Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

FIRST SEMESTER B.TECH (E & C) DEGREE END SEMESTER EXAMINATION
NOV/DEC 2015
SUBJECT: BASIC ELECTRONICS (ECE - 1001)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ALL** questions.
- Missing data may be suitably assumed.

1A. Draw the circuit diagram of a Bridge rectifier to convert 10 sin ($2\pi 50t$) available at the secondary of the transformer to DC with a ripple factor of 0.001. Explain the working of the circuit with relevant waveforms. Assume R_L=500 ohms. Calculate the dc output voltage across the load.

1B. Draw the circuit of a Zener regulator. Assuming an ideal Zener diode with Vz = 10 V, $I_Z$min = 1.5 mA and $P_Z$max = 0.5W, determine the range of input voltage required for obtaining regulation. Assume R_S=480ohm, R_L=560 ohms.

1C. Sketch the output waveform for the circuit shown in **Fig.Q1C**, if V_{in} = 10Sinωt and V_Z of D2 and D4 is 5V. Assume D_1 and D_3 to be ideal diodes.

(5+3+2)

2A. Draw the circuit diagram of NPN Si transistor in Common Emitter configuration. Plot and explain the input - output characteristics highlighting the salient features.

2B. For a self-bias circuit employing Si transistor, if R_1 = 90 KΩ, R_2 = 10 KΩ, R_C = 5.6 KΩ, R_E = 1 KΩ, β = 50 and V_{CC} = 22 V, calculate I_B, I_C and V_{CE}.

2C. For an RC coupled amplifier, the mid band gain is 30 dB. Find the gain at upper cut off frequency. Determine the output voltage at mid band frequency for an input voltage of 1mV

(5+3+2)

3A. i. Draw the circuit of an integrator using an op amp. Assuming the input is a rectangular waveform with peak to peak 5V and a frequency of 1 kHz, sketch the output waveform.

ii. For the circuit shown in **Fig. Q3A(ii),** obtain the expression for output voltage.

3B. Define the following: i) Slew Rate ii) CMRR iii) input offset voltage

3C. Draw the output waveform for the circuit shown in **Fig. Q3C** if the input voltage Vin = 5sinωt. Assume supply voltage Vcc = ±12V

(5+3+2)

4A. i) Design a full adder circuit and implement using NAND gates only.

ii) Perform $(18)_{10}$-$(24)_{10}$ using 1's complement method.

4B. Simplify the following Boolean expression using K-map and implement using basic gates:

$f(x, y, z) = \Sigma m(1,3,4,5) + d(6,7)$

4C. Draw the circuit diagram of a JK-FF using NAND gates and give the truth table.

(5+3+2)

5A. **Fig. Q5A** shows the spectrum of a modulated signal. (i) Name the type of modulation. (ii) Write the time domain expression for message signal, carrier signal and the modulated signal. (iii) Determine the modulation index, bandwidth and total transmitted power from the spectrum.

5B. Draw the waveforms of different types of pulse modulated signals considering sinusoidal signal as a message and train of pulses as carrier.

5C. Compare TDMA and FDMA techniques.

(5+3+2)

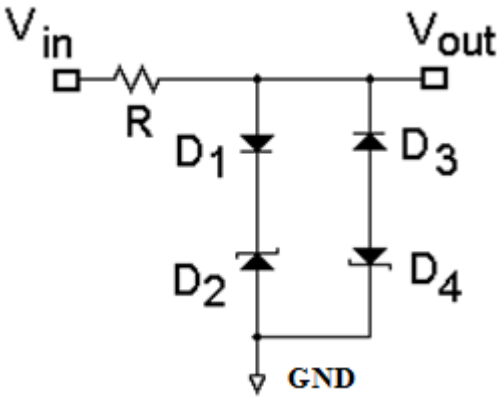

Fig. Q1C

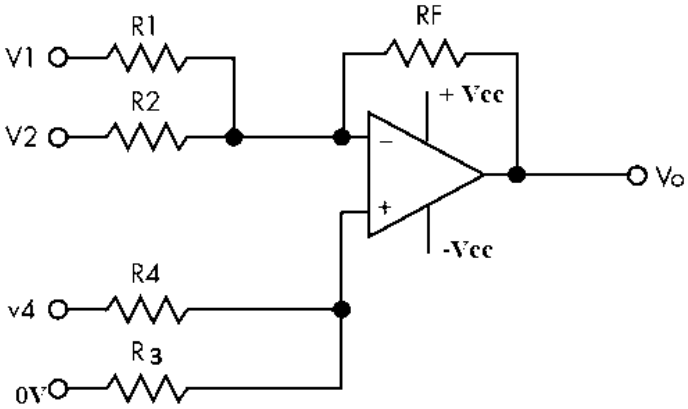

Fig. Q3A (ii)

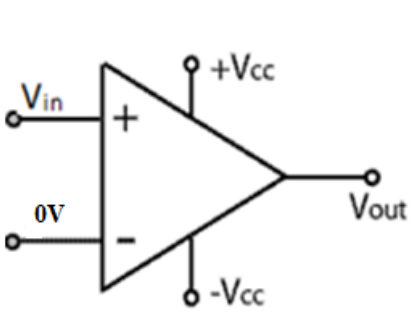

Fig. Q3C

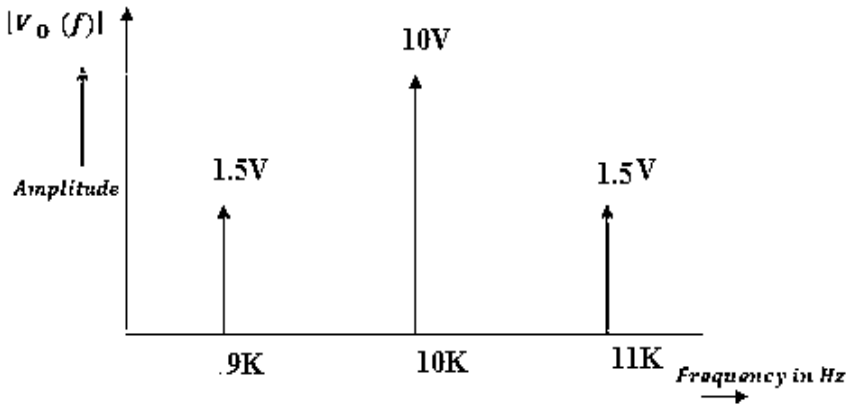

Fig. Q5A