Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

FIRST SEMESTER B.Tech. DEGREE END SEMESTER EXAMINATION
NOV 2017
SUBJECT: BASIC ELECTRONICS (ECE - 1001)

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

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

1A. For a self- bias circuit employing Si transistor, if R_1 = 90kΩ, R_2 = 10kΩ, R_C = 5.6kΩ, R_E = 1kΩ, β = 50 and V_{CC} = 22V. Determine the Q point. If R_E changes to 500Ω, then find the effect of it on the Q point.

1B. Draw the circuit diagram of n-p-n transistor in CE configuration. Sketch the input and output characteristics and indicate the different regions of operation.

1C. For a Si diode having a reverse saturation current of 12nA at 20^0 C. Calculate i) Diode current when it is forward biased by 0.65V. ii) Static and Dynamic resistance when the applied voltage is 0.7V.

(5+3+2)

2A. Draw the circuit diagram of full wave center tap type rectifier without filter. Derive the expression for average dc load current and RMS load current. Draw the wave form for voltage across each diode and load current. Assume diodes are ideal.

2B. i) Draw the equivalent circuit of Zener diode in breakdown condition.
ii) A 5.1V Zener diode has a resistance (R_z) of 4Ω. What is the actual voltage across its terminals when the current through it is 25 mA? Assume Zener is in breakdown condition.

2C. Three amplifiers with voltage gains 10, 100 and 1000 are connected in cascade. Determine i) The overall gain in decibels ii) The output voltage, when the input voltage is 1μV.

(5+3+2)

3A. Simplify the expression $f(a,b,c,d) = abc + ab\bar{c}d + \bar{a}cd$ using K-Map and implement using only NAND gates.

3B. Draw the logic circuit for 3 bit asynchronous up counter using negative edge triggered JK flip-flop. Also draw the output waveform of each flip-flop.

3C. What is the difference between a latch and a flip-flop? Draw the logic circuit of an SR flip-flop using only NAND gates.

(5+3+2)

4A. What is a full adder? With the help of truth table, implement a full adder using basic gates.

4B. For the data shown in FIG.Q4B, Sketch ASK, FSK and PSK signals.

4C. Define the Sampling theorem. What is the Nyquist sampling rate of the signal $x(t)=3cos(50\pi t)+10sin(300\pi t)+cos(550\pi t)$.

(5+3+2)

5A. Draw the block diagram of electronic communication system and explain the role of each block.

5B. For the spectrum shown in FIG.Q5B, identify the type of modulation and write the appropriate equation for modulated signal.

5C. A carrier signal of frequency 100MHz is frequency modulated by a modulating signal of frequency 2kHz, resulting in frequency deviation of 75 kHz. Find the bandwidth of FM Signal.

(5+3+2)

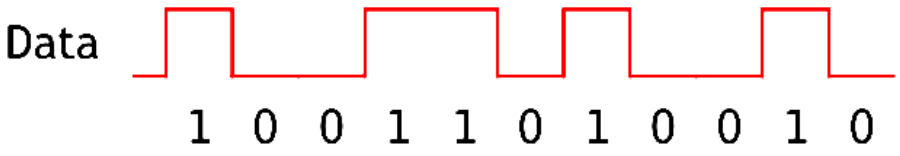

FIG.Q4B

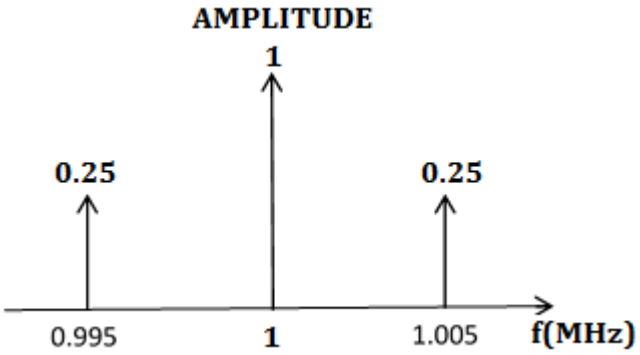

FIG.Q5B