

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), April-May 2015

B. Tech in Electronics & Communication Engineering, Semester IV



Roll No.....

ECE 401: Analog Electronics

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark) 10

- i. Where does the operating point of a class-B power amplifier lie?
 - (a) At the middle of ac load line
 - (b) Approximately at the collector cutoff on both the dc and ac load lines
 - (c) Inside the collector cutoff region on ac load line
 - (d) At the middle point dc load line
- ii. Schmitt trigger is basically
 - (a) An astable multivibrator
 - (b) A bistable multivibrator
 - (c) a monostable multivibrator
 - (d) An oscillator
- iii. A crystal oscillator is frequently used in digital circuits for timing purpose because of its
 - (a) Low cost
 - (b) ability to set the frequency at the desired value
 - (c) high frequency stability
 - (d) Simple circuitry
- iv. In the shunt series feedback amplifier, the basic amplifier and the feedback network are parallel connected at the input and series connected are the output. The signal sampled and the summing down will be respectively
 - (a) Voltage and voltage
 - (b) Current and current
 - (c) Current and voltage
 - (d) Voltage and current
- v. An amplifier without feedback has a gain of 1000. What is the gain with a negative feedback of 0.009?
 - (a) 900
 - (b) 125
 - (c) 100
 - (d) 10
- vi. In a transconductance amplifier, the device output
 - (a) Voltage depends upon the input voltage
 - (b) Voltage depends upon the input current
 - (c) Current depends upon the input voltage
 - (d) Current depends upon the input current
- vii. Consider the following:
 1. Oscillator
 2. Emitter follower
 3. Cascaded amplifier
 4. Power amplifierWhich of these use feedback amplifier?
 - (a) 1 and 2
 - (b) 1 and 3
 - (c) 2 and 4
 - (d) 3 and 4

viii.	If power distribution of class AB push-pull amplifier increases by 3 dBm, by how much does it increase in absolute terms? (a) 3 mW (b) 1000 mW (c) 2 mW (d) 2000 mW
ix.	Crossover distortion behavior is characteristic of (a) Class A output stage (c) Class B output stage (b) Class AB output stage (d) Common-base output stage
x.	A Hartley oscillator is used for generation of (a) Very low frequency oscillation (c) Audio frequency oscillation (b) Microwave oscillation (d) Radio-frequency oscillation

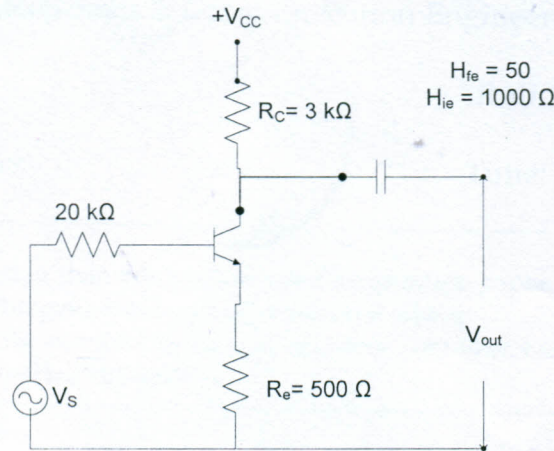


Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	Discuss about Diffusion capacitance.	
ii.	What do you mean by quasi stable state of a multivibrator?	
iii.	Explain why positive feedback not negative feedback is not necessary to produce oscillations	
iv.	What are drawbacks of complementary symmetry push-pull class B power amplifier?	
Q.3A	Draw circuit diagram of bistable multivibrator and explain its working.	05
Q.3B	Explain symmetrical triggering through diodes with the help of circuit diagrams.	05
Q.4A	A power amplifier working in class A operation has a transformer load. If the transformer has a turn ratio of 10 and secondary load is 100Ω . Find the maximum ac power output. Given that zero signal current is 0.1A.	05
Q.4B	A class C transistor amplifier is operating at 150 kHz. The transistor is conducting for $1\mu s$ in each cycle. The saturation values for the transistor are: $I_{C(sat)} = 100\text{ mA}$; $V_{CE(sat)} = 0.2\text{ V}$. Assuming ideal pulse approximations and the output swinging over the entire load line, find the average power dissipation.	05
Q.5A	Draw a circuit diagram of wein bridge oscillator and discuss its operation.	05
Q.5B	A colpitt's oscillator is designed with $C_1 = 100\text{ pF}$ and $C_2 = 7500\text{ pF}$. The inductance is variable. Determine the range of inductance values, if the frequency of oscillations is to vary between 950 kHz and 2050 kHz.	05
Q.6A	An amplifier has a mid-frequency gain of 100 and a bandwidth of 200kHz. (i) What will be the new bandwidth and gain, if 5% negative feedback is introduced? (ii) What should be the amount of feedback, if the bandwidth is to be restricted to 1 MHz?	05
Q.6B	An R-C coupled amplifier has a voltage gain of 1000, $f_1 = 50\text{Hz}$, $f_2 = 200\text{kHz}$ and a distortion of 5% without feedback. Find the amplifier voltage gain, f_1' , f_2' and distortion when negative feedback applied with feedback ration of 0.01.	05
	OR	
Q.6B	Calculate the voltage gain, input and output resistances of a voltage series feedback amplifier having $A_v = 300$, $R_i = 1.5\text{ k}\Omega$, $R_o = 50\text{ k}\Omega$ and $\beta = 1/15$.	05

7 Draw and explain the working of saw tooth wave generator. 05

OR

Q.7 Find the type of feedback in the given circuit. Also determine the value of feedback factor β . 05



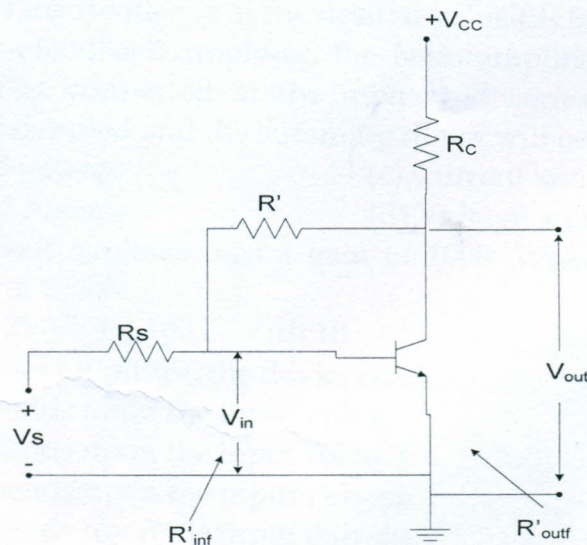
Q.8 Explain the effect of negative feedback on input impedance on all four feedback topologies by the help of proper diagrams and mathematical expressions. 15

Q.9A Design a collector-coupled one shot multivibrator circuit using *n-p-n* transistors. Neglect I_{CBO} and junction voltages of the transistor in saturation. Let $h_{fe}(\min) = 20$. In stable state, the OFF transistor has $V_{BE} = -1$ V. The ON transistor has base current I_B which is 50% in excess of the $I_{B(\min)}$ value. $V_{CC} = 8$ V, $I_{C(sat)} = 2$ mA, delay time = 2500 μ sec. Chosen $R_1 = R_2$. $I_{B2}(\text{actual}) = 1.5 I_{B2(\min)}$. 10

Q.9B Explain the high frequency response of the common-emitter amplifier with proper diagrams and equations. Also find out f_H . 10

OR

Q.9B 10



The circuit of given figure has the following parameters:

$R_C = 4$ k Ω , $h_{ie} = 1.1$ k Ω , $R' = 40$ k Ω , $h_{fe} = 50$, $R_s = 10$ k Ω , $h_{re} = h_{oe} = 0$.

Find (a) A_{vf} (b) R_{inf} (c) R'_{outf} .