Code No: RT22041 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, November-2017
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Show that the voltage gain increases with cascading. (4M)
   b) Derive the expression for overall gain of a negative feedback circuit. (4M)
   c) Explain why LC oscillators are not used at low frequencies. (4M)
   d) An amplifier with a bandwidth of 20Hz to 20Khz is available. Find the overall bandwidth of an amplifier if A=30dB and feedback factor is 0.2 (4M)
   e) What is thermal runaway? Explain it. (3M)
   f) Why do we go for tapped single tuned amplifier? (3M)

PART –B

2. a) What is a Giacelletto model of a Transistor? Derive the relationship between various parameters. (8M)
   b) A single stage Common Emitter amplifier is measured to have a voltage-gain bandwidth f_H of 5 MHz's with R_L = 500 Ohms. Assume h_{fe} = 100, g_m = 100 *mA/V,* $r_{bb'}$ = 1000, C_c = 1 pf, and f_T = 400 MHz's .Find the value of the source resistance that will give the required bandwidth. (8M)

3. a) Draw the circuit for CASCODE Amplifier. Explain its working, obtain overall values of the circuit in terms of h-parameters. (8M)
   b) Discuss about the effect of cascading on bandwidth of multistage amplifiers. (8M)

4. a) Enumerate and explain with necessary derivations the characteristics that get affected with negative feedback. (8M)
   b) Analyze CE with R_e circuit using linear analysis and negative feedback circuit. (8M)

5. a) Derive the frequency of oscillation and condition for sustained oscillation in a FET based RC Phase shift oscillator. (8M)
   b) What is a clapp oscillator and discuss its advantages compared to colpitts oscillator. (8M)

6. a) What is a power amplifiers and are classify them based on class of operation and also compare them (8M)
   b) Derive the expression for conversion efficiency of a Class B Power amplifier. (8M)

7. a) Draw the diagram of a capacitance coupled tuned amplifier and derive an expression for its quality factor. (8M)
   b) Show that Bandwidth decreases with cascading of single tuned amplifiers. (8M)
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Code No: RT22041 **R13** SET - 1

II B. Tech II Semester Regular/Supplementary Examinations, April/May-2017
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Define the h-parameter of the Transistor. Draw a h-parameter network representation of a transistor (4M)
   b) What is Darlington Transistor. What are its sailent features (4M)
   c) What is meant by feedback in amplifiers, what are the types of feedback (4M)
   d) What are the constituent parts of an Oscillator (4M)
   e) How are amplifiers classified based on the biasing condition (3M)
   f) Mention the application of Class-C tuned amplifier (3M)

PART –B

2. a) With a neat sketch explain about FET (8M)
   b) A FET has Drain saturation current I_{DSS} of 10mA and Quiescent point Drain current I_D is 5mA,with pinch –off voltage V_p=-4V,calculate the value of V_{GS} and the value of Transconductance g_m. (8M)

3. a) Explain about Boot-strap follower (8M)
   b) Differential amplifier using BJT (8M)

4. a) With a neat sketch explain a negative feedback amplifier and obtain expression for its closed loop gain (8M)
   b) An amplifier requires an input signal of 60mV to produce a certain output. with a negative feedback to get the same output the required signal is 0.5V.The voltage gain with feedback is 90.Find the open loop gain and feedback factor (8M)

5. a) Draw the circuit of Hartley oscillator and explain its working. Derive the expressions for frequency of oscillation and condition for starting of oscillation (8M)
   b) In an Hartley oscillator ,if L_1=0.2mH,L_2=0.3mH and C=0.003 µF, calculate the frequency of its oscillation (8M)

6. a) What is Heat-sink. explain the different types of Heat sinks (8M)
   b) Determine the power dissipation capability of a transistor ,which has been mounted with a heat sink having thermal resistance $\Theta_{HS-A}=8^0$c/w, $T_A=40^0$c,$T_{J=}160^0$c, $\Theta_{J-C}=5^0$c/w and $\Theta=85^0$c/w (8M)

7. a) Define Q-factor, derive the expressions for Q factors of RL and RC circuits (8M)
   b) Explain about the stability of Tuned amplifiers (8M)
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Code No: RT22041 **R13** SET - 2

II B. Tech II Semester Regular/Supplementary Examinations, April/May-2017
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1.	a)	Write the elements of the Hybrid-π model	(4M)
	b)	With a neat sketch explain about Multi stage amplifier	(4M)
	c)	How does negative feedback reduce distortion in an amplifier	(4M)
	d)	What are factors which affects the frequency stability of an oscillator	(4M)
	e)	Why is non-linear distortion called Harmonic distortion	(3M)
	f)	Define a Q-factor of a resonant circuit	(3M)

PART -B

2.		Define Hybrid-π model. Draw and derive the expressions for different elements of the Hybrid –π model (i) Determination of Trans Conductance (ii) Determination of input conductance (iii) Determination of feedback conductance (iv) Determination of output conductance	(16M)
3.		Explain about the different Coupling schemes used in amplifiers with diagrams	(16M)
4.	a)	What are the different types of negative feedback ,explain how the input and output impedances of an amplifier are affected by the different types of negative feedback	(8M)
	b)	The distortion in an amplifier is found to be 3%,when the feedback ratio of a negative feedback amplifier is 0.04,when the feedback is removed, the distortion becomes 15%.Find the open loop gain and closed loop gain	(8M)
5.	a)	Write down the expression for frequency of oscillation in Hartley and Colpitts Oscillators	(8M)
	b)	A Colpitts Oscillator is designed with C_2=100pF and C_1=7500pF.The inductance is variable, determine the range of inductance values, if the frequency of oscillation is to vary between 950 and 2050 KHz	(8M)
6.	a)	What is meant by distortion in power amplifiers, explain the given different types of distortions	(8M)
	b)	With a neat sketch explain about push-pull amplifier	(8M)
7.	a)	Draw the equivalent circuit of capacitance coupled single tuned amplifier and derive the equation for voltage gain	(8M)
	b)	Differentiate the single tuned and double tuned amplifiers	(8M)
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Code No: RT22041 **R13** SET - 3

II B. Tech II Semester Regular/Supplementary Examinations, April/May-2017
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Derive the expression for output conductance of Hybrid –π model (4M)
   b) A multi stage amplifier employs five stages, each of which has a power gain of 30.what is total gain of the amplifier in dB. (4M)
   c) Compare negative feedback with the positive feedback (4M)
   d) State Barkhausan critetion for Oscillation (4M)
   e) What are the different types of distortion in amplifiers (3M)
   f) What is a tuned amplifier, what are the various types of tuned amplifiers (3M)

PART -B

2. a) Draw and Explain about the h-parameter definitions for Common Emitter transistor (8M)
   b) Determine the hybrid –π parameters of a Transistor operating at Collector Current $I_C(Q)$=2mA,$V_{CE}(Q)$=20V and $I_B(Q)$=20μA.Transistor specifications are β_0=100,unity gain frequency f_T=50MHz,C_{OB}=3pF,h_{iE}=1.4KΩ,h_{re}=2.5*10^{-4}, h_{oe}=25μmhos.Assume that the Operating temperature is 300^0K. (8M)

3. Draw the equivalent circuits of RC coupled amplifier for Mid-band ,Low frequency range, high frequency range and derive the expressions for current gain, voltage gain (16M)

4. a) What is meant by negative feedback in amplifier, enumerate the effects of negative feedback on the various characteristics of the amplifier (8M)
   b) An amplifier with 2.5KΩ input resistance and 50KΩ output resistance has a voltage gain of 100.The amplifier is now modified to provide 5% negative feedback in series with the input. Calculate (i) the voltage gain (ii) the input resistance and (iii)the output resistance with feedback (8M)

5. a) Draw the circuit diagram of Wein-bridge oscillator and explain its operation (8M)
   b) In the Wein-bridge oscillator ,if the RC network consists of resistors of 200KΩ and the capacitors of 300pF,find its frequency of oscillation (8M)

6. a) What is Class B amplifier ,Derive the expression for efficiency (8M)
   b) If the ideal push-pull amplifier operates at maximum dissipation ,show that its efficiency is 50% (8M)

7. Derive the expressions for 3dB bandwidth of (i)Capacitance coupled single tuned amplifiers (ii)Double tuned amplifiers (16M)
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Code No: RT22041 **R13** SET - 4

II B. Tech II Semester Regular/Supplementary Examinations, April/May-2017
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Explain about validity of Hybrid –π model (4M)
   b) What are DC amplifiers, mention a few applications of DC amplifiers (4M)
   c) An amplifier with stage gain 200 is provided with negative feedback of feedback ratio 0.005,find the new gain (4M)
   d) Explain the difference between an amplifier and an Oscillator (4M)
   e) What is the difference between crossover distortion and inter modulation distortion (3M)
   f) What is a stagger tuned amplifier (3M)

PART –B

2. a) Draw and Explain about the small signal high frequency equivalent circuit of a Transistor (8M)
   b) If a Transistor has a value of β=50 and Collector current of 10mA,determine the value of Emitter Current and Calculate the value of α of the Transistor (8M)

3. a) With a neat sketch explain about the cascade amplifiers (8M)
   b) A CE-RC coupled amplifier uses transistor with the following h-parameters: h_{fe}=50, h_{oe}=30x10^{-6} mhos, h_{re}=2.5x10^{-4}.The value of g_m at the operating point is 50m mhos. The biasing resistor R1 between V_{cc} and base is 100KΩ and R_2 between base and ground is 10KΩ.The load resistor R_C = 5KΩ. let C = 160pF be the total shunt capacitance in the input circuit and the coupling capacitor C_c=6μF,Calculate for one stage of the amplifier (i) mid-band current gain (ii) mid-band voltage gain (8M)

4. a) Explain the method of identifying feedback Topology (8M)
   b) A voltage-series negative feedback amplifier has a voltage gain without feedback of A-500,input resistance R_i=3KΩ,output resistance of R_o=20KΩ and feedback ratio β=0.01,calculate the voltage gain A_f, input resistance R_{if} and output resistance R_{of} of the amplifier with feedback (8M)

5. Explain the working of a (i) Miller Crystal Oscillator (ii) Pierce crystal oscillator (16M)

6. a) What is Class A amplifier ,Derive the expression for maximum value of efficiency (8M)
   b) $V_{CE(max)}$=15V,$V_{CE(min)}$=1V,find the overall efficiency for (i)series –fed load(ii)transformer-coupled load (8M)

7. a) What is a Q-factor, Derive the expression for Q-factor of a capacitor (8M)
   b) Explain the effect of cascading single tuned amplifiers on Bandwidth (8M)

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Code No: RT22041 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016
ELECTRONIC CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What is the expression for harmonic distortion in tuned amplifiers? (4M)
   b) Which configuration is the best in cascade for an output stage and for an intermediate stage? (4M)
   c) Calculate the junction to ambient thermal resistance for a device dissipating 600 mW into an ambient of60°C and operating at a junction temperature of 120°C. (4M)
   d) Explain the significance of the gain bandwidth product. (4M)
   e) What are the different types of Tuned Amplifiers and explain various areas of applications. (3M)
   f) Explain the limitations of RC phase shift oscillator. (3M)

PART -B

2. a) Derive the expression for f_T of a transistor. (8M)
   b) Derive an expression for Voltage gain, input resistance, output resistance of a source follower at high frequencies. (8M)

3. a) What are different types of distortions possible in amplifiers? (8M)
   b) Discuss about effect of C_b on frequency response of RC coupled amplifier. (8M)

4. a) What are various basic amplifiers used in a single feedback amplifier circuit and explain them. (8M)
   b) Using Linear analysis and negative feedback circuit analyze common collector circuit. (8M)

5. a) Derive the expression for frequency of oscillation and condition for sustained oscillation of a Hartley oscillator. (8M)
   b) Draw Wien bridge oscillator using BJT and show that the gain must be at least 3 for the oscillations to occur (8M)

6. a) A single transistor is operating as an ideal class B amplifier with a 10-K load. A dc meter in the collector circuit reads 8mA. How much signal power is delivered to the load? (8M)
   b) Explain the operation of a class A push-pull power amplifier and list out its advantages and disadvantages. (8M)

7. a) Draw the circuit for BJT tuned class *B/C* amplifier. Explain its working (8M)
   b) What is a stagger tuned amplifier? Explain its advantages and disadvantages. (8M)

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Code No: RT22041 **R13** SET - 1

II B. Tech II Semester Regular Examinations, April/May - 2016
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) Write a short note on hybrid-π capacitances.
   b) List the features of Darlington pair amplifier.
   c) Write advantages of negative feedback in amplifier?
   d) Classify different types of oscillator.
   e) What are the types of distortions possible in an amplifier.
   f) What is the importance of stagger tuning.

PART-B

2. a) Derive the equation for g_m, which gives relation between g_m, I_C and temperature.
   b) Draw the equivalent circuit of hybrid-model and derive the expression for hybrid -π impedance in terms of low frequency h-parameters.

3. a) Draw the circuit diagram of cascade amplifier circuit and analyze its performance.
   b) Draw and explain the emitter coupled differential amplifier.

4. a) Give comparison of positive and negative feedback.
   b) Discuss the effect of negative feedback with respect to closed loop gain, bandwidth and distortion.

5. a) A phase shift oscillator is to be designed with FET having g_m =5000μs ,r_d=4kΩ while the resistance in the feedback circuit is 9.7kΩ. Select the proper value of c and R_D to have the frequency of oscillations as 5KHz.
   b) Perform the generalized analysis of LC oscillators with suitable block diagram and obtain the condition for Hartley and colpitt's oscillators.

6. a) Differentiate between push-pull and complementary symmetry configuration of a class B power amplifier.
   b) For a class B amplifier driven from a 24V power supply and driving a 8Ω load, compute i) Input d.c power, ii) output power, iii) conversion efficiency if the peak to peak output voltage across the load resistance is 22 Volts maximum.

7. a) Explain how the stagger –tuned design is superior to synchronously tuned design in the design of a multistage amplifier?
   b) Write about wideband amplifiers.

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Code No: RT22041 **R13** SET - 2

II B. Tech II Semester Regular Examinations, April/May - 2016
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) How Hybrid-π parameters vary with temperature?
   b) Write a note on difference amplifier.
   c) Classify the amplifiers.
   d) Explain the Barkhausen criterion in detail.
   e) Write features of Power amplifiers.
   f) Write advantage and disadvantage of tuned amplifier.

PART-B

2. a) Derive the expressions for the CE current gain and voltage gain including source resistance Rs.
   b) Derive the expression for f_H and input admittance for emitter follower amplifier at high frequencies.

3. a) Draw the circuit diagram of a cascade amplifier and derive its overall voltage gain and impedance from its equivalent circuit.
   b) Derive the expression for voltage gain and input impedance of bootstrap emitter follower amplifier.

4. a) Explain the method of analysis of feedback amplifier.
   b) Calculate the voltage gain, input impedance and output impedance of a voltage series feedback amplifier having an open loop gain A=300, R_i=1.5KΩ , R_0=50KΩ and β=1/20.

5. a) Draw the diagram of Colpitt's oscillator and explain its working.
   b) What are the factors that affects the frequency stability of an oscillator? How frequency stability can be improved in oscillators?

6. a) Derive the expression for efficiency of a direct coupled Class A power amplifier.
   b) A single transistor operates as an ideal class B amplifier. If d.c current drawn from the supply is 25mA, calculate the a.c power delivered to load for load of 2KΩ.

7. a) Derive the expression for the gain of a single-tuned capacitance coupled amplifier, Discuss about its Selectivity .
   b) Explain the Mismatching technique in tuned amplifiers.

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Code No: RT22041 **R13** SET - 3

II B. Tech II Semester Regular Examinations, April/May - 2016
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) Write about Gain-Bandwidth product.
b) Explain the need of cascading amplifiers.
c) Explain how the noise is reduced due to the negative feedback.
d) Write advantages and disadvantages of wien bridge oscillator.
e) What you meant by cross over distortion.
f) Classify tuned amplifier.

PART-B

2. a) Draw the circuit diagram of cascade- transistor amplifier circuit and analyze its performance.
b) Explain the differential mode and Common Mode operation of emitter coupled differential amplifier.

3. a) Draw the circuit diagram of Darlington pair circuit and derive its important characteristics.
b) Compute the value of overall current gain and input impedance of a Darlington pair with 1KΩ emitter resistance connected to the emitter of a second transistor if h_{fc} , h_{ic},h_{oc} and h_{rc} of both the transistor are given as - 51,1.1kΩ,0 and 1 respectively.

4. a) What are the different types of feedback amplifiers? Give their equivalent circuits.
b) An amplifiers with negative feedback gives an output of 12.5 with an output of 1.5V. When feedback is removed, it requires 0.25V input for the same output. Find i) values of voltage gain without feedback. ii) value of β, if the input and output are in phase and β is real.

5. a) Calculate the value of 'C' in the frequency –determining network of a FET RC phase shift oscillator circuit having R=2.5KΩ , assuming frequency of oscillation f=1.625KHz. Repeat same if it is BJT RC phase shift oscillation with R_C=4KΩ.
b) Draw the circuit of Hartley oscillator and explain its working .Derive the expressions for frequency of oscillation and condition for starting of oscillation.

6. a) Derive the expression for maximum value of conversion efficiency of class A power amplifier.
b) Write a note on Heat sinks.

7. a) Draw the circuit diagram of a double –tuned circuit and explain its working and derive the expression for I_2 max.
b) What is the effect of cascading single tuned amplifier on bandwidth? Derive the expression for it.

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Code No: RT22041 **R13** SET - 4

II B. Tech II Semester Regular Examinations, April/May - 2016
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) Why h-parameter model is not suitable for high frequency analysis?
   b) Write about CMRR.
   c) Give characteristics of negative feedback amplifier.
   d) Explain the principle of operation of oscillator.
   e) Explain the term impedance matching.
   f) Write about stability of tuned amplifies.

PART-B

2. a) Draw the circuit for Darlington pair amplifier and derive the expressions for A_I, A_v, R_i And Ro.
   b) Draw the circuit diagram of emitter coupled differential amplifier and obtain its d.c analysis.

3. a) Compare the three types of coupling methods used in multistage amplifiers.
   b) Perform the analysis of boot – strapped emitter follower circuit.

4. a) Draw the circuit diagram of current shunt feedback and derive expressions for input and output resistance.
   b) Explain the concept of feedback with block diagram.

5. a) Discuss and explain the basic circuit of an LC oscillator and derive the conditions for the oscillations.
   b) A Hartley oscillator is to span a frequency range from 50KHz to 150KHz. The variable capacitance has the values in the range 50pF to 450pF.The transistor to be used as hfc=50 and Δ he = 0.5. Determine the values of the inductances. Neglect mutual inductance between the coils and use CE circuit configuration.

6. a) A single transistor is operating as an ideal class B amplifier with a 500Ω load. A d.c meter in the collector circuit reads 10mA. How much signal power is derived to the load?
   b) Draw a neat circuit diagram of push pull class B amplifier. Explain its working.

7. a) Explain the operation of a single tuned amplifier circuit and its frequency response.
   b) Draw the circuit diagram of double tuned amplifier and simplify the same with its equivalent circuit.

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Code No: RT22041 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, Dec - 2015
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Explain why RC Phase shift oscillators are not used at high frequencies. (4M)
   b) Define percent tilt and derive an expression for it. (4M)
   c) Show that band width decreases with cascading. (4M)
   d) What is Heat sink and explain its advantages. (4M)
   e) Derive the expression for harmonic distortion. (3M)
   f) Define Q factor. (3M)

PART –B

2. a) Find the voltage gain, input and output resistances of a emitter follower at high frequencies. (8M)
   b) A common source amplifier uses a MOSFET with the following parameters g_m=1.5mA/V, r_d=40kohms, C_{gs}=3pF, C_{ds}=1pF, C_{gd}=3.2pF. The value of R_d=200Kohms. The amplifier operates at 30KHz. Find Voltage gain, input resistance, output resistance and input capacitance. (8M)

3. a) With a neat circuit diagram. Explain about Boo-Strap emitter follower amplifier? (8M)
   b) Draw the circuit of a differential amplifier using BJT and derive an expression for CMRR. (8M)

4. a) Draw the block diagrams of four types of negative feedback amplifier circuits and explain the advantages and disadvantages with necessary derivations. (8M)
   b) Two FET based amplifiers with gains of 30 dB are cascaded together. Find the overall gain. Also find bandwidth of the overall circuit, if individual lower and higher 3 dB frequencies are 20 Hz and 20 kHz respectively. (8M)

5. a) Derive the expression for frequency of oscillation of BJT RC phase-shift oscillator with necessary explanation. (8M)
   b) What is the equivalent circuit of a crystal? Derive the expressions for series and parallel resonances. A crystal oscillator has the following parameters: L=0.33H, C=0.065pF, C_m=1.0pF and R=5.5 k ohm. i) Find the series resonant frequency. ii) Find the Q of the crystal. (8M)

6. a) A signal $i_b=I_m$ coswt is applied to a power amplifier with second order nonlinearity between i_b and i_c. Derive the expression for i_C and also derive ditrtion factor. (8M)
   b) Explain the operation of a class A power amplifier with necessary diagram. (8M)

7. a) Explain the operation of a single tuned amplifier circuit and its frequency Response. (8M)
   b) Show that for an "n" stage synchronously tuned amplifier, maximum. Bandwidth is achieved if the single stage gain is 4.34 dB. (8M)

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Code No: RT22041 **R13** SET - 1

II B. Tech II Semester Regular Examinations, May/June - 2015
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) What is unity gain frequency of a BJT and derive an expression for it.
   b) Three amplifiers of gain 10dB, 20dB and 30dB are connected together. Find the overall gain in dB and in normal units.
   c) Show that the input resistance increases with series mixing.
   d) Draw the electrical equivalent of a crystal and derive expressions for series and parallel resonances.
   e) What are the advantages of push pull power amplifiers.
   f) What is staggering? State the advantages of stagger tuned amplifier.

(3M+4M+4M+4M+4M+3M)

PART-B

2. a) Draw the High frequency model of a Transistor. Derive the relationship between high frequency and low frequency parameters.
   b) Compare, CS, CH, and CD amplifier circuits at high frequencies. (8M+8M)

3. a) Derive an expression for the lower 3dB frequency of an RC coupled amplifier by taking the effect emitter bypass capacitor into account.
   b) What is fidelity of an Amplifier? Explain about Frequency response of an amplifier by considering different frequency regions (8M+8M)

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4. a) Give the block diagram of a general feedback amplifier. State the function of each block.
   b) If an input of 0.028V peak to peak given to an open loop amplifier, it gives fundamental frequency output of 36V peak to peak, but it is associated with 7% distortion. i) If the distortion is to be reduced to 1%, how much feedback is to be introduced and what will be required input voltage? ii) If 1.2% of output is feedback and the input is maintained at the same level, what is the output voltage? (7M+9M)

5. a) Discuss about frequency and amplitude stability of oscillators.
   b) Draw the circuit diagram of a FET based RC phase shift oscillator and derive the expression for frequency of oscillation and condition for sustained oscillations (7M+9M)

6. a) Draw the circuit diagram of a class A transformer coupled amplifier and derive an expression for it's conversion efficiency.
   b) In an Ideal Class B push pull amplifier, V_{CC}=20V, N_2=2N_1 and R_L=20 ohms. Find the output signal power, P_{0max} and collector dissipation in each Transistor, P_C under full power condition, Find P_{Cmax} also. (8M+8M)

7. Write short notes on
   a) Single Tuned amplifier b) Double Tuned Amplifier (8M+8M)

Code No: RT22041 **R13** SET - 2

II B. Tech II Semester Regular Examinations, May/June - 2015
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) Draw the high frequency model of FET and derive an expression for Gain of common source amplifier at high frequencies.
   b) Show that the band width reduces with cascading of amplifiers.
   c) Define sensitivity and derive an expression of Desensitivity of a negative feedback amplifier.
   d) Define frequency and amplitude stability of an oscillator.
   e) Classify power amplifiers.
   f) Define Q-factor and compare various tuned amplifiers. (3M+4M+4M+4M+4M+3M)

PART-B

2. a) Draw the equivalent diagram of a single stage CE amplifier at high frequencies. Derive the expression for gain under short circuited load conditions.
   b) When a Ge PNP transistor is biased at 2mA, 15V, it has a base width of 1 micron. Find C_e and f_T if D_B=47cm^2/sec.. (8M+8M)

3. a) The 3dB bandwidth of an amplifier extends from 10Hz to 10KHz. Find the frequency range over which the bandwidth of the overall amplifier varies when three stages has been cascaded. Find the overall voltage gain in Decibels if the gain of the single stage is 10.
   b) Draw the circuit for differential amplifier and derive the expression for CMRR. (8M+8M)

4. a) Show that Input impedance increases with series mixing and decreases with shunt mixing.
   b) Enumerate the steps in the linear analysis of the feedback amplifier. Draw the CE with Re Circuit and analyze the circuit. (7M+9M)

5. a) What is a clap oscillator and derive an expression for frequency of oscillations.
   b) Draw the circuit diagram of a BJT based RC phase shift oscillator and derive the expression for frequency of oscillation and condition for sustained oscillations (7M+9M)

6. a) Derive the expression for Max. Theoretical efficiency in the case of class B push pull amplifier. Why is it named so? What are its advantages and disadvantages?
   b) Design a class B power amplifier to deliver 30W to a load resistor R_L = 40 using a transformer Coupling. V_m = 30V = V_{cc} Assume reasonable data wherever necessary. (8M+8M)

7. a) Draw the circuit for single tuned capacitance coupled amplifier explain its operation
   b) Draw the circuit for Double Tuned Amplifier. Explain its working. What are the advantages of this amplifier? (8M+8M)
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Code No: RT22041 **R13** SET - 3

II B. Tech II Semester Regular Examinations, May/June - 2015
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) Explain different Hybrid-π Capacitances and derive necessary expressions.
   b) Explain about the classification of Amplifiers based on type of coupling and bandwidth.
   c) Explain various basic amplifiers used in a negative feedback circuits.
   d) Why LC oscillators are not used at low frequencies?.
   e) What is cross over distortion? Explain how to eliminate it.
   f) What is a tuned amplifier? Explain how tuned amplifiers are classified.
   (3M+4M+4M+4M+4M+3M)

PART-B

2. a) Given a Germanium PNP transistor whose base width is 10^{-4} cm. At room temperature and for a DC Emitter current of 2mA, find, i) Emitter diffusion capacitance ii) f_T.
   b) Explain how f_β and f_T of a BJT can be determined? Obtain the expression for the Gain Bandwidth product of a transistor. (8M+8M)

3. a) Derive an expression for the lower 3dB frequency of an RC coupled amplifier (using BJT and FET) by taking the effect Coupling capacitor into account.
   b) Draw the circuit for Cascode Amplifier. Explain its working, obtaining overall values of the circuit in terms of h-parameters. (8M+8M)

4. a) An amplifier has an open loop voltage gain of 1000 and delivers 10 watts output with 10% second harmonic distortion when the input is 10mV.If 40dB of negative feedback is applied, what is the value of distortion?. How much input voltage should be applied to get 10watts of output power?.
   b) Discuss quantitatively about the effect of negative feedback on
   i) Gain ii) Bandwidth iii) Distortion. (7M+9M)

5. a) What are the differences between an oscillator and an amplifier?. Explain the operating principle of an oscillator.
   b) Draw the circuit diagram of a Wien bridge oscillator and derive the expression for frequency of oscillation and condition for sustained oscillations (6M+10M)

6. a) A signal $i_b=i_m\cos\omega t$ is applied to a power amplifier with characteristics $i_c=G_1i_b+G_2i_b^2$. Show that the output contains a DC term, fundamental component, second harmonic component.
   b) Design a class A power amplifier to deliver 5V rms to a load of 8 Ohms using a transformer coupling. Assume that a supply of 12V is available. The resistance of the primary winding of the transformer also should be considered. (6M+10M)

7. a) Draw the frequency response. Derive the expression for L for maximum power transfer.
   b) Explain the principle and working of wide band amplifiers. Draw the circuit for tapped single tuned capacitance coupled amplifier and explain its working. (8M+8M)

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Code No: RT22041 **R13** SET - 4

II B. Tech II Semester Regular Examinations, May/June - 2015
ELECTRONICS CIRCUIT ANALYSIS
(Com. to ECE, EIE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) Explain various parameters of FET high frequency model.
   b) What is bandwidth shrinkage factor?
   c) Draw any two topologies of negative feedback circuits.
   d) Explain the why RC oscillators are not used at high frequencies.
   e) Explain how a power amplifier acts as a rectifier.
   f) Give the classification of tuned amplifiers. (3M+4M+4M+4M+4M+3M)

PART-B

2. a) Derive the expressions for voltage gain, current gain, input and output resistances of a Common Drain amplifier at high frequencies.
   b) A single stage Common Emitter amplifier is measured to have a voltage-gain bandwidth f_H of 5 MHz with R_L = 500 ohm. Assume h_{fe}=100,g_m = 100 mA/V, $r_{bb'}$ = 1000, C_c = 1pf, and f_T = 400 MHz. Find the value of the source resistance that will give the required bandwidth. (8M+8M)
3. a) With the help of necessary waveforms, explain about the step response of amplifiers.
   b) What are the advantages of common collector amplifier? Explain how the input resistance of the CC amplifier can be enhanced further. (8M+8M)

4. a) Discuss quantitatively about the variation of output impedance with type of sampling.
   b) Preform the linear analysis of the common collector amplifier using feedback concept. (7M+9M)
5. a) Derive and explain Barkhausen criterion.
   b) Draw the circuit diagram and derive the expression for frequency of oscillation and condition for sustained oscillations of i) Colpitts oscillator ii) Hartley Oscillator (7M+9M)

6. a) Draw the circuit and explain the working principle of a complementary symmetry push-pull power amplifier and state its disadvantages?
   b) Derive the expressions for maximum Theoretical efficiency for (i) Transformer coupled (ii) Series fed amplifiers. What are their advantages and disadvantages? (8M+8M)

7. a) Discuss about the effect of cascading the tuned amplifiers on Bandwidth.
   b) Draw the circuit for single tuned inductively coupled amplifier. Draw its equivalent circuit and Derive the expression for $(A_V)_{max}$? (8M+8M)
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