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SB-3444

M. Sc. (Part - I) Examination

March / April – 2011

Electronics

(Analog & Digital Circuit, Measurement & Instrumentation)

Time : Hours] [Total Marks :

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 - 1)**

Name of the Subject :

☛ **Electronics**

☛ Subject Code No. : **3 4 4 4** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

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

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

(4) Assume the data if required.

SECTION - I

1 (i) List the advantages of an IC. State the prime advantage of NMOS, CMOS, ECL & TTL technologies. **3**

(ii) List the voltage -current characteristics equations of an NMOS transistor. Comment on the results. **2**

(iii) Give the architecture of two phase ratioless shift register cell, state its operation. **4**

2 (a) Explain the function of current source for IC. Explain different types of current sources with their limitations. **5**

(b) For the Circuit shown in the following figure, derive the expression for output voltageVo **4**

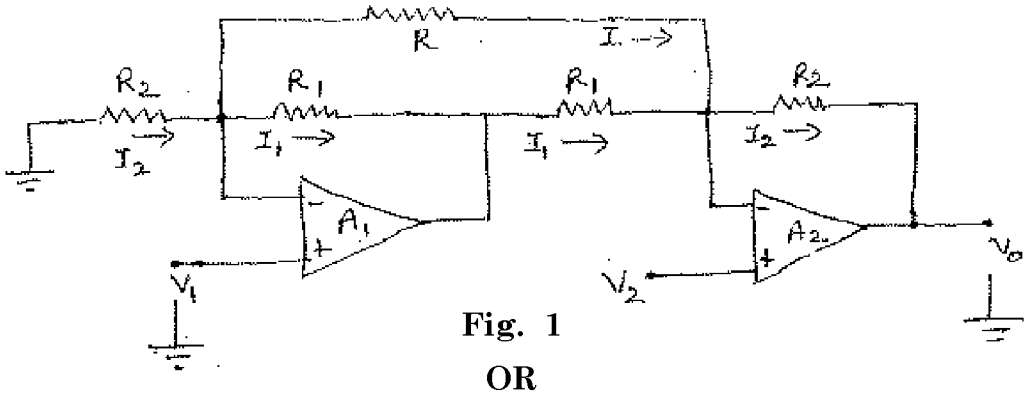

Fig. 1

OR

2 (a) What are BIFET-BIMOS? Explain three stage architecture used for the architecture of an op-amp. Using this technology. **5**

(b) The MOSFET having the following parameters from its transfer characteristics. **4**

$I_D = 0.1\ mA, V_{GS} = 4.25\ V, V_{DD} = 18\ V$

$R_D = 5.0k\ \Omega$ *and* $R_S = 10\ k\ \Omega$

(i) Determine the ratio R_1/R_2 which makes $I_D = 0.1\ mA$

(ii) What is the value of V_{DS} ?

3 (a) Define "Electron per Bit" **5**
What is CCD?
Explain three phase CCD operation with its charge shift from one capacitor to other.

(b) Draw high frequency response equivalent circuit for a CE amplifier. Derive the expression for $A_{VH}(S)$. **4**

OR

3 (a) (i) Sketch the topology for a generalized resonant oscillator using impedance Z_1, Z_2 and Z_3 **5**

(ii) At what frequency will the circuit oscillate?

(iii) Under what conditions does the configuration reduce to a colpit's oscillator and a Hartley oscillator?

(b) Derive the equations for Input regulation factor Sv; Output resistance Ro and Temperature coefficient S_T for a regulated power supply stabilization. List the advantages of monolithic regulators. **4**

SECTION - II

4 (a) Explain the Chi Square test for goodness of fit. **3**

(b) What are the applications of correlation methods? **2**

(c) A certain $3\frac{1}{2}$ digit DVM has an accuracy specifications of $\pm 0.5\%$ of reading ± 2 digits. **4**

(i) What is the possible error in volt, when the instrument is reading 5.00 V on its 10 V range?

(ii) What is the possible error, when reading 0.10 V on the 10 V range?

(iii) What percentage of reading is the possible error in the case of (b)?

5 (a) Define the static performance characteristics of an instrument. **5**

(b) A temp. probe having a first order response with a time constant of 1 sec is given a step input of 50°C from 0° C. Calculate the temperature indicated 0.6 S after the application of the input. **4**

OR

5 (a) (i) What is piezoelectric effect? Derive the expression for output voltage with suitable diagram of piezoelectric transducer. **3**

(ii) Draw the block diagram of generalized input-output configuration of measuring instrument and explain it. **2**

(b) A first order instrument must measure signal with frequency content up to 100 Hz. with an amplitude inaccuracy of 5%. What is the maximum allowable time constant? What will be the phase shift at 50 Hz? **4**

6 (a) Describe the construction and Working of a photomultiplier tube? What is the disadvantage of it? **5**

(b) Design an LCR filter for a resonance frequency of 50 KHz. A Coil with an inductance of L=390 μH and resistance R=35 Ω is available. The circuit is supplied from a 2 V rms source with a 600 Ω output impedance. Determine the capacitance C and Q of the circuit. What is the value of FWHM? **4**

OR

6 (a) Explain various methods for frequency modulation **5**

(b) A waveform consists of a signal of approximate level 10 μV with random fluctuations of 50 μV rms. if the waveform is signal averaged, what will be the magnitude of the dc and ac components of the stored waveform at the output of the averager at the end of (i) 100 averages, (iii) 1000 averages (iii) how many averages would it require to achieve a signal to noise ratio 5:1 ? **4**
