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Total number of printed pages – 3

B. Tech  
CPES 5202

**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
- How operating point (Q) varies with ' $\beta$ ' and 'base width' of a transistor ?
  - What are the parameters that remain 'Fixed' in the fixed bias method of the transistor biasing ?
  - How gain is affected by emitter resistance ( $R_E$ ) of the transistor amplifier ?  
Explain.
  - What is square wave testing of an amplifier ? Why square wave is chosen for testing ?
  - If the overall bandwidth of three identical voltage amplifier stages connected in cascade is 1000. Find bandwidth of each stage in dB.
  - The output waveform of an operational amplifier as seen in CRO is 4V peak to peak with 0.04 micro second rise time ( $t_r$ ). What is its slew rate ?
  - Why single OPAMP based instrumentation amplifiers are not generally used in measurement system ?
  - How a Class B power amplifier is biased ?
  - The gain-bandwidth product of a voltage amplifier is 10000. Find its value when a negative feedback with feedback ratio of 0.1 is employed.
  - Is it possible to design a oscillator circuit with negative feedback ? Explain.

**P.T.O.**

2. (a) In the Fig.1, if  $R_1 = 470\text{ K}\Omega$ ,  $R_2 = 270\text{ k}\Omega$ ,  $R_C = 6.2\text{ K}\Omega$ ,  $R_E = 1.5\text{ K}\Omega$ ,  $C_{in} = C_o = 10\text{ }\mu\text{F}$ ,  $C_b = C_E = 5\text{ }\mu\text{F}$ , then find  $V_C$ ,  $V_E$ ,  $I_C$ , and  $V_{CE}$  when there is no input signal. 7

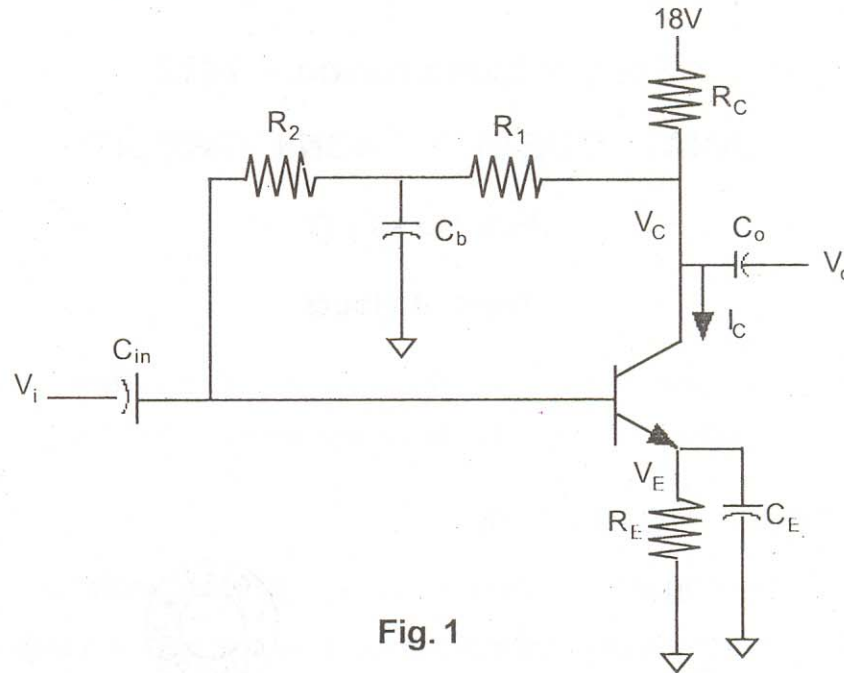


Fig. 1

- (b) What is the function of  $C_b$  in the above biasing circuit? 3
3. (a) Derive an expression for the overall bandwidth when N no. of identical voltage amplifiers are connected in cascade. 6
- (b) Draw a voltage divider bias emitter follower circuit. Draw its  $r_e$  equivalent circuit. What is its importance in analog circuits? 4
4. (a) What is Barkhausen criterion? 2
- (b) State the basic conditions for oscillations in a feedback amplifier. 2
- (c) What are the primary requirements to obtain steady oscillation at a fixed frequency? 2
- (d) The open loop gain of an amplifier changes by 5 percents. If 10 dB negative feedback is applied, calculate percentage change of the closed loop gain. 4
5. (a) Design a OPAMP circuits which will give an output voltage,  $V_o = 0.5 V_1 - 2 V_2 + 0.25 V_3$ , where  $V_1$ ,  $V_2$  and  $V_3$  are three input voltages? 5

- (b) Design a first order active filter which have gain = 5 and cut-off frequency 5 KHz. 5
6. (a) Explain, how the harmonics distortions in Class B power amplifier can be minimized. 5
- (b) Draw the circuit diagram of a push pull power amplifier circuit. Obtain an expression for maximum efficiency of the circuit. 5
7. (a) A FET amplifier in common-source configuration uses a load resistance of  $250\text{ K}\Omega$ . The ac drain resistance of the device is  $100\text{ K}\Omega$  and the transconductance is  $0.5\text{ mA/V}$ . Calculate the voltage gain and the output resistance of the amplifier. 6
- (b) With the help of schematic diagram explain how h-parameters of the transistors are obtained graphically. 4
8. Write short notes on any **two** : 5×2
- (a) D-MOSFET
- (b) Miller effect capacitance
- (c) Cascode amplifiers
- (d) Instrumentation amplifier