DG-1444
M. Sc. (Tech.) (Sem. III) in Instrumentation
Examination
March / April – 2016
Integrated Circuits & Its Applications in Instrumentation

Time : Hours] [Total Marks : 
Instructions :

(1) Fill up strictly the details of signs on your answer book.

Seat No. :

(2) Figures to the right indicate full marks.

(3) Assumed necessary data if required.

1. Attempt any two
   A) Which type of feedback is used in inverting op-amp? Derive exact expressions for voltage gain, input resistance, output resistance and bandwidth for inverting op-amp.
   B) Derive the expression for voltage gain, input resistance, output resistance and bandwidth of an inverting amplifier using op-amp with negative voltage shunt feedback.
   C) Explain working of monostable multivibrator using IC 555 with internal blocks. Mention applications of monostable and astable multivibrator using 555 timer.
   D) For an astable multivibrator using 555 Timer, \( R_A = 4.7 \text{K} \Omega \), \( R_B = 1 \text{K} \Omega \), and \( C = 0.5 \mu \text{F} \), determine the positive pulse width, negative pulse width and the free running frequency.

2. Attempt any two
   A) Explain with necessary diagrams the working of AC amplifiers (inverting and non inverting) with single supply voltage.
   B) Draw the circuit of basic integrator using an op-amp. What are the problems associated with this configuration? How they are overcome?
   C) Explain wide band-pass filter with necessary circuit, derivation and waveforms
   D) Draw the circuit of basic differentiator using an op-amp. What are the problems associated with this configuration? How they are overcome?
3 Attempt any two
   A) Explain working of 555 timer based monostable multivibrator. Design the same for the output pulse width of 10 ms.
   B) Draw circuit diagram of an astable multivibrator using IC 555 and explain its operation. Derive expression for frequency of operation and duty cycle.
   C) Explain generation of DSB-SC Signal
   D) Explain Envelope detector and square law detector

4 Attempt any two
   A) Explain first order low pass Butterworth filter with necessary circuit, derivation and waveforms
   B) Design first order low pass Butterworth filter at cut-off frequency of 1 KHz with pass band gain of 2. Draw circuit with component value.
   C) Draw and explain the block diagrams of 555 Timer
   D) Derive the equation of power for AM Signal.

5 Attempt any two
   A) Explain all the three open loop Op-Amp configurations.
   B) Explain the working of a Voltage to Current converter with floating load. Illustrate the application of this circuit as a Zener diode tester.
   C) Explain Envelope detector and square law detector
   D) Draw and explain the block diagrams of Op-amp