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M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

SEMESTER END EXAMINATIONS – January 2013

Course & Branch	**: B.E :- Common to All Branches**	**Semester**	**: I**
Subject	**: Basic Electronics**	**Max. Marks**	**: 100**
Subject Code	**: EC101**	**Duration**	**: 3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

Unit – I

1. a) Define signal? List out the types of a signal. (06)

   b) Define analog signal? List and explain any two properties of systems. (06)

   c) Write a short note on audio system. (08)

2. a) Write short note on electronic system packaging. (07)

   b) List out the applications of wireless networks. (05)

   c) Bring out the necessary steps to minimize the power and thermal issues in electronic packaging systems. (08)

Unit-II

3. a) With the help of neat sketch explain the forward and reverse biasing of P-N junction diode with its V-I characteristics. (10)

   b) Draw the circuit diagram, waveform and derive the expression for (10)
   i) ripple factor ii) DC output voltage iii) efficiency of full wave rectifier.

4. a) With the help of neat circuit diagram, explain the operation of collector – to – base bias circuit. Justify that how this circuit significantly improves the bias stability for h_{FE} changes compared to base bias. (10)

   b) With neat circuit diagram explain the operation of crystal oscillator. List any four advantages. (10)

Unit-III

5. a) Define the following terms (06)
   i) slew rate
   ii) PSRR
   iii) CMRR

b) An op-amp has a differential gain of 500 and a CMRR of 80dB. If the common mode input signal is 2sin100 t V, calculate the common mode output voltage. (06)

c) Explain an integrator using operational amplifier in detail with the help of neat circuit diagram. Derive and expression for output voltage. (08)

6. a) Calculate the output voltage of a 3-input summing amplifier given that (04)

R1=200KΩ V1 = -2V

R2=250KΩ V2 = 2V

R3=500KΩ V3 = 1V

Rf=1MΩ

b) Distinguish between differential gain and common mode gain of an op-amplifier. (06)

c) Explain the operation of non-inverting amplifier with the help of neat circuit diagram. Derive an expression for the voltage gain with negative feedback. (10)

Unit-IV

7. a) Choose the correct answer for the following: (04)

i) The decimal equivalent of $(10AB)_{16}$ is _____

a. 3267 b. 4265 c. 4268 d. 4267

ii) The binary equivalent of $(1126)_8$ is _____

a. 001 001 010 110 b. 100 001 010 110

c. 010 010 110 010 d. 001 001 110 010

iii) The 2's complement of $(57)_{10}$ is _____

a. 111 b. 111001 c. 01010111 d. 10101000

iv) The octal equivalent of $(ABC)_{16}$ is _____

a. 5724 b. 5274 c. 7254 d. 2574

b) Perform the following: (08)

i) Subtract $(123)_8$ from $(567)_8$ using 7's complement

ii) Subtract $(23)_{10}$ from $(48)_{10}$ using 2's complement

iii) Add $(65)_8$ and $(23)_8$ using 1's complement

iv) Add $(AC6)_{16}$ and $(B59)_{16}$

c) Convert the following using necessary conversion steps: (08)

i) $(7034)_8 = (\_\_\_\_\_)_{10}$

ii) $(2616)_{10} = (\_\_\_\_\_)_{16}$

iii) $(101010.101)_2 = (\_\_\_\_\_)_{10}$

iv) $(ABCD)_{16} = (\_\_\_\_\_)_2$

8. a) Simplify and realize the following function using only 2 input NAND gates (12)

F = A B' C' + A' B' C' + A B C' + A' B C'

F = A' B C + A B' C + A B C

b) Explain full adder with the help of truth table for sum and carry expressions. (08) Design a full adder using basic gates.

Unit-V

9. a) Derive an expression for the instantaneous voltage of amplitude modulated wave (12) with the help of suitable waveforms. Explain the principle of AM.

b) Derive an expression for the total average power sinusoidal AM wave. (08)

10. a) The total power content of an AM wave is 2.64KW at a modulation factor of 80%, (04) Determine the power content of i) Carrier ii) Each sideband

b) With the help of neat block diagram explain the AM transmitter. List out (08) advantages of AM transmitter.

c) Explain the principle of operation of super-heterodyne receiver with the help of (08) neat block diagram.

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