Reg. No.										

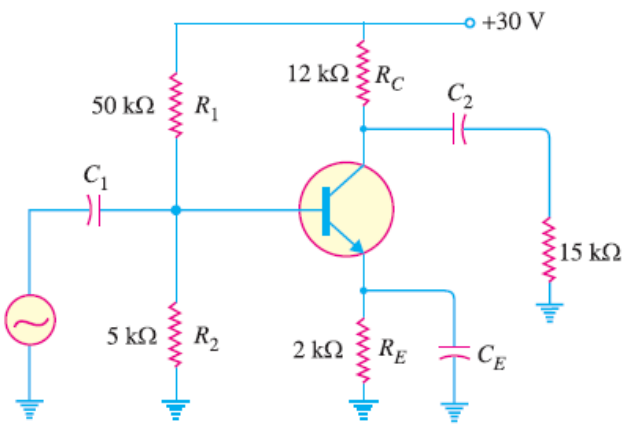
MANIPAL INSTITUTE OF TECHNOLOGY
(A Constituent Institute of Manipal University)
Manipal – 576 104

III SEMESTER B.Tech (BME) DEGREE MAKE-UP EXAMINATIONS, DEC/JAN 2015-16
SUBJECT: ANALOG ELECTRONICS (BME 2102)
Wednesday, December 30, 2015 (9.00 a.m. - 12.00 noon)

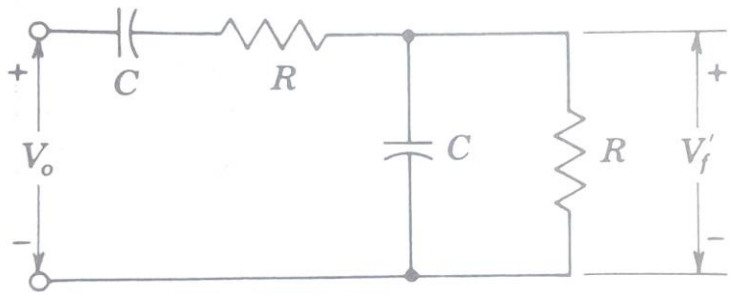
DURATION: 3 HOURS **MAX. MARKS: 100**

Instruction to Candidates:

Answer all FIVE full questions.
Assume relevant data if missing.
Give diagrams wherever necessary.

1A	(i) A germanium transistor is to be operated at zero signal I_C = 1mA. If the Collector supply V_{CC} = 12V, what is the value of R_B in the base resistor method? Take β = 100. (ii) If another transistor of the same batch with β = 50 is used, what will be the new value of zero signal I_C for the same R_B?	**8**
1B.	What do you understand by Self biasing? What is its need? State its advantages and disadvantages. How stabilization of operating point is achieved by this method of biasing?	**6**
1C.	Draw the small signal exact model of common emitter configuration and derive expression for common emitter hybrid parameters (h_{ie} & h_{fe}) in terms of common base hybrid parameters.	**6**
2A.	For the circuit shown in Fig. 2A, use approximate hybrid formulas to determine (i) Input impedance (ii) voltage gain iii) Output impedance and iv) Current gain. The h parameters of the transistor are $h_{ie} = 1.94K\Omega$ and $h_{fe} = 71$.  Fig 2A	**8**

2B.	There is a need for amplification of autism EEG signal in order to enhance its level so that it can be provided as an input to an analog to digital converter. Draw the basic transistor amplifier that is required to boost the signal to a certain level. Derive the general expressions for the following parameters: (*i*) Overall current gain (*ii*) current gain (iii) Overall voltage gain and (*iii*) voltage gain in terms of *h* parameters and the load resistance.	**6**
2C.	Draw the circuit diagram of hybrid π model and derive expressions of its resistances and capacitances.	**6**
3A.	Draw a typical two stage RC coupled amplifier circuit with following parameters: $R_1 = R_2 = R_3 = R_4 = 50K$, $R_{C1} = R_{C2} = R_{E1} = R_{E2} = 2K$, Assume that C_E represents a short circuit at the frequency 20Hz. $h_{fe} = 50$, $h_{ie} = 1.1K$ and $h_{re} = h_{oe} = 0$. Find the mid band gain. Find the value of C_b to give a lower 3dB frequency of 20Hz.	**8**
3B.	What do you understand by RC coupled transistor amplifier? Draw the circuit and explain its operation. Mention its applications. What are its advantages and disadvantages?	**6**
3C.	Derive expressions for the overall upper 3-dB frequency and overall lower 3-dB frequency of a typical non-interacting multistage amplifier circuit.	**6**
4A.	An amplifier without feedback gives a fundamental output of 36 volts with 7% second harmonic distortion, when the input is 0.028 volts. a) If 1.2% of the output is fed back into the input in a negative voltage series feedback circuit, what is the output voltage? b) For an output of 36 volts with 15 second harmonic distortion, what is the input voltage?	**8**
4B.	Draw the circuit of common drain feedback amplifier with source resistor R_s. Derive expressions for voltage gain with feedback, input impedance and output impedance.	**6**
4C.	Find $\frac{V_{f'}}{V_o}$ for the network shown in Fig 4C. Determine the expression for the frequency of oscillation and find the minimum gain required for oscillation. Draw the FET phase shift oscillator.	**6**

	 Fig 4C	
5A.	Design a suitable circuit that is required to generate sinusoidal oscillations in the audio frequency range. Assume stability factor of the circuit to be 6.	**8**
5B.	How does Class AB configuration help in reducing crossover distortion originating in class B power amplifier? Justify the same with suitable circuit and characteristics. Mention its advantages and disadvantages.	**6**
5C.	Draw the circuit diagram of common source amplifier using depletion IGFET with the following circuit components. $R_D = 8k\Omega$, $R_G = 1M\Omega$, $V_{DD} = 24V$, $R_S = 2.k\Omega$, $I_{DSS} = 6mA \& V_P = -6V$. Determine the operating point, V_D, ac equivalent circuit, input impedance and output impedance.	**6**