Reg. No. ☐☐☐☐☐☐☐☐☐☐☐☐

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University, Manipal – 576 104
FIRST SEMESTER B.E. DEGREE END SEMESTER EXAMINATION
December –2007
SUBJECT: BASIC ELECTRONICS (ECE – 101/102)
(REVISED CREDIT SYSTEM)
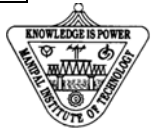
TIME : 3 HOURS   **MAX. MARKS : 50**

Instructions to candidates
- Answer ANY FIVE full questions.
- Missing data may be suitably assumed.

1A. List the characteristics of ideal OPAMP.   3

1B. Simplify the following Boolean expression and realize using NAND gates

$F = (A + B + C) (A + B + C) (A + B)$ 3

1C. What is amplitude modulation? Derive equation for AM output in time domain. Sketch sinusoidally modulated AM wave for modulation index m =1, m <1 and m >1.   4

2A. Explain AND gate with help of a circuit using discrete components.   3

2B. Explain the need for modulation.   3

2C. Assume that a silicon transistor with β = 80, V_{CC} = 16V, R_C=3.9 K R_E =0.68K, R_1 =62K and R_2 =9.1K is used in voltage divider bias circuit. Determine the operating point.   4

3A. With the help of energy band diagrams classify solids.   3

3B. Define α and β. Derive the relationship between them   3

3C. Primary voltage to a transformer with turns ratio is 5:1 is 120V, 60Hz. This is applied to bridge rectifier employing 4 identical diodes with forward voltage drops 0.6V and forward resistance 15Ω. The load resistance is 1kΩ. Calculate average and rms load voltage, efficiency, ripple factor, PIV rating and frequency of output waveform.   4

4A. What is doping ? Compare P and N type semiconductors.   3

4B. Explain half adder with functional table and write logical expressions for sum and carry. Realize carry using NOR gates.   3

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4C. i) For the zener regulator Vi= 16 V, R_S= 1 K, V_Z= 10 V and R_L= 3 K. Determine
   V_o, I_Z and P_Z
   ii)Repeat with R_L= 1K   4

5A. Perform the following
   (i) $(257.75)_{10}$ - $(128.825)_{10}$ using binary 2's complement arithmetic
   (ii) $(ABCD)_{16}$ = (?)$_{10}$ = (?)$_2$ = (?)$_8$ 3

5B.Sketch the frequency response of RC coupled amplifier and mark the regions
   and indicate bandwidth   3

5C. A silicon diode has reverse sat current 12 nA at 20°C. (a) Find the diode current
   when it is forward biased by 0.65 V.   Find the diode current when the
   temperature rises to 100°C.   4

6A. For a differential amplifier, the input voltages are v_1 =10 mV and v_2 = 8mV.
   If the differential gain is 5000, Calculate the output voltage when the CMRR
   is 80 dB.   3

6B. Draw the circuit diagram of OPAMP adder and derive the expression for
   output.   3

6C. With help of circuit diagram and waveforms explain working of center
   tapped full wave rectifier.   4

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