B.E. Electrical (Electronics & Power) Engineering Sem-IV

EP-403 : Analog and Digital Circuits

P. Pages : 2 **GUG/S/19/1551**

Time : Three Hours * 1 2 0 5 * 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) Use Karnaugh-map technique for solving the following. Also realize it using logic gates. **8**

i) $y = m_0 + m_2 + m_4 + m_6 + m_8 + m_{10} + m_{12} + m_{14} + d_5 + d_7$

ii) $f = m_0 + m_3 + m_5 + m_6 + m_9 + m_{10} + m_{12} + m_{15} + d_1 + d_2 + d_8$

Note: - {m-minterms and d-don't cares}

b) Using suitable Multiplexer implement the following logic equation **8**

$F(P, Q, R, S) = \Sigma m(0, 2, 3, 5, 6, 8, 10, 13)$

Assume S as the input link to the MUX.

OR

2. a) Design 4 - bit binary to gray code and Gray code to binary converters. **8**

b) Explain how two half adders can be used to get full adder function. **8**

3. a) Explain the concept of clock in SR flip flop. Explain the working using suitable logic diagram. **8**

b) Which triggering methods are used in flip flops. Which is the most preferred method? why? **8**

OR

4. a) Design & Explain Modulo- 06 counter. **8**

b) Explain 4 - bit Bidirectional shift register operation using suitable diagram. **8**

5. a) Draw internal block diagram of operational amplifier (op-amp). Explain function of each block. **8**

b) Define and give typical values of following op-amp parameters for IC741. **8**

i) I/p offset voltage ii) Slew Rate

iii) PSRR iv) CMRR

OR

6. a) Explain Dominant pole freq. compensation and pole-zero compensation technique in op-amp. **8**

b) For non-inverting amplifier configuration of op-amp if $R_F = 10\,k\Omega$, $R_1 = 1k\Omega$, supply voltage applied is $\pm 12V$. Draw the input output waveforms if the above circuit is applied with input as. **8**

i) 1 KHz sine wave with $V_m = 5V$

ii) 1 KHz sine wave with $V_m = 10mV$

7. a) Explain voltage to current converter with grounded load using op-amp. **8**

b) Draw practical integrator circuit. How it is different from ideal circuit. Draw its response and explain working. **8**

OR

8. a) Using op-amp implement the equation. **8**
$V_0 = 3V_1 - 2V_2 + V_3$.

b) Derive the output equation for three input inverting summing amplifier circuit. **8**

9. a) Explain inverting Schmitt Trigger with neat circuit diagram and waveforms. Also draw the voltage transfer curve for above circuit. **8**

b) Using internal block diagram explain the working of Astable multivibrator using IC555. Give the equations for T_{ON}, T_{OFF} and frequency of oscillations. **8**

OR

10. a) Draw and explain working of full wave precision rectifier with neat circuit diagram and waveforms. **8**

b) Write note on monostable multivibrator using IC555. **8**

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