(Set-1)

B.Tech - 4th
AdEC

Full Marks : 70

Time : 3 hours

Q. No. 1 is compulsory and answer any five from the rest

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2 × 10

   (*a*) What is an active filter ? Draw and explain a band stop filter.

   (*b*) Explain the operation of a universal active filter.

   (*c*) Differentiate between a comparator and a saw tooth wave generator.

   (*d*) Write two applications of an instrumentation amplifier.

(*e*) Why compensation is necessary in wideband amplifiers ?

(*f*) What do you mean by stable states of a binary ?

(*g*) Discuss the role of commutating capacitor in bistable multivibrator.

(*h*) What are the operating modes of IC 555 timer ?

(*i*) Draw the block diagram of a voltage controlled oscillator.

(*j*) Write down some applications of voltage time base generator.

2. (*a*) Draw and explain the principle of operation of low pass, high pass, band pass and band reject filters. 5

(*b*) A step input of 10 V when applied to the low pass RC circuit produces the output with a rise time of 200 μS. Calculate the upper 3dB

frequency of the circuit if the circuit uses a capacitor of 0·47 μF. Determine the value of the resistance. 5

3. (*a*) Draw and explain the operation of instrumentation amplifier circuit. What is the expression for its voltage output ? 5

(*b*) Design a wideband filter with $f1 = 400$ Hz and $fh = 2$KHz and passband gain of 4. Calculate Q for the filter and comment on the result. 5

4. (*a*) Describe the triggering mechanism for a bistable multivibrator with suitable diagrams. 5

(*b*) Draw and explain the Schmith trigger circuit. 5

5. (*a*) Draw and explain the principle of operation of an emitter coupled astable multivibrator. 5

(*b*) Explain how tunnel diode can be used as monostable, astable multivibrator. 5

6. (*a*) Explain the principle of operation of a voltage time base generator. Discuss about its applications. 5

(*b*) Explain the operation of a current time base generator circuit with applications. 5

7. (*a*) Draw and explain the block diagram of a PLL circuit. Discuss about its applications. 5

(*b*) Explain the operation of IC 555 timer circuit and its applications. 5

8. Write short notes on any *two* : 5×2

(*i*) Sawtooth wave generation using UJT

(*ii*) VOC using IC 555 timer

(*iii*) Shunt compensation

(*iv*) Triangular wave generator.
