



RF-3595-96

M. Sc. - II Examination

April / May - 2010

Electronics : Paper - III

(Microwave, C & CAD for Electronics)

Time : Hours]

[Total Marks :

RF-3595

Instructions :

(1)

नीचे दृष्टावेक निशानीवाणी विगतो उत्तरवडी पर अवश्य कपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="M. Sc. - 2"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Electronics - 3"/>	<input type="text"/>
Subject Code No. : <input type="text" value="3"/> <input type="text" value="5"/> <input type="text" value="9"/> <input type="text" value="5"/>	<input type="text" value="Student's Signature"/>
Section No. (1, 2,.....) : <input type="text" value="1"/>	

- (2) Answers to the **two** sections must be written in **separate** answer books.
- (3) Figures to the **right** hand side of each question indicate full marks.
- (4) Assume the data if necessary.

- 1 (a) Explain the principle of operation of TRAPATT diode and derive equation for the avalanche zone velocity. **5**
- (b) Typical values of tunnel diode are **3**
 $R_s = 1 \Omega$, $L_s = 5 nH$, $C = 20 PF$ and $-R = 30 \Omega$.
Determine :
(i) The resistive cut-off frequency
(ii) The reactive cut-off frequency
(iii) Draw the equivalent circuit of a tunnel diode and find out its input impedance.
- 2 (a) Consider a $p^+ - n - p^+$ structure of BARITT diode. **5**
Under small signal behaviour, find out the small signal resistance and reactance of the structure.
- (b) A rectangular cavity resonator has dimensions of **4**
 $a = 5 \text{ cm}$, $b = 2 \text{ cm}$ and $d = 15 \text{ cm}$, compute :
(i) The resonant frequency of the dominant mode for an air-filled cavity.
(ii) The resonant frequency of the dominant mode for a dielectric field cavity of $\epsilon_r = 2.56$.

OR

RF-3595-96]

1

[Contd...

- 2 (a) What do you mean of tee junctions ? Explain them with theorems. Explain E-plane tee and Magic tee in detail. 5
- (b) A reflex klystron operates at the peak of the $n = 2$ mode. The dc power input is 40 mW and the $\frac{V_1}{V_0} = 0.278$: 4
- (i) Determine the efficiency of the reflex klystron
- (ii) Find the total output power
- (iii) If 20% of the power delivered by the electron beam is dissipated in the cavity walls, find the power delivered to the load.

Note that for $n = 2$, $X' = 2.408$ and $J_1(X') = 0.52$.

- 3 (a) Draw the schematic diagram of a linear magnetron. Derive the expressions of the Hull cut-off voltage and Hull cut-off magnetic flux density of it. 5
- (b) Find out the solution of the following wave equation in cylindrical coordinates using the method of separation of variables : 4

$$\frac{1}{r} \frac{\partial}{\partial r} \left(r \frac{\partial \psi}{\partial r} \right) + \frac{1}{r^2} \frac{\partial^2 \psi}{\partial \phi^2} + \frac{\partial^2 \psi}{\partial z^2} = r^2 \psi$$

OR

- 3 (a) Explain the bunching process in a two cavity klystron amplifier. Find out the spacing between the buncher and catcher cavities in order to achieve a maximum degree of bunching. 5
- (b) A TWT operates under the following parameters : 4

Beam current $I_o = 50 \text{ mA}$

Beam voltage $V_o = 2.5 \text{ kV}$

Characteristic impedance of helix $Z_o = 6.75 \Omega$

Circuit length $N = 45$

Frequency $f = 8 \text{ GHz}$

Determine :

- (i) The gain parameter
- (ii) The output power gain A_p
- (iii) All four propagation constants :
Use the following data if required

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

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

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

$$\frac{e}{m} = 1.759 \times 10^{11} \text{ C/kg}$$

Instructions :

(1)

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Electronics - 3			
Subject Code No. :	3 5 9 6	Section No. (1, 2,.....):	2

- (2) Answers to the **two** sections must be written in **separate** answer books.
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- 4 (a) List and explain different data types in C. 3
- (b) Compare printers and plotters. Why plotters are preferred in CAD system ? 2
- (c) Which of the following are invalid variable name ? 3
Why ?
- (i) int
- (ii) sum \$
- (iii) v6s7
- (iv) _flag
- (v) 2 unit
- (vi) Price tag.
- 5 (a) Giving appropriate example, explain the use of : 5
(i) "for" and
(ii) "while" statements in C.
- (b) Giving flow chart, write a C-program that finds a smallest number from a set of five numbers. 4

OR

- 5 (a) With example, explain "function" and "structure" in C-programing 5
- (b) Write a function program that calculates average of 10 data stored in array. 4

- 6 (a) List at least five cursor control devices and giving construction, explain operation and application of any two devices. 5
- (b) Apply design process step by step for the designing of the transistorized monostable multivibrator. 4

OR

- 6 (a) Describe : 5
- (i) Raster scan and
- (ii) Stroke writing technique to generate image on CRT screen.
- (b) Translate the line $L_1 = \begin{bmatrix} 2 & 2 \\ 4 & 4 \end{bmatrix}$ in the space by 1 unit 4
- in x-direction and 4 units in y-direction. Represent both, the original and modified lines on the same coordinates.
