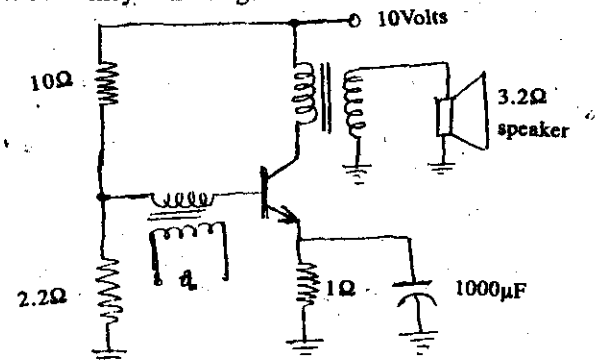
VIII. (a) A class A power amplifier is shown in the figure. Calculate (i) DC Base voltage (ii) DC emitter current (iii) DC supply current drain. If the voltage across the speaker is 5V peak to peak, calculate the (i) output power (ii) average power dissipated in the transistor and (iii) % efficiency of the stage. (12)



(b) Draw a neat schematic diagram showing positive feedback employed in oscillator system and derive the necessary conditions to be satisfied for sustained oscillations to occur. Draw the circuit diagram of any RC oscillator and write the expression for o/p frequency. (8)

IX. (a) Explain a basic operational amplifier and mention the important characteristic features of the OP-amp. Compare the important characteristics of an Ideal OP-amp with those of a Real (Practical) op-amp. (8)

(b) Draw the circuit of an Op-amp precision rectifier or a positive peak detector and explain its working. Sketch the input, output waveforms. (6)

(c) Draw the circuit of an OP-amp astable multivibrator and sketch the o/p voltage and capacitor voltage wave forms. Write equation for T_H and T_L and o/p frequency. (6)

OR

X. (a) Starting from Basic Principles show that the output of a Differential amplifier is given by $v_o = A_d V_d \left(1 + \frac{1}{\rho}\frac{V_C}{V_d}\right)$ where $\rho = CMRR$. (10)

(b) Draw the Instrumentation amplifier circuit and derive the expression for the output voltage. (10)
Calculate the output voltage if all the fixed reistors in the circuit are equal to 5KΩ and the variable resistor (potentiometer) is 1KΩ. The difference of the 2 input voltages is 200mV.

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B.Tech. Degree III Semester Examination November 2002

CS 305 ELECTRONIC CIRCUITS

(1999 Admissions onwards)

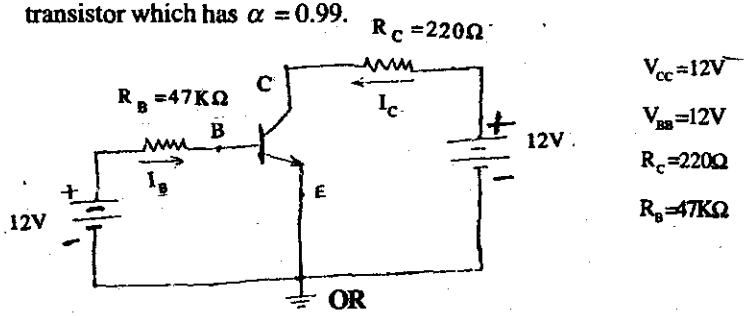
Time: 3 Hours Maximum Marks: 100

(Draw neat sketches, circuit diagram, where they are required)

I. (a) Explain the basic principle of a varactor diode and draw its important characteristic. (6)

(b) Define α, β of a transistor and establish the relationship between them. (8)

(c) Calculate the Base current, Collector current and Collector to Emitter voltage in the transistor circuit given. The transistor used is a silicon transistor which has $\alpha = 0.99$. (6)



OR

II. (a) Draw the Draun characteristics for 3 different values of 'V_{GS}' and transfer characteristics for 2 different values of 'V_{DS}' and indicate the various regions of operation on the characteristics. Show the salient features. (5)

(b) The following readings were obtained for an N-channel JFET. (10)

$V_{GS} = 0$

I_D (mA)	0	5	8	9.9	10	10	10	10.....10.1
V_{DS} (volts)	0	1	2	3	3.5	4	5	6..... 15

Determine I_{DSS}, V_P and $V_{GS(OFF)}$ for the JFET, from the above readings. Calculate r_{ds}, (i) when V_{DS} varies from 1 to 2 volts. (ii) When V_{DS} varies from 5V to 15 volts. Calculate g_m at $V_{GS} = 0$ and at $V_{GS} = -2V$. (5)

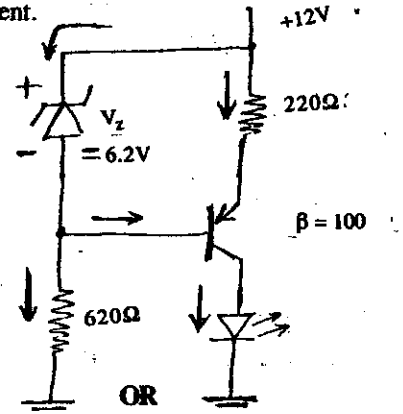
(c) Compare JFET with BJT and bring out the advantages of JFET.

(Turn over)

III. (a) Explain the importance of a Q-point stability for a BJT amplifier circuit. (6)
Discuss the problems which may occur due to unstable Q-point.

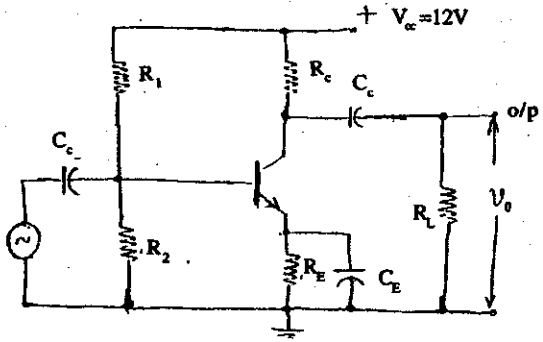
(b) Define the stability factors for a transistor biasing circuit with respect to variations in I_{CO}, V_{BE} and β. (6)

(c) Calculate V_B, V_E, I_B, I_E, I_C. Calculate the voltage drop across the LED and the LED current. (8)



OR

IV. (a) Derive the expressions starting from the basic fundamentals for R_{in}, A_v, A_i and R_o and hence calculate these, for the RC coupled amplifier circuit given in figure. (15)
Use approximate h - parameter AC equivalent circuit for the transistor.



V_{CC}= 12V, R_1 = 47KΩ, R_2 = 15KΩ, R_E = 0.47KΩ, R_C = 1KΩ, R_L = 10KΩ, C_C = 0.22μF, C_E = 500μF, h_{ie} = 500Ω, h_{fe} = 80.

(b) Sketch the typical frequency response curve of a RC coupled amplifier and show how you would determine the lower an upper cut off frequencies and the band width. (5)

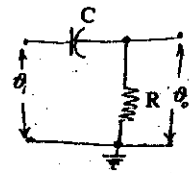
Contd.....3

V. (a) What is feedback and why feed back is required? Distinguish between positive and negative feedback. (

(b) Sketch a periodic rectangular pulse train and show the following: (
(i) OFF-SET, (ii) Pulse Amplitude (iii) PW
For this wave form how you would calculate duty cycle and PRR?

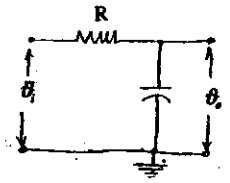
(c) A periodic rectangular pulse train at a frequency of 2KHz and duty ratio of 50%, voltage varying between 0 to 10V is applied to the circuits shown below: Sketch the steady state o/p voltage for each of the circuit. (

(i)



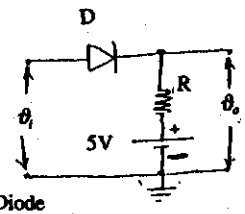
R = 500Ω C = 0.1μF

(ii)



R = 500Ω C = 0.1μF

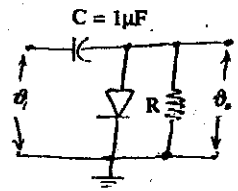
(iii)



R = 10KΩ

D → Silicon Diode

(iv)



C = 1μF R = 10KΩ

OR

VI. (a) What are the different types of feedback used? Explain briefly with schematic diagram. (

(b) What are Multivibrators? What are the different types of multivibrators? (

(c) With relevant waveforms explain the differences between a Monostable and an astable multivibrator. (
What are the different devices and ICs used to build astable and monostable circuits?

VII. (a) Explain and bringout the differences between voltage and power amplifiers. (

(b) What are the different factors used to classify the amplifiers? (
List down the different types of amplifiers based on these distinguishing factors.

(c) Draw a Transformer coupled push pull circuit and explain its operation with suitable waveforms. Show how you will calculate % efficiency? (

OR

Contd.....4.