B.E. Electrical (Electronics & Power) Engineering Fourth Semester

EP-403 - Analog and Digital Circuits

P. Pages : 2 **GUG/W/18/1551**

Time : Three Hours * 1 2 2 0 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Minimize following function using k-map and realize it. **8**

i) $F(A, B, C, D) = \sum m\,(0, 1, 2, 5, 8, 14) + d(4, 10, 13)$

ii) $Y = ABC + B\bar{C}\bar{D} + \bar{A}BC$

b) Design Excess-3 code to BCD code converter using suitable gates. **8**

OR

2. a) Draw and explain BCD to seven segment decoder. **10**

b) Implement a full adder circuit using a single decoder and two OR gates. **6**

3. a) What is the concept of clock ? Explain different methods of triggering a flip-flop. **8**

b) Design S.R. flip flop using J-K flip flop. **8**

OR

4. a) Explain how race around condition is overcome using master slave flip-flop. **8**

b) Draw and explain 3-bit binary ripple counter using J-K flip flop. **8**

5. a) Draw and explain the block diagram of operational amplifier. **8**

b) Explain the following terms : **8**

i) Output offset voltage.

ii) Slew rate equation.

OR

6. a) Explain ideal and practical characteristics of operational amplifier. **8**

b) For an op-amp used in inverting mode has the value of R_F and R_1 47 kΩ and 470 Ω respectively. The input offset voltage drift is 28 μV/ºC while input offset current drift is 300 PA/ºC. The amplifier is nulled at 25ºC. if a input voltage of 12 mv peak sine wave at 2 kHz is applied. **8**

i) Calculate the error voltage & output voltage.

ii) Draw the waveform at 55ºC

7. a) Draw and explain the circuit of summing integrator using operational amplifier. **8**

b) Draw the circuit of differential amplifier with two op-amp and derive the expression for its output voltage. **8**

OR

8. a) What are the limitations of basic integrator using op-amp ? How can they eliminated in practical integrator. **8**

b) Draw and explain precision full wave rectifier using operational amplifier. **8**

9. a) Explain negative clamper circuit using operational amplifier. **8**

b) Explain temperature compensated log amplifier using operational amplifier. **8**

OR

10. Write a short note on **any two.** **16**

i) Wein bridge oscillator.

ii) Band pass filter.

iii) IC 555 timer.

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