

**EC101**

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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

- Define signal? List out the types of a signal. (06)
 - Define analog signal? List and explain any two properties of systems. (06)
 - Write a short note on audio system. (08)
- Write short note on electronic system packaging. (07)
 - List out the applications of wireless networks. (05)
 - Bring out the necessary steps to minimize the power and thermal issues in electronic packaging systems. (08)

Unit-II

- With the help of neat sketch explain the forward and reverse biasing of P-N junction diode with its V-I characteristics. (10)
 - Draw the circuit diagram, waveform and derive the expression for
i) ripple factor ii) DC output voltage iii) efficiency of full wave rectifier. (10)
- 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)
 - With neat circuit diagram explain the operation of crystal oscillator. List any four advantages. (10)

Unit-III

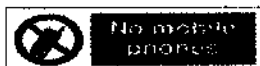
- Define the following terms (06)
 - slew rate
 - PSRR
 - CMRR



- b) An op-amp has a differential gain of 500 and a CMRR of 80dB. If the common mode input signal is $2\sin 100t$ 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 an expression for output voltage. (08)
6. a) Calculate the output voltage of a 3-input summing amplifier given that (04)
- $R_1 = 200K\Omega$ $V_1 = -2V$
 $R_2 = 250K\Omega$ $V_2 = 2V$
 $R_3 = 500K\Omega$ $V_3 = 1V$
 $R_f = 1M\Omega$
- 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) $(7034)_8 = (\text{_____})_{10}$
 - ii) $(2616)_{10} = (\text{_____})_{16}$
 - iii) $(101010.101)_2 = (\text{_____})_{10}$
 - iv) $(ABCD)_{16} = (\text{_____})_2$
8. a) Simplify and realize the following function using only 2 input NAND gates (12)
- $$F = AB'C' + A'B'C' + ABC' + A'BC'$$
- $$F = A'BC + AB'C + ABC$$
- 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.
