Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

III SEMESTER B.Tech (BME) DEGREE END SEMESTER EXAMINATIONS NOV/DEC 2016
SUBJECT: ANALOG ELECTRONICS (BME 2102)
(REVISED CREDIT SYSTEM)
Wednesday, 23rd November 2016, 9 AM to 12 NOON

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

Instructions to Candidates:

1. **Answer FIVE full questions.**
2. **Draw labeled diagram wherever necessary**

1. (a) For the circuit shown below, determine the values of I_{BQ}, I_{CQ} and V_{CEQ} with i) β = 75 and ii) β = 150. Assume $V_{BE} = 0.7v$ 8

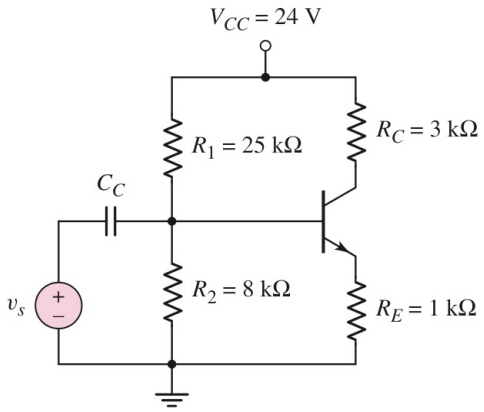

Fig 1

(b) Derive an expression for the factor that describes the stabilization of collector current against variations in the value of reverse saturation collector current, keeping the values of base emitter voltage and β constant. 6

(c) Draw the approximate small signal model for the common emitter transistor amplifier configuration, and find the expressions for: voltage gain, current gain, input resistance and output resistance. 6

2. (a) For the two stage RC coupled amplifier shown in Fig 2, determine the voltage gain of the first, second stages and the overall voltage gain. 8

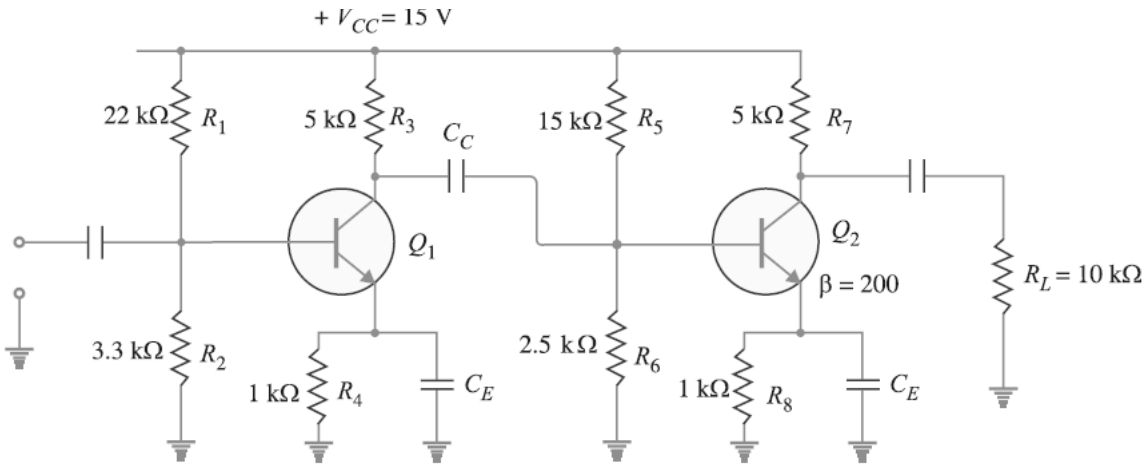

Fig 2

(b) Express h_{ie} & h_{fe} in terms of common base h – parameters. 6

(c) What is a multistage transistor amplifier? Explain its need. How will you achieve impedance matching with transformer coupling? Draw the circuit of transformer coupled transistor amplifier. 6

3. (a) i) For the circuit shown in Fig 3, if the gain of the amplifier without feedback is 10,000, find feedback fraction, overall voltage gain and the output voltage if the input voltage is 1mV. 4+4

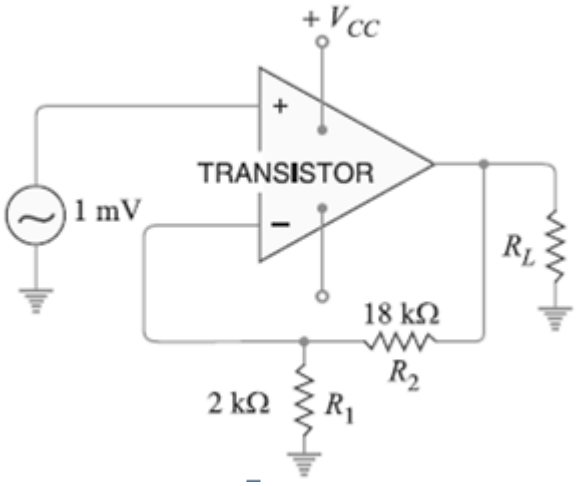

Fig 3

ii) An amplifier has a voltage gain of 500 without feedback. If a negative feedback is applied, the gain is reduced to 100. Calculate the fraction of the output fed back. If, due to

ageing of components, the gain without feedback falls by 20%, calculate the percentage fall in gain with feedback.

(b) What do you understand by feedback? Illustrate the principle of a negative feedback amplifier. Derive an expression for the gain of the negative voltage feedback amplifier. 6

(c) Design a voltage series feedback amplifier circuit with the following specifications: Input resistance with feedback is 40 KΩ. 6

4. (a) A network shown below in Fig 4 is used in a phase shift oscillator circuit. Determine the expression for the frequency of oscillation and find the minimum gain required for oscillation. Draw the transistor phase shift oscillator. 8

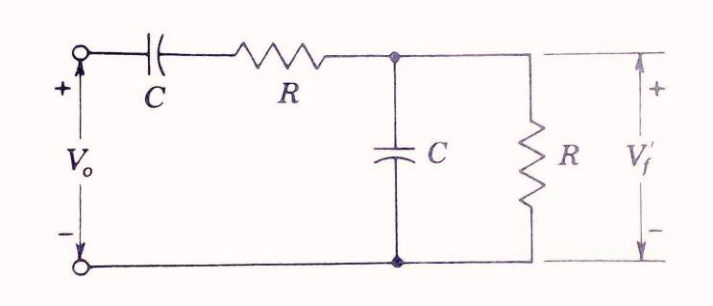

Fig 4

(b) What are the limitations of LC and RC oscillators? How different is crystal oscillator in comparison with LC and RC oscillators? Highlight the principle, equivalent circuit, symbol and frequency response of the crystal, together with its working. 6

(c) Design a suitable oscillator circuit that generates oscillations having a frequency of 300 KHz. The stability factor is 6. 6

5. (a) i) Construct and sketch, a class B push pull amplifier circuit using a supply voltage of 30 V and driving a load of 16 Ohm. Determine the values of maximum input power, output power and the efficiency. 4+4

ii) For the circuit shown below in Fig 5, find the quiescent values of drain current, gate source voltage and drain source voltage of the FET. The pinch off voltage is 4 V and drain source saturation current is 4 mA.

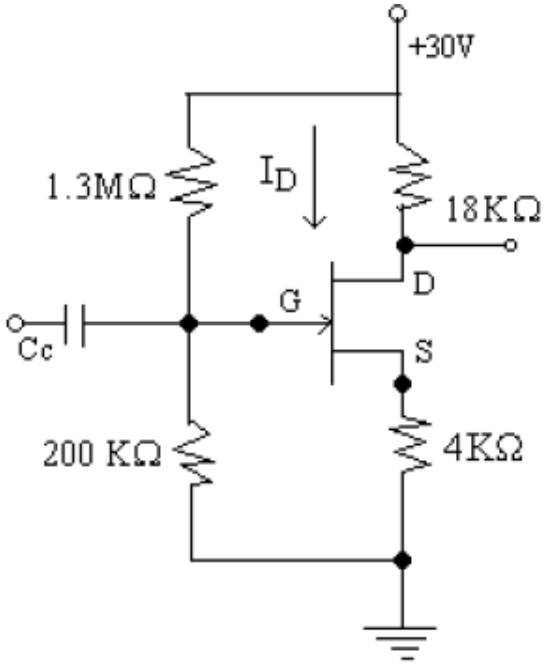

Fig 5

(b) How does a complementary push pull class B power amplifier circuit work? What are its drawbacks? How will a class AB power amplifier overcome the drawbacks? Explain. 6

(c) i) Compare enhancement MOSFET with depletion MOSFET with respect to their drain and transfer characteristics. 4+2

ii) Determine the value of trans conductance for an *n*-channel enhancement MOSFET having threshold voltage of 3 volts at the operating points of 6 volts and 8 volts.