Code No: R22043 **R10** SET - 1

II B. Tech II Semester Supplementary Examinations January - 2014
ELECTRONIC CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Mention any three applications of a CE amplifier. Consider a single stage CE amplifier with R_S = 1K and R_L = 1.2K. Using typical values of h-parameters find A_i, A_V, R_i and R_o.
   b) Explain how FET can be used as an amplifier. The FET shown in figure 1 has the following parameters: I_{DSS} = 5.6 mA, and V_P = -4V. Find υ_o, if (i) υ_i = 0 and (ii) υ_i = 10V. (8M+7M)

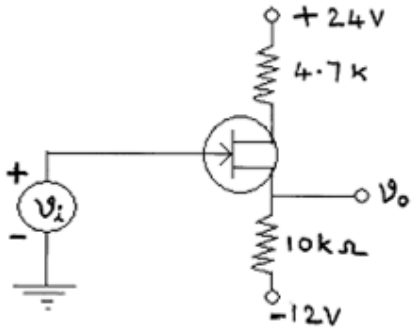

Figure.1

2. a) Classify various feedback amplifiers. Explain how negative feedback improves the characteristics of amplifier.
   b) For voltage series feedback amplifier with parameters of the internal amplifier as A_V= −200; R_{in}= 5K; R_0= 20K; Bandwidth = 50 kHz and having feedback factor β = - 0.02. Calculate:
      i) Voltage gain A_{Vf}
      ii) input impedance R_{inf}
      iii) Output impedance R_{0f} and
      iv) Bandwidth (8M+7M)

3. a) Classify different type of oscillators based on frequency range.
   b) Calculate the value of 'C' used in the Wein-bridge circuit that determines the oscillator frequency of 10 kHz. Assume R=50 K in the Wein-bridge circuit.
   c) Draw the electrical equivalent circuit of a crystal and draw the frequency versus reactance curve and show the two resonant frequencies f_S and f_P on the graph. (4M+4M+7M)
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4. A three stage CE amplifier using silicon BJT as shown Figure 5, has R_F=50 K, R_{F2}=10K,β =50, R_{L1}=15 K and V_{cc}=20 V. Calculate the value of $V_{c3.}$ Also show that the amplifier is DC stabilized for large values of β. (15M)

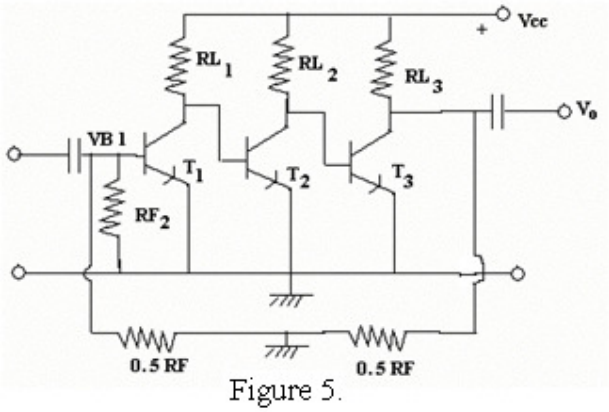

Figure 5.

5. a) What is the order of magnitude of each resistance in the hybrid - π model?
   b) Given the following transistor measurements made at I_C = 5 mA, V_{CE} =10V and at room temperature, h_{fe} = 100, h_{ie}= 600, [A_{ie}] = 10 at 10MHz, C_e =3 pf. Find f_β f_T , C_e, $r_{b'e}$ and $r_{bb'}$.
   c) Explain how the parameters of hybrid-π model vary with I_C, V_{CE} and temperature.
   (4M+7M+4M)

6. a) Explain why a power amplifier is always preceded by a voltage amplifier?
   b) Design a class B power amplifiers to deliver 25 W to a load resistor R_L = 8 ohms, using transformer coupling. V_m = V_{cc}=25V. Assume necessary data.
   c) Explain about class D amplifier (4M+7M+4M)

7. a) Draw a simple BJT tuned amplifier circuit and its ideal response characteristic
   b) In the single tuned amplifier, the circuit bandwidth is 5 kHz and voltage gain has a maximum value at 1000 kHz, when the tuning capacitor is adjusted to 500 pf. Calculate the Q of the circuit and the coil inductance? (8M+7M)

8. a) With reference to voltage regulators discuss about
   i) Output resistance ii) Load regulation
   iii) Line regulation iv) Stability factor
   b) Draw the circuit of a shunt regulator circuit and explain its operation. (8M+7M)

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Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
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1. a) Mention any three applications of CB amplifier. List out the characteristics of CB amplifier and mention their typical values. Draw the basic CB amplifier circuit and its equivalent h-parameter model. Derive an expression for its R_i and R_o.
   b) The circuit shown in the Figure 1 below uses a transistor whose h-parameters are h_{ie} = 1.1K, h_{fe} = 50, h_{re}= 2.5 x 10^{-4}, h_{oe} =25 μA/V. Calculate A_i, A_V ,A_{VS}, R_i' and R_o'.

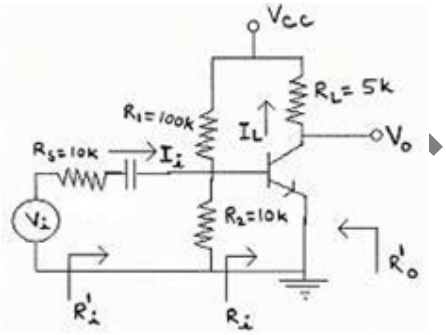

Figure.1

(10M+5M)

2. a) Derive the expressions for A_v, Z_i, Z_o and A_I of voltage shunt feedback.
   b) Determine voltage gain, input and output impedance of negative feedback amplifier having A=100, R_i=10kΩ R_o=20kΩ for a feedback factor of β=0.1 and 0.5. (8M+7M)

3. a) Draw the circuit of R-C phase shift oscillator circuit using JFET as active device and discuss nature of feedback used in the feedback path.
   b) Derive the expression for feedback factor in the Wein-bridge circuit
   c) In a transistor Colpitts oscillator circuit, L = 10 μ H. C= 0.01μF and C_2 =0.1μF. Calculate the: i) operating frequency and ii) feedback fraction β' (7M+4M+4M)

4. a) Compare different types of amplifier circuits based on the type of coupling.
   b) The gain of an RC coupled 2 stage FET amplifier falls by 90% of the mid-band value at 400 kHz. If g_m of each FET is 10 m A/V, and total output capacitance for each stage is 20 pf. Calculate the R_L required and the stage mid-band gain. (8M+7M)
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5. a) Derive the expression for output conductance and diffusion capacitance of hybrid-π CE amplifier.
   b) The h-parameters of a transistor at I_c = 8mA, V_{CE} = 10v, and at room temperature are h_{ie} = 1KΩ , h_{oe} = 2 x 10^{-5} A/V, h_{fe} = 50, h_{re} = 2.5 x10^{-4}. At the same operating point, f_T = 60 MHz, and C_{ob} = 2PF. Compute the values of hybrid -π parameters. (5M+10M)

6. a) Derive the equation for maximum value of efficiency of a class A transformer coupled amplifier.
   b) Calculate the effective load resistance RL seen looking into the primary of a10:1 transformer connected to an output load of 16 ohms.
   c) Define conversion efficiency of an amplifier. (7M+5M+3M)

7. a) Explain the principle of stagger tuning technique of transformer-coupled amplifier that is used to obtain band pass filter characteristic with pass band of 10 KHZ with all necessary diagrams for illustration.
   b) Draw the circuit of double-tuned transformer-coupled amplifier. Discuss the nature of responses of the amplifier for different values of KQ=1; KQ>1 and KQ<1. (8M+7M)

8. a) Draw and explain series voltage regulated power supply. Calculate stability factor and output resistance.
   b) What is the function of voltage regulator circuit? How it is different from unregulated power supply.
   c) A power supply has a voltage regulation of 1%. If the no load voltage is 30V, what is the full load voltage? (7M+4M+4M)

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ELECTRONIC CIRCUIT ANALYSIS
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Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
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1. a) Draw AC equivalent circuit for a CE amplifier with a bypassed emitter resistor and with an un by passed emitter resistor. Briefly explain each circuit.
   b) What are the advantages of h-parameters?
   c) The circuit shown in the Figure 1 below, the CS amplifier with self-bias and by pass resistor R_S. Derive the expressions for R_i, R_o and A_V, using its equivalent circuit. (7M+3M+5M)

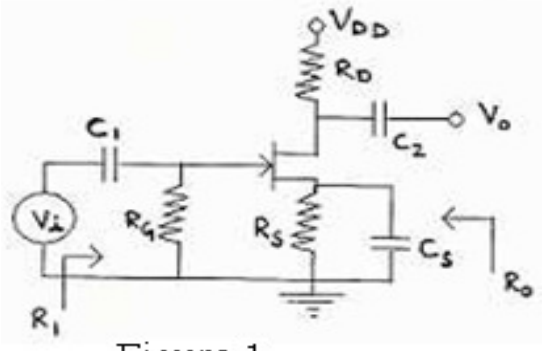

Figure.1

2. a) Explain the general characteristics of negative feedback amplifiers. Compare the advantages and disadvantages of positive and negative feedback
   b) Derive the expressions for voltage gain, R_i and R_o of voltage series feedback amplifiers (8M+7M)

3. a) Draw the circuit diagram of a RC phases shift oscillator using BJT. Derive the expression for frequency of oscillators.
   b) In a transistorized Hartley oscillator the two inductances are 2mH and 20μH while the frequency is to be changed from 950 kHz to 2050 kHz. Calculate the range over which the capacitor is to be varied.
   c) Why RC oscillators are not suitable for high frequency applications. (7M+4M+4M)

4. a) Derive the relation between f_2 and f_{2n} when such, n-identical amplifier stages are cascaded.
   b) In an RC-coupled BJT amplifier, it is given that R_L=6.8k, effective AC load after C_c is R_{ac}=1k, C_c=1 μf, C_E=24μF, R_E=2.2k, h_{fe} =49, R_S=5k and h_{ie}=1k, find the low frequency cut off point. (8M+7M)
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5. a) What is the order of magnitude of each resistance in the hybrid π-model?
   b) Define f_β and f_T and derive the relation between f_β and f_T.
   c) Show that the hybrid π model is valid for frequencies up to approximately f_T /3.
   (4M+5M+6M)

6. a) Draw the circuit of transformer less push pull amplifier circuit with loud speaker as the load resistance. Justify the circuit operation with "emitter follower" circuit working.
   b) Calculate transformer turns ratio required to match an 8 ohms speaker load to an amplifier so that effective load resistance is 3.2 kilo-ohms. (8M+7M)

7. a) Explain the principle of stabilizing the double-tuned transformer coupled amplifier response against the internal feedback
   b) Explain the function of 'swamping resistor' in improving the bandwidth of tuned amplifiers.
   c) Draw the circuit of typical single tuned RF amplifier stage employing a transistor, explain its operation. If the tuned circuit contains L=200μH, C=126pF, R_L=5 kΩ. Calculate the Bandwidth of the amplifier. (7M+4M+4M)

8. a) What are the merits and limitations of series regulators?
   b) Explain the limitations of unregulated power supplies. To derive regulated DC output from AC mains, what are the important building blocks required, explain about each block.
   c) Give the differences between Load and Line Regulations. (6M+5M+4M)

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ELECTRONIC CIRCUIT ANALYSIS
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Answer any **FIVE** Questions
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1. a) A self-biased CE amplifier circuit has R_1 = 100 K , R_2 = 10K, R_c = 5K, R_E = 1K, R_S = 10K. Compute A_I, A_V, A_{VS} and R_i. The h-parameters of the transistor are h_{ie} = 1.1kΩ, h_{fe} = 50, h_{re} = 2.5 x 10^{-4} , h_{oe} = 25μA/V.
   b) Compare BJT and FET with respect to low frequency small signal model. The circuit shown below Figure 1, gives an N-channel FET having I_{DSS}=1mA V_D=-1V. If quiescent drain to ground voltage is 10V, find R_1. (8M+7M)

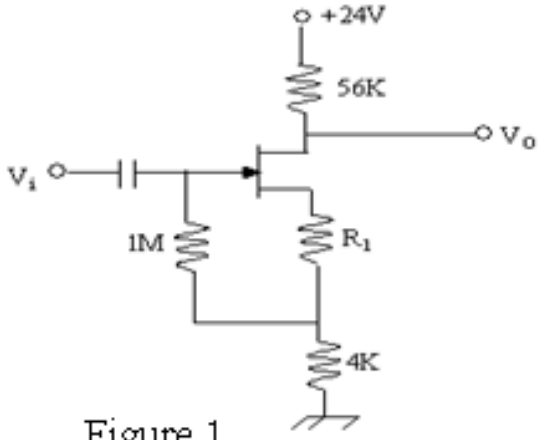

Figure 1.

2. a) What are the different types of feedback amplifiers? Give their equivalent circuits.
   b) Explain with the help of mathematical expressions, how the negative feedback in amplifiers increases amplifier bandwidth and reduces distortion in amplifiers.
   c) An amplifier circuit has a gain of 60 dB and an output impedance Z_o=10KΩ. It is required to modify its output impedance to 500Ω by applying negative feedback. Calculate the value of the feedback factor. Also find the percentage change in the overall gain, for 10% change in the gain of the internal amplifiers. (4M+5M+6M)

3. a) Show that the gain of Wien bridge oscillator using BJT amplifier must be at least 3 for the oscillations to occur.
   b) Calculate the value of 'C' in the frequency-determining network of a FET RC phase shift oscillator circuit having R = 2.5 K; assuming frequency of oscillation f = 1.625 kHz.
   c) Repeat (b) if it is BJT RC phase shift oscillator with R_C = 4K. (7M+4M+4M)
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4. An RC coupled FET Amplifier has the following circuit values: R_L =10K, R_G=500K, C_c=0.01μF, C_{sh}=150 pF, μ=25, r_d=10 K and g_m =2.5mA/V, find A_m, $f_1$and f_2 and also derive the three parameter expressions. (15M)

5. a) Draw an approximate equivalent hybrid -π circuit for the calculation of the short-circuit CE current gain and derive the same.
   b) The hybrid-π parameters of the transistor used in circuit of the following figure are: g_m = 50mA/V, $r_{bb'}$=100Ω, $r_{b'e}$= 1K, $r_{b'c}$ = 4M, r_{ce} = 80K, C_c = 3pF, C_e = 100 pF. Using Miller's theorem and the appropriate analysis, compute
      i) The upper 3 dB frequency of the current gain AI
      ii) The magnitude of voltage gain at the frequency of part (i) (5M+10M)

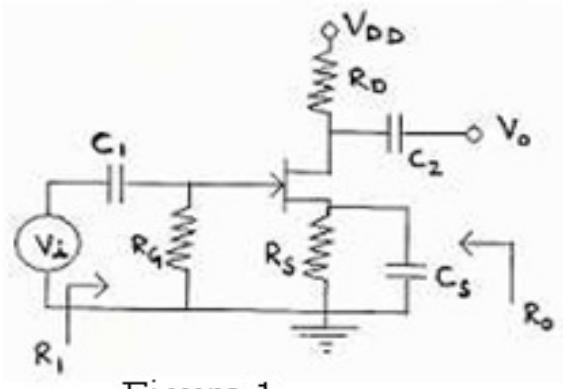

Figure. 1

6. a) Derive the expression for maximum collector Power Dissipation P_c(Max) in the case of class B power amplifiers
   b) Draw the circuit diagram of a single ended power amplifier? Explain the function of each component used in the circuit? (8M+7M)

7. a) State the functions and frequency ranges of operation of Tuned amplifiers with relevant reasons.
   b) Explain and also mention the class of operation of the amplifier for limiting the amplitude of gain to the desired level
   c) Derive the equation for the 3 dB band width of capacitance coupled single tuned amplifier (3M+7M+5M)

8. a) What are the limitations of various linear regulators? Explain what type of protection circuits are required in power supplies?
   b) Give the disadvantages of the series and shunt regulators.
   c) A 50V power supply has line regulation 0.2%. How large would the 75V input voltage to the supply have to become for the output voltage to rise to 52V? (5M+5M+5M)