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INTERNATIONAL CENTRE FOR APPLIED SCIENCES (MAHE)

III SEMESTER B.Sc. (Applied Sciences) MAKE -UP EXAMINATION – January 2022

SUBJECT: ANALOG ELECTRONIC CIRCUITS (IEC 231)

(BRANCH: CS)

Timing: 3 hours **DATE: 12th January 2022** **Max. Marks: 50**

- ✓ **Answer All questions.**
- ✓ **All questions carry equal marks.**
- ✓ **Missing data, if any, may be suitably assumed**

1A The dc common base current gain for a certain transistor is, $\alpha_{dc} = 0.998$. Determine the emitter current I_E, if the base current is $I_B = 40\mu A$. Assume that the reverse saturation current, $I_{CBO} = 2\mu A$. Also determine I_{CEO}.

1B For the circuit in **Fig. Q1B**, $\mu_n C_{ox}$ = 100 μA/V^2 and $V_{TH} = 0.4V$. Calculate

i) Drain current.

ii) If the gate voltage increases by 20 mV, what is the change in the drain voltage?

iii) What choice of R_D places the transistor at the edge of the triode region with value of I_D as in part i)?

iv) Determine the value of W/L that places M_1 at the edge of saturation with V_{GS} as in part i).

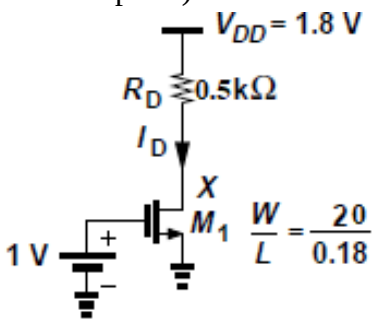

Fig Q1B

2A With suitable diagrams, explain how power amplifiers are classified based on the operating point.

2B In an RC phase shift oscillator using FET, the value of resistors and capacitors in the feedback circuit are R = 150 KΩ and C = 0.25 Nano Farads. Determine the frequency of oscillation. If the value of R_D =1kΩ and g_m = 2500millimhos, find the gain of the amplifier.

3A Draw the self-bias circuit for the transistor and explain. Describe with detailed analysis how bias stability is achieved.

3B In a fixed bias circuit silicon transistor with β=100 is used. Draw the DC load line and determine the operating point. Given R_B=200KΩ, Vcc=10V and R_C=2KΩ. Assume V_{BE}=0.7V.Neglect I_{CO}. Draw the circuit diagram

4A Draw the circuit diagram of Class 'A 'power amplifier and derive an expression for efficiency.

4B With a neat circuit diagram, explain the RC coupled amplifier and its frequency response.

5A With the help of a block diagram, explain negative feedback. Derive an expression for gain in a negative feedback amplifier. Mention the application of positive feedback.

5B For the circuit shown in Fig Q5B, determine I_{BQ}, I_{CQ}, V_{CEQ}, V_C, V_E, V_B. Draw the load line.

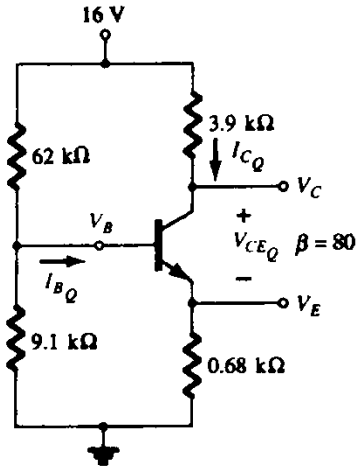

Fig. Q5B