Code No: X0425 **R07** SET - 1

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
ELECTRONIC CIRCUIT ANALYSIS
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain the small signal analysis of FET Amplifier in CD configuration and draw its characteristic curves.
   b) A single stage CE amplifier with $R_s = 1K\Omega$, $R_E = 50\ K\Omega$, $R_2 = 2K\Omega$, $R_C = 1K\Omega$, $R_L = 1.2K\Omega$, $h_{fe} = 50$, $h_{oe} = h_{re} = 0$. $h_{ie} = 1.1K\Omega$. Find A_i, Ri_n, A_v, R_o, and power gain using approximate method of Analysis. (8M+8M)

2. a) Draw and perform the analysis of Boot-Strapped emitter follower multi-stage amplifier circuit.
   b) Three identical non-interacting amplifier stages are cascaded with an overall gain of 0.3dB down at 50 kHz compared to mid-band. Calculate the upper cutoff frequency of the individual stages. (8M+8M)

3. a) Discuss the concept of CE short circuit current gain with its hybrid-π equivalent circuit.
   b) Following measurements of a certain transistor are available at room temperature and with $I_C = 5$ mA, $h_{fe} = 100$, $h_{ie} = 0.62\ K\Omega$. Short circuit current gain = $A_{IS} = 10$ at 10MHz. $C_{b'c} = 3_{pF}$. Calculate f_T and f_β. (8M+8M)

4. a) Derive the expression for maximum value of conversion efficiency of Class A transformer coupled power amplifier.
   b) A power transistor is to be used as a class A transformer coupled amplifier and is to deliver a maximum of 5W to a 4 ohm load. Operating point is adjusted for symmetrical clipping with collector supply voltage of 20V. Assume ideal characteristics with $V_{min} = 0V$.
   Calculate. i) Transformer turns ratio. ii) Peak collector current iii) Operating point values of I_{CQ} and V_{CEQ}. iv) Power dissipation rating of transistor.v) Collector circuit efficiency. (8M+8M)

5. a) Draw the circuit diagram of a Double-tuned amplifier and explain the different stages of simplification with its equivalent circuit.
   b) Draw and explain the circuit diagram of single tuned capacitive coupled amplifier and derive the expression for (A/A_{reso}) . (8M+8M)

6. a) Draw and explain the working of class-C tuned power amplifier. Derive the expression for its efficiency.
   b) Draw the circuit diagram for JFET tuned R.F. amplifier and explain its working. (8M+8M)

7. a) Draw and explain the circuit diagram of series type voltage regulator.
   b) Design and draw a voltage regulator circuit to give output voltage adjustable from 10V to 15V. Maximum output current is 100mA and input voltage is 20V. (8M+8M)

8. a) With suitable circuit diagram explain the working principle of IC 723 Voltage Regulator.
   b) IC 7824 regulator can deliver a maximum current of 700 mA. Design a circuit using same IC to deliver a current of 3 Amps. (8M+8M)
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Code No: X0425 **R07** SET - 2

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
ELECTRONIC CIRCUIT ANALYSIS
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Perform the small Signal analysis of FET amplifier in CS configuration and explain its characteristics.
   b) The emitter follower circuit is with R_s = 1KΩ and R_L = 5 KΩ, determine the A_V, A_I, R_i, R_o. using h-parameters, h_{fe} = 75, h_{ie} = 1.1KΩ, h_{oe} = 25 μA/v. (8M+8M)

2. a) Draw and explain the circuit diagram of differential amplifier with its equivalent circuit.
   b) Draw and analyze the circuit diagram of two-stage RC-Coupled amplifier. (8M+8M)

3. a) Discuss about Hybrid-π capacitances. How do Hybrid-π parameters vary with temperature?
   b) Following measurements of a certain transistor are available at room temperature and with I_C = 5mA, V_{CE}=10V, h_{fe} = 100, h_{ie} = 600Ω. $[A_{ie}]$ = 10 at 10MHz. C_c = 3pF. Calculate f_β, f_T, C_e, $r_{b'e}$ and $r_{bb'}$. (8M+8M)

4. a) Derive the expression for maximum value of conversion efficiency for Class B push pull power amplifier.
   b) Explain Class D and Class S power amplifiers. Mention their salient features and applications. (8M+8M)

5. a) Draw and explain the circuit diagram of double-tuned amplifier with its equivalent circuit.
   b) Perform the analysis of single-tuned FET amplifier with synchronous tuning. (8M+8M)

6. a) What is stagger tuning? How it is different from synchronous tuning? Derive an expression for the selectivity of a stagger tuned amplifier.
   b) Explain the principle and working of class-C tuned power amplifier. Derive the expression for its efficiency. (8M+8M)

7. a) Define performance parameters of voltage regulators and explain their significance.
   b) Design a Zener-shunt voltage regulator with V_Z = 10V. Input supply voltage varies from 15V to 25V and the load current varies between 0 and 15 mA. Determine the line and load regulation. (8M+8M)

8. a) What are the limitations of linear voltage regulators? How are they overcome with switching regulators?
   b) Design a voltage regulator using IC 723 for 5 V output and 3A load current. V_{in} = 10V and V_{SC} = 0.65V. (8M+8M)
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Code No: X0425 **R07** SET - 3

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
ELECTRONIC CIRCUIT ANALYSIS
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Perform the small signal analysis of FET Amplifier in CG configuration and explain its characteristic curves.
   b) Consider a single stage CE amplifier with R_s = 750KΩ, R_E = 40 KΩ, R_2 = 2KΩ, R_c = 1KΩ, R_L = 1.8KΩ, h_{fe} = 50, h_{oe} = h_{re} = 0. h_{ie} = 1.1KΩ. Find A_i, R_o, A_v and power gain using exact method of analysis. (8M+8M)

2. a) Draw and explain the circuit diagram of cascode-transistor amplifier.
   b) With suitable circuit diagram, explain the working of a RC Coupled amplifier and derive the expression for voltage gain. (8M+8M)

3. a) Derive the expression for short circuit current gain of an amplifier at high frequency and obtain the expression for f_T.
   b) Following measurements of a certain transistor are available at room temperature and with I_C = 10 A, h_{fe} = 100, h_{ie} = 0.62 KΩ. Short circuit current gain = A_{IS} = 10 at 5MHz. $C_{b'c}$ = 3_{pF}. Calculate f_T and f_{β}. (8M+8M)

4. a) Deduce the expression which gives the relationship between maximum collector dissipation and maximum power output of class-B push pull amplifier.
   b) Ideal class – B transformer-coupled audio amplifier is fed from 20V DC. Transformer ratio is $\frac{N_p}{N_s} = 4$. A 4 ohm speaker is connected to load. Calculate:
   i) Maximum signal power delivered to load. ii) Power dissipation rating to each transistor.
   iii) Maximum excitation current at input if transfer characteristic is linear. (h_{fe} = 20) (8M+8M)
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5. a) Derive the expression for the gain of a single-tuned capacitance coupled amplifier. Discuss about its Selectivity.
   b) A single-tuned class A transformer-coupled RF amplifier has the following parameters:
   Transconductance, g_m of the transistor = 5mA/V
   Primary inductance = 100 μH
   Secondary inductance = 50 μH
   Coefficient of coupling = 0.01
   Primary resistance = 10 Ω
   Secondary resistance = 8 Ω
   The primary is tuned with a 100 pF capacitor and the secondary is loaded by a 10KΩ resistance. Find:
   The resonant frequency
   The effective Q of the tuned circuit
   The 3 dB bandwidth
   Assume r_o of the transistor to be very large. (8M+8M)

6. Draw the circuit diagram of single tuned direct-coupled RF amplifier and explain its operation with its equivalent circuit. Also derive the following expressions for the same circuit.
   i) Voltage gain at resonance
   ii) Voltage gain at frequencies other than resonance and
   iii) Bandwidth (16M)

7. a) Draw the circuit and explain how short circuit over load protection is provided in voltage regulators circuits.
   b) A series regulator has stability factor of 6×10^{-3} and output resistance of 10^{-4} ohms. Calculate the change in output voltage when
   i) Unregulated input d.c voltage varies by 10V ii) Load current varies by 250mA. (8M+8M)

8. a) Explain the principle of operation of switching regulators and also mention the various types of them.
   b) Design a voltage regulator using IC 723 to provide an output voltage of 5 volts at 1.5A. Fold back current limiting is to be provided so that knee current is 1.6 Amps, short circuit current is 300mA and input voltage is 13 volts. (8M+8M)

Code No: X0425 **R07** SET - 4

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
ELECTRONIC CIRCUIT ANALYSIS
(Electronics and Communications Engineering)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Perform the Small Signal Analysis of CC Amplifier and explain the characteristics with the relevant graphs.
   b) With the help of necessary equations, discuss the variations of A_v, A_I, R_i, R_o, A_p with R_S and R_L in common Emitter configuration. (8M+8M)

2. a) Draw the circuit diagram for Darlington pair amplifier and derive the expressions for A_I, Av, R_i and R_o.
   b) Design a two-stage CE-CE amplifier for the given data. $h_{fe1}=h_{fe2}=180$, $R_L=1K\Omega$ $I_{E1}=I_{E2}=1mA$, S=3, $V_{CC}=12V$, f=100Hz. Assume identical transistors. (8M+8M)

3. a) Draw the equivalent circuit of hybrid-π model and derive the expressions for Hybrid-π impedances in terms of low frequency h-parameters.
   b) The following low-frequency parameters are available for a transistor at
   $I_{CQ} = 5$ mA
   $h_{ie} = 1K$, $h_{fe} = 100$ $h_{oe} = 4 \times 10^{-5}$ A/V
   $h_{re} = 10^{-4}$ $C_{ob} = 2$ pF $f_T = 10$ MHz
   Compute the values of hybrid-π parameters at room temperature. (8M+8M)

4. a) Show that class B push pull amplifiers exhibit half wave symmetry.
   b) A power transistor is to be used as a class A transformer coupled amplifier and is to deliver a maximum of 10W to a 4 ohm load. Operating point is adjusted for symmetrical clipping with collector supply voltage of 15V. Assume ideal characteristics with $V_{min} = 0V$.
   Calculate.
   Transformer turns ratio.
   Peak collector current
   Operating point values of I_{CQ} and V_{CEQ}.
   Power dissipation rating of transistor.
   Collector circuit efficiency. (8M+8M)
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5. a) Derive the expression for the gain of a Single-tuned inductively coupled amplifier. Discuss about its bandwidth.
   b) A parallel resonant circuit comprises of an inductor (having inductance of 1mH and resistance of 10Ω) and a parallel capacitor of 100 pF.
   Calculate:
   Resonant frequency, ignoring the resistance.
   Resonant frequency, considering the resistance.
   Q-factor.
   Impedance at resonant frequency. (8M+8M)

6. a) What is stagger tuning? How it is different from synchronous tuning? Derive an expression for the selectivity of a stagger tuned amplifier.
   b) Write notes on wide band tuned amplifiers. (8M+8M)

7. a) Define the terms: i) Load Regulation ii) Line Regulation iii) Ripple Rejection and iv) Temperature Stability pertaining to voltage regulator ICs.
   b) A shunt regulator utilizes a Zener diode whose voltage is 5.1 V at 50 mA and whose $r_z = 7\Omega$. The diode is fed from a 15V DC supply through a 200 Ω resistor. What is the output voltage at no load? Find the line and load regulations. (8M+8M)

8. a) Draw the circuit for 7805 Voltage Regulator IC and explain its working.
   b) Design a voltage regulator using IC 723 for 5 V output and 3A load current. $V_{in} = 10V$, $V_{SC} = 0.65V$. (8M+8M)