



RF-3477-78

M. Sc. (Part - I) Examination

April / May - 2010

Electronics : Paper - IV

(Analog & Digital Circuits, Measurement & Instrumentation)

Time : 3 Hours]

[Total Marks : 54

RF-3477

Instructions :

(1)

नीचे दशांशविले निशानीवाणी विगतो उत्तरवही पर अवश्य लिखवी. 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. - 1"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="ELECTRONICS - 4"/>	<input type="text"/>
Subject Code No. : <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="7"/> <input type="text" value="7"/>	<input type="text"/>
Section No. (1, 2,.....) : <input type="text" value="1"/>	
Student's Signature	

- (2) Use separate answer book for each section.
(3) Symbols used have their usual meaning.
(4) Figures to the right indicate full marks.

- 1 (a) Explain the significance of aspect ratio W/L in volt ampere characteristics of an NMOS transistor. Give all relevant formulas also. 3
- (b) What is current square? Explain Widlar current source in detail. 3
- (c) An NMOS transistor having $K = 1 \text{ mA/V}^L$ $W/L = 2$ and $V_T = 4V$ is used in the circuit having voltage supply of 12 V and $R_D = R_S = 2 \text{ K ohm}$, $R_1 = 100 \text{ K } \Omega$ and $R_2 = 300 \text{ K ohm}$. Determine I_D and V_{DS} . 3
- 2 (a) What is an Inverter? Explain the depletion load inverter in detail. With its transfer characteristics. 3
- (b) List the limitations of a ROM. How these limitations are overcome? Explain such devices. 2

- (c) Draw three inputs NOR gate using NMOS transistors. Explain its truth table. 4

OR

- 2 (a) Explain Emitter Coupled Logic (ECL) circuits in detail. 3
- (b) What do you understand by the high frequency response of an amplifier. explain this response for common emitter configuration. 2
- (c) Two 16 Kb (2048 x 8) ROMS are available. Show how to connect these so as to obtain (a) a 32 Kb (2048 × 16) ROM and (b) a 32 Kb (4096 × 8) ROM. 4
- 3 (a) Define stability. Explain Nyquist diagrams and its significance in electronic circuits. 3
- (b) Explain General analysis of Multistage feedback amplifier. 2
- (c) A waveform has a positive peak of magnitude V_1 and a negative peak of magnitude V_2 . Draw a circuit using two peak detector whose output is equal to the peak-to-peak value $V_1 - V_2$. 4

OR

- 3 (a) Define Electron per Bit of a CCD. Explain charge transfer in CCD using suitable example. 3
- (b) What is BIFET-BIMOS circuits? Explain three stage operational amplifier. 2
- (c) Determine the magnitude of Emitter Resistance for a Widlar current source. Using given data $V_{CC} = 15 V$, $R = 14.0 K \text{ ohm}$, $V_{BE2} = 0.7 V$, $\beta_F = 100$ and the desired value of $I_{C_1} = 50 \text{ micro A}$. Use $V_T = 25 \text{ mV}$. 4

- (b) A thermistor has a resistance as $3980\ \Omega$ at the ice point (0°C) and $794\ \Omega$ at 50°C . The R-T relationship is given by $R_T = aR_0 \exp\left(\frac{b}{T}\right)$. Calculate
- (i) constants a and b
- (ii) change in resistance to be measured if the temperature varies from 40°C to 100°C .
- 6** (a) (i) Draw the block diagram of digital voltmeter and explain how it can be used for the measurement of current, voltage and resistance
- (ii) What is the importance of an instrumentation amplifier?
- (b) The output of a LVDT is connected to a 5 voltmeter through an amplifier whose amplification factor is 250. An output of 2 mV appears across the terminals of LVDT when the core moves through a distance of 0.5 mm. Calculate the sensitivity of the LVDT and that of the whole set up. The milivoltmeter scale has 100 divisions. The scale can be read to 1/5 of a division. Calculate the resolution of the instrument in mm.

OR

- 6** (a) (i) Explain the chi square test for goodness of fit.
- (ii) What are the applications of capacitive transducer?
- (b) An average photogenerated current of $90\ \mu\text{A}$ in a reverse biased photodiode is measured using a series resistance of $12\ \text{K}\Omega$ and an amplifier with a bandwidth of 100 KHz.
- (i) Compare the relative contributions of Johnson and shot noise voltage.
- (ii) What is the signal to noise ratio at the amplifier output?

Assume that the noise figure is 1 and the temperature is $293\ \text{K}$.