

INTERNATIONAL CENTRE FOR APPLIED SCIENCES MAHE, MANIPAL B.Sc. (Applied Sciences) in Engg. End – Semester Theory Examinations – NOV 2021 III SEMESTER - ANALOG ELECTRONIC CIRCUITS (IEC -231)

Time: 3 Hours	Date: 26 NOV 2021	Max. Marks: 50
 ✓ Answer ALL questions. ✓ Missing data, if any, may be suitably assumed. 		

- 1A Draw the circuit diagram of common emitter configuration using NPN transistor. Draw and explain the input and output characteristics. Indicate cut-off, saturation and active regions. 10M
- 1B Draw the circuit diagram of a common source stage using NMOSFET, with drain resistance R_D . Draw the small signal model of the circuit. Obtain the expression for the voltage gain and output resistance. Assume $\lambda \neq 0$. 10M
- 2A Determine I_B, I_C, I_E, V_{CE}, V_B, V_C and V_E for the voltage divider configuration shown in **Fig** Q2A given that β =80. Assume V_{BE}=0.7V. What is the region of operation? Neglect I_{CEO}.



10M

2B State and explain Millers theorem. Illustrate use of this theorem in the analysis of high frequency response of CS stage amplifier. 10M

- 3A Draw the circuit diagram of RC coupled amplifier with feedback using NPN transistor. Mention the function of each component. Explain the working at low, medium and high frequencies.
- 3B Draw the circuit diagram of a crystal oscillator and explain the working. Mention any two advantages of Crystal oscillators. 10M
- 4A Explain with the help of a circuit diagram, the working of transformer coupled Class B push pull power amplifier. Derive an expression for the maximum power efficiency. Mention one drawback of this amplifier. 10M
- 4B For the transistor (Silicon) circuit shown in **fig.** Q4B, $R_{in} = 100K\Omega$, $R_L = 820\Omega$ and $V_{CC} = 10V$. Assume V_{BE} , sat=0.8V and V_{BE} sat = 0.2V. Find the minimum base and collector current required in order to keep the transistor in saturation. Neglect I_{CBO}. Explain briefly the working of the circuit and draw the output waveform.



Fig. Q4B

10M

- 5A Explain with necessary current equation explain Triode and Saturation region in MOSFET. Explain how current varies when width, length and oxide thickness are varied with necessary plot.
 10M
- 5B Determine the voltage gain, input and output impedance with feedback for voltage Series feedback having A= -100, $R_i = 10k\Omega$ and $R_o = 20k\Omega$ for feedback of i) $\beta = -0.1$ ii) $\beta = -0.5$ 10M

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