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RR-0819

Third Year B. Sc. (Electronics) Examination

March / April – 2010

Electronics : Paper - VI

(Op Amp & Linear IC)

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1)

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

Name of the Examination :

☛ **T. Y. B. Sc. (Electronics)**

Name of the Subject :

☛ **Electronics - 6**

☛ Subject Code No. : **0 8 1 9** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Figure on the right indicates full marks.

(3) All symbols and abbreviations have their usual meaning.

(4) Non-programmable calculators are allowed.

(5) Q. **1** is **compulsory**.

(6) Assume data if necessary.

1 Answer in brief : **14**

(1) What do you mean by virtual ground ?

(2) List important features of 555 timer IC.

(3) Design a low-pass filter at a cut-off frequency of 1 kHz with a pass band gain of 2.

(4) Draw the different types of feedback configurations.

(5) What are the ideal characteristics of an op-amp ?

(6) What is Butterworth response ?

(7) What is voltage limiting ? Why is it needed ?

2 (a) Using the ac equivalent circuit, derive the expression for the voltage gain A_d and differential input resistance of a dual input, unbalanced output differential amplifier. 8

(b) Design a Zener constant current bias circuit according to the following specifications : 6

Emitter current I_{E3} = 6 mA,

IN3825 Zener diode with V_Z 4.7 V and I_{zt} = 53 mA

CA 3086 transistor with $\beta_{ac} = \beta_{dc} = 100$ and $V_{BF} = 0.715$ V

Supply voltage : $-V_{EE} = -9$V

OR

2 (a) Derive the voltage gain and input resistance of a differential amplifier with three op-amps. Write down its advantages. 7

(b) Get the expression for voltage gain and input resistance for a voltage shunt feedback amplifier. 7

3 (a) Obtain the expression for the output voltage of a basic integrator from its diagram. 4

(b) Why do we need a practical integrator ? Give its frequency response and applications. 5

(c) Design a peaking amplifier circuit to provide a gain of 5 at a peak frequency of 10 kHz. 5

OR

3 (a) Illustrate the circuit operation of a triangular wave generator using op-amp. 7

(b) Explain phase correctors and its applications. 7

4 (a) What is the need of higher order active filters ? Explain a second order low-pass Butterworth filter and its design principles. 7

(b) Design a second order low-pass filter at a high cutoff frequency of 2 kHz. And draw the frequency response of it. 7

OR

4 (a) Define A/D and D/A converters. What are the disadvantages of D/A converter with binary weighted resistors ? **4**

(b) Explain another D/A converter, which will overcome this difficulty. **5**

(c) Determine the size of each step if $R_F = 1.2\ k\Omega$ in a D/A converter (4-bit) with binary - weighted resistors. What is the output voltage when inputs b_0 through b_3 are at 5 V ? $R = 10k\ \Omega$. **5**

5 (a) Explain sample and hold circuit and its applications. **6**

(b) Discuss the working principle of absolute-value output circuit with necessary diagram and derivation. **8**

OR

5 (a) Using the internal block diagram of timer IC explain its action as a monostable multivibrator and give its applications. **8**

(b) Design a monostable multivibrator to be used as a divide-by-2 network. The frequency of the input trigger signal is 2 kHz. **6**
