tem modes in circular waveguides. What are the properties of Tem modes. 3

(b) What is a E- plane tee ? What are its properties ? 2

(c) A circular waveguide has a cut- off frequency of 9 GHz in dominant mode. Where $X'_{11} = 1.841$. 4

(i) Find the inside diameter of the guide if it is air- filled.

(ii) Determine the inside diameter of the guide if the guide is dielectric- filled . The relative dielectric constant is $\in_r = 4$

OR

3 (a) What is microwave isolator ? How does it use to isolate one component from reflections of other components in the transmission on line. 4

(b) What is hybrid ring ? What are its characteristics ? Define S- matrix of it. 1

(c) Two 3- dB quadrature lange couplers are used in a Ga As Mesfet balanced amplifier circuit with the following parameters : 4

Mesfet a : Reflection coefficients

$S_{11a} = 0.7488$

$S_{22a} = 0.8521$

Forward transmission Coefficient $S_{21a} = 1.3500$

Mesfet b : Reflection coefficients

$S_{11b} = 0.6210$

$S_{22b} = 0.7727$

Forward transmission $S_{21b} = 1.2200$ coefficient.

Compute :

(i) The input and output vswRs.

(ii) The power gain in dB for the balanced amplifier.

(iii) The linear output power gain in dB. Use the following data if required :

$\mu_o = 4\pi \times 10^{-7}$ Henry/meter

$e = 1.602 \times 10^{-19} C$

$\in_o = 8.854 \times 10^{-12}$ Farad/meter

m = mass of an electron = 9.109×10^{-31} Kg.

SECTION - II

4 (a) Explain meaning of the following format control codes, 3
(1) % f (2) % e (3) % x

(b) List all five functions that the workstation must accomplish. 3

(c) Write precedence of the arithmetic operators in C. 2

5 (a) Classify following into valid integer hexadecimal constant and invalid integer hexdecimal constant and give reason of invalidity of each invalid integer hexadecimal constant. 5

(i) 6AC5

(ii) 0x5BCH

(iii) -0x2FF

(iv) FFFF

(v) 0x1010.

(b) Draw the flowchart and write a C-program to find biggest out of five numbers. 4

OR

5 (a) What is "Pointers" ? Explain use of "Pointer" in C- language programming with suitable example. **5**

(b) Write a C program that converts an octal number entered through keyboard into **4**

(i) hexadecimal number and

(ii) decimal number and display converted values on the monitor.

6 (a) Enlist and explain different type of input devices with their merits and demerits. **5**

(b) Define mathematically **4**

(i) Scaling matrix (ii) Rotation matrix

Design two- dimensional rotation matrix to rotate the line about the origin by $45°$.

OR

6 (a) Explain the "scaling", "translation" and "rotation" of a line in two-dimension. **5**

(b) Suppose a line difined by the matrix, $\begin{bmatrix} 2 & 2 \\ 3 & 4 \end{bmatrix}$ is to be scaled by a factor of two, calculate the resulting matrix Also mention scaling matrix. **4**