College of Engineering Pune
Electronics and Telecommunication Department
F.Y.B.Tech.

(ET 101) Basic Electronics

ESE (2008-2009)

Time: 3 Hour] [Max. Marks: 50

Instructions to candidates:

1) **All questions** in **question No. 1 are compulsory**.
2) Attempt **any three sub-questions** from question number 2 to question number 5.
3) Neat Diagrams must be drawn wherever necessary.
4) Assume suitable data, if necessary.
5) Figures to the right indicate full marks.
6) Use of logarithmic tables and non-programmable electronic calculator is allowed.

Q 1

a) State fixed and adjustable voltage regulator ICs. Draw the block diagram of fixed regulator IC. (2)

b) Draw a diagram of half wave rectifier circuit and derive the expressions for dc voltage and r.m.s. voltage of half wave rectifier circuit. (2)

c) Prove the following using Boolean algebra theorems. (2)
$\bar{A}BC + A\bar{B}C + AB\bar{C} + ABC = AB + BC + CA$

d) Draw circuit diagram of the Wien bridge oscillator. Write the expression for frequency of oscillation. (2)

e) Draw the block diagram of CRO. (2)

f) Write any four differences between frequency and amplitude modulation. (2)

g) Draw the circuit diagram of inverting comparator and explain the waveform. (2)

Q 2

a) Explain with the help of block diagram: The Public Address System (3)

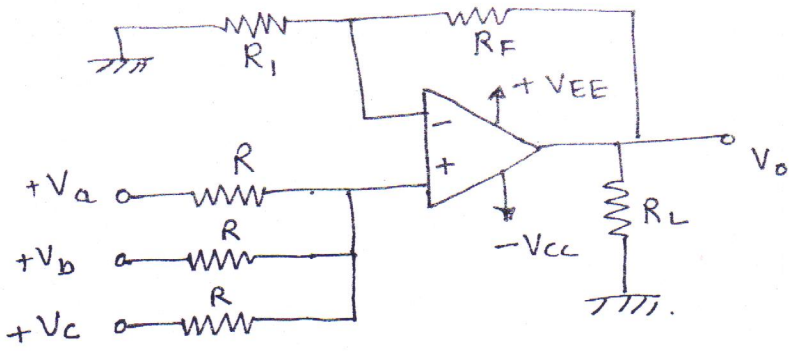
b) What is the difference between positive logic and negative logic systems used in digital systems? (3)

c) With reference to the amplitude modulation scheme, draw the following waveforms: (3)
   i. Modulation voltage,
   ii. Carrier voltage,
   iii. Modulated carrier wave.

d) Write a short note on GSM architecture. (3)

Q 3 a) What do you mean by MOD COUNTER? Explain the construction and working of MOD-8 asynchronous counter using suitable waveforms. (3)

b) In the given circuit, supply voltages = + 15 V. V_a = +2 V, V_b = -3 V, V_c = 4 V. R = R_1 = 1 KΩ and R_F = 2 K Ω. Determine the voltage V1 at non inverting terminal and the output voltage Vo. Assume the OP-AMP is initially nulled. (3)



c) Minimize the four variable logic function using K – map and realize it using NAND gates. (3)

$f(A, B, C, D) = A\bar{B}\bar{C}D + \bar{A}BCD + \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}\bar{D} + A\bar{C} + A\bar{B}C + \bar{B}$

d) Define the following terms associated with logic gates: (3)

a. De-morgan Theorem
b. Race around condition
c. Undefined states of RS flip flop

Q 4 a) How does monostable multivibrator work? Explain with the help of detailed block diagram of 555 timer and waveforms. (3)

b) In an astable multivibrator RA = 3.9KΩ, RB =2.2 KΩ and C = 0.1 μF. Determine positive pulse width T_{ON}, negative pulse width T_{OFF} and free running frequency f_0. (3)

c) Define transducer. Classify transducer based on (i) Application and (ii) Electrical Principle. Give principle of working of LVDT. Specify application of it. (3)

d) A strain gauge with a gauge factor K = 2 is bound to a steel member which is subjected to a strain of 10^{-6}. If the original 'no – strain' resistance of the gauge is 120Ω, calculate the change in gauge resistance. (3)

Q 5 a) Why modulation is needed? Give brief classification of analog and digital modulation. (3)

b) Derive expression for Amplitude modulated voltage. A 400 watt carrier is modulated to a depth of 75 percent. Calculate the total power in the modulated wave. (3)

c) Derive mathematical representation of FM. Find the carrier and modulating frequencies. The modulating index and the maximum deviation of the FM wave represented by the voltage equation $v = 12 \sin(6 \times 10^8 t + 5 \sin 1250t)$. What power will this FM wave will dissipate in 10Ω resistor? (3)

d) Write a short note on "Wired and wireless communication". (3)

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