

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

EndTerm Examination (Regular/Backlog), April-May 2018

B. Tech ECE Engineering, Semester IV

Roll No.....

COURSE CODE: ECE 401
Analog Electronic Circuits

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

- i. The gain of an amplifier without feedback is 100 dB. If a negative feedback of 3 dB is applied, the gain of the amplifier will become
(A) 5 dB (B) 300 dB (C) 103 dB (D) 97 dB
- ii. A feedback circuit usually employs network
(A) Resistive (B) Capacitive (C) Inductive (D) None of the above
- iii. When current feedback (negative) is applied to an amplifier, its input impedance
(A) Is decreased (B) Is increased (C) Remains the same (D) None of the above
- iv. Bistable multivibrator circuit is also known as
(A) Latch (B) Gate (C) Flip-flop (D) Bidirectional circuit
- v. Monostable multivibrator can also be termed as:
(A) Full astable multivibrator (B) Half astable multivibrator
(C) Half bistable multivibrator (D) Full bistable multivibrator
- vi. The piezoelectric effect in a crystal is
(A) A voltage developed because of mechanical stress
(B) A change in resistance because of temperature
(C) A change in frequency because of temperature
(D) None of the above
- viii. One condition for oscillation is
(A) A phase shift around the feedback loop of 180°
(B) A gain around the feedback loop of one-third
(C) A phase shift around the feedback loop of 0°
(D) A gain around the feedback loop of less than 1
- ix. The Q of the crystal is of the order of

(A) 100 (B) 1000 (C) 50 (D) More than 10,000

x The main features of a large-signal amplifier is the circuit's _____.

- (A). power efficiency
- (B). maximum power limitations
- (C). impedance matching to the output device
- (D). All of the above

Q.2 Short answer type questions (4 questions @ 2.5 marks)

- (a) Why does input resistance increase for amplifier with voltage series feedback?
- (b) Draw block diagram of trans-conductance amplifier
- (c) Draw the hysteresis graph of Schmitt trigger.
- (d) Explain Barkhausen's criterion for oscillation.

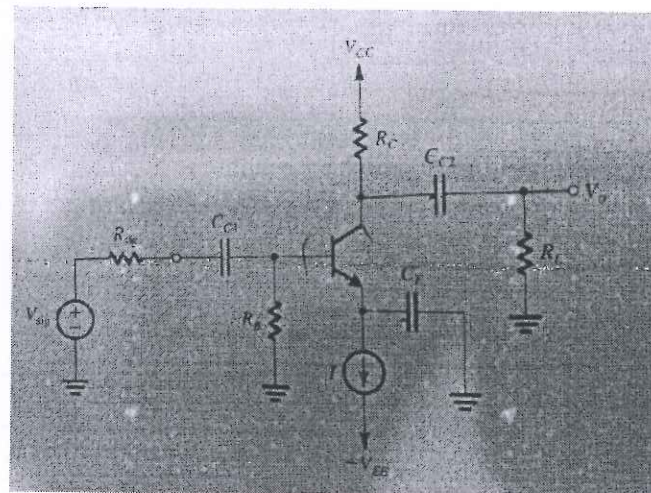
Q.3A List the method for finding the input and output equivalent circuit for amplifier 05

Q.3B Find the De-sensitivity factor, A_{VF} & R_{OF} of emitter follower BJT. 05

Q.4A Explain the Miller theorem and its Dual. 05

Q.4B Find equivalent internal capacitance for BJT at input using Miller theorem 05

Q.5A It is required to find to find the upper 3 dB frequency of common emitter amplifier shown in Figure below. $V_{CC}=V_{EE}=10\text{ V}$, $I=1\text{ mA}$, $R_B=100\text{ K}\Omega$, $R_C=5\text{ k}\Omega$, $R_L=5\text{ K}\Omega$, $\beta_0=100$, $V_A=100\text{ V}$, $C_\mu=1\text{ pF}$, $f_T=800\text{ M Hz}$, and $r_x=50\text{ }\Omega$. 05



Q.5B A common emitter amplifier has $C_{C1}=C_E=C_{C2}=1\text{ }\mu\text{F}$, $R_B=100\text{ k}\Omega$, $R_{sig}=5\text{ k}\Omega$, $g_m=40\text{ mA/V}$, $r_\pi=2.5\text{ k}\Omega$, $R_C=8\text{ K}\Omega$, and $R_L=5\text{ K}\Omega$. Assuming that the three capacitors do not interact, find the three cutoff frequencies and the effective f_L . 05

Q.6A Draw the high frequency Model of FET amplifier. 05

Q.6B Derive the expression for unity gain frequency (f_T) of MOSFET. 05

OR

Q.6B Determine f_{T0} of n channel MOSFET whose $C_{gs} = 24.7$ fF, $C_{gd} = 1.72$ fF. Assume operation at $100 \mu A$, and $k_n' = 160 \mu A/V^2$, $W/L = 10$. 05

Q.7A Draw the circuit diagram of LC tuned circuit oscillator and explain the condition for oscillation. 05

Q.7B A Colpitt's oscillator has two capacitors of value 24 nF & 240 nF connected in parallel to inductor of 10 mH. Determine the frequency of oscillation and the feedback gain β for the circuit. 05

OR

Q.7B In a Wein Bridge oscillator, $R = 200$ K Ω . We want to change the frequency of sinewave output from 5 KHz to 100 KHz. What should be the values or range of variable capacitor so as to get the desired frequency range? 05

Q.8 Draw the block diagram of Astable Multivibrator and derive the expression for Time period of oscillation assuming square wave of 50% duty cycle. 10

Q.9A Draw the circuit of Class B pushpull amplifier and explain its working. 10

Q.9B Draw the output characteristics of class B pushpull amplifier and explain crossover distortion. 10

OR

Q.9B Show that maximum efficiency of Class B stage is 78.5% . 10