

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- IVth SEMESTER-EXAMINATION – MAY/JUNE- 2012****Subject code: 141101****Date: 25/05/2012****Subject Name: Advance Electronics****Time: 10:30 am – 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Derive CE current gain for finite value Resistive load using π model and prove that 3-dB band width of this configuration is inversely proportional to the value of the resistive load **07**
- (b) Classify distortion in an amplifier and explain each, briefly **07**

- Q.2** (a) Multistage amplifier consists of 3-stages and voltage gain of each stage is 50, 60 and 80 respectively. Find (1) Overall gain in dB (2) if multi stage input is $10 \mu V$, what is the final output? **07**
- (b) Describe the principle of crystal oscillator along with its equivalent circuit **07**

OR

- (b) What is diffusion capacitance? Derive value of diffusion capacitance in terms of physical parameters of transistor **07**

- Q.3** (a) Draw equivalent circuit of voltage & current amplifier and discuss on the value of input and output impedance. Also Classify distortion in an amplifier and explain each, briefly **07**
- (b) CE transistor hybrid π model parameters are as follows: $g_m = 50 \text{ mA/V}$, $r_{b'e} = 1 \text{ K}\Omega$, $r_{bb'} = 10 \Omega$, $C_{b'e} = 101 \text{ pF}$, $C_{b'c} = 3.5 \text{ pF}$. Find (1) 3-dB bandwidth for $R_L = 1 \text{ K}\Omega$ (2) Gain at 1 MHz frequency **07**

OR

- Q.3** (a) Discuss validity of hybrid π model and prove that the model is valid up to one third of f_T **07**
- (b) Frequency sensitive arm of Wein-bridge oscillator uses $R_1 = R_2 = 10 \text{ k}\Omega$ while $C_1 = C_2$, is kept variable. Find Minimum and maximum value of Capacitance to achieve output frequency range from 20 KHz to 70 KHz **07**

- Q.4** (a) Explain emitter coupled differential amplifier in brief. How its performance can be improved **07**
- (b) Derive gain equation for Op Amp for inverting and non inverting mode and derive equation for Common mode rejection Ratio (CMRR). Why CMRR should be ideally high. **07**

OR

- Q.4** (a) List the characteristic of Ideal Op Amp. Two set of inputs for differential amplifier are (i) $V_1 = 100 \mu V$, (ii) $V_2 = -100 \mu V$ & $V_1 = 1100 \mu V$, (ii) $V_2 = 900 \mu V$. For CMRR = 200 Calculate %difference in output Voltage. If CMRR changed to 20000. Calculate %difference in output Voltage **07**
- (b) Discuss the effect of positive feedback and negative feed back on a transistor amplifier circuit. Which feed back improves the stability? Which one creates instability & what is the application of feed back which create the instability? Explain with appropriate condition **07**

- Q.5** (a) Draw NOR gate circuit using RTL logic. Explain its operation and list disadvantages **07**
- (b) Explain requirement of Digital to Analog converter and draw and explain the weighted resistor type (4-bit) Digital to Analog converter. **07**

OR

- Q.5** (a) Draw circuit of two input TTL NAND GATE. Explain its working. Compare it with RTL in terms of speed and power consumption with reasoning **07**
- (b) Draw and explain track type analog to digital converter. In terms of speed is it better than the counter type ? Give reason in support to your answer **07**
