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Total number of printed pages – 3

B. Tech  
PCEC 4201

**Special Examination – 2012**  
**ANALOGUE ELECTRONIC CIRCUIT**

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any **five** from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2 × 10
- (a) How does fixed bias resistor affect the input resistance of a CE amplifier ?
- (b) What is the need of biasing in an amplifier ? What do you mean by 'proper biasing' ?
- (c) If the overall bandwidth of three identical voltage amplifier stages connected in cascade is 1000. Find bandwidth of each stage in dB.
- (d) What are two salient features of a 'buffer amplifier' ?
- (e) Why the emitter resistance ( $R_E$ ) of the differential amplifier is made so high ?
- (f) Why a crystal oscillator provides a stable frequency ?
- (g) What is CMRR of an OPAMP ? How CMRR can be increased during the manufacturing of OPAMP ?
- (h) What is last stage of an OPAMP and why ?
- (i) How a BJT amplifier behaves at low frequency ?

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- (j) Three OPAMP based instrumentation amplifiers are better than single OPAMP based instrumentation amplifiers. Justify.
2. (a) Find the load line and operating point of the above transistor amplifier shown in Figure 1. 4

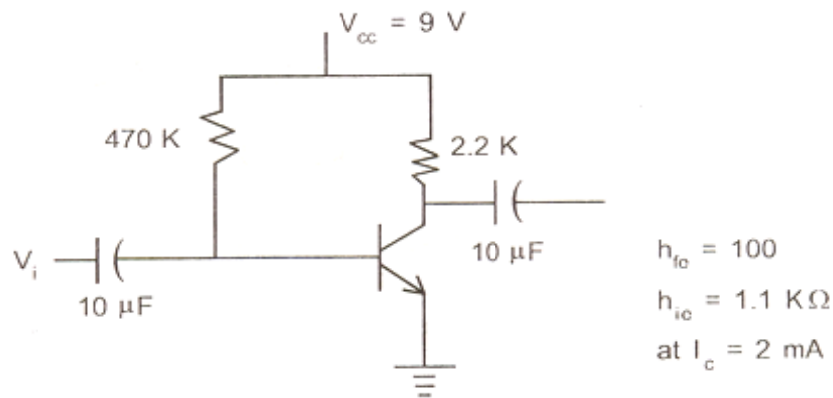


Fig. 1

- (b) Find voltage gain, current gain, input resistance and output resistance using h-parameter model of the circuit shown in fig. 1. 6
3. (a) A transistor has a value of  $\alpha = 0.99$  in a CB amplifier. Its load resistance is  $4.5 \Omega$  and dynamic resistance at the emitter junction is  $50 \Omega$ . Find its voltage gain and power gain? 5
- (b) Explain the frequency response of a CE transistor amplifier. 5
4. (a) Explain the odd harmonic cancellation property of a push pull power amplifier. Justify your answer mathematically. 5
- (b) Derive the condition for oscillation in RC phase shift oscillator. 5
5. (a) Establish a condition for applying maximum signal frequency to an OPAMP which has finite slew rate 'r'. 5
- (b) Draw a non inverting amplifier circuit of OPAMP whose open loop voltage gain is finite and its value A d. Derive closed loop voltage gain of the circuit. 5

6. (a) Derive the maximum efficiency of a class B power amplifier when a square wave is given as input to the power amplifier. 5
- (b) Explain the principle operation of a push pull power amplifier. Compare its performance with Complementary symmetry power amplifier. 5
7. (a) The voltage gain of a transistor amplifier is 50. Its input and resistances are  $1\text{ K}\Omega$  and  $40\text{ K}\Omega$ . If the amplifier is provided with 10% negative voltage feedback in series with the input, calculate the closed loop voltage gain, input resistance and output resistance. 5
- (b) How the source resistance ( $R_S$ ) and load resistance ( $R_L$ ) affect the voltage gain of a amplifier. Explain with necessary mathematical expression. 5
8. Write short notes on any **two** : 5×2
- (a) Crystal oscillator
- (b) Differential amplifier
- (c) Non linear distortions in amplifier
- (d) High frequency effects in a transistors.

