

Scheme – I

Sample Question Paper

Program Name : Computer and Electronics Engineering Program Group

Program Code : CO/CM/CW/DE/EJ/ET/EN/EX/IE/IS/IC/MU

Semester : Third

Course Title : Applied Electronics

Marks : 70

22329

Time: 3 Hrs.

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following :-

10 Marks

- (a) Define the terms related to an amplifier
 - i. Voltage Gain
 - ii. Bandwidth
- (b) State need for multistage transistor amplifier.
- (c) State the functions of power amplifier.
- (d) State the necessity of positive feedback in oscillator.
- (e) Define the term feedback.
- (f) Sketch the labeled block diagram of series voltage feedback amplifier.
- (g) Define line and load regulation.

Q.2) Attempt any THREE of the following :-

12 Marks

- (a) Classify Amplifiers on the basis of coupling technique, operating frequency, number of stages and bandwidth.
- (b) Explain the effect of negative feedback on the input impedance of an amplifier.
- (c) Sketch the circuit diagram of Dual Voltage regulator using IC 78XX and 79XX to obtaining +/- 5Volt output.
- (d) Justify that Crystal oscillator is preferred over RC phase shift oscillator in microcontroller applications.

Q.3) Attempt any THREE of the following.

12 Marks

- (a) Explain the term crossover distortion. State methods to overcome it.
- (b) Describe with the help of circuit diagram and load line, working of class C power amplifier.
- (c) Calculate output frequency of RC phase oscillator if $R_1=R_2=R_3=2K\Omega$ and $C_1=C_2=C_3=0.1\mu f$.

- (d) State the effect of low load regulation factor and higher load regulation factor on power supply. State the significance of low line regulation factor.

Q.4) Attempt any THREE of the following.

12 Marks

- (a) Explain with circuit diagram operation of Class AB push pull power amplifier.
 (b) Sketch frequency response of single stage Common Emitter(CE) amplifier and label the following:
 i. 3dB lower cutoff frequency
 ii. 3 dB Upper cutoff frequency
 iii. Mid frequency region
 iv. 3 dB Bandwidth
 (c) Draw labeled block diagram of current series feedback and voltage shunt feedback amplifier.
 (d) Justify the use of time base generator in CRT display.
 (e) Identify the block diagram given as figure No.1. Name the block “A” and Sate its function.

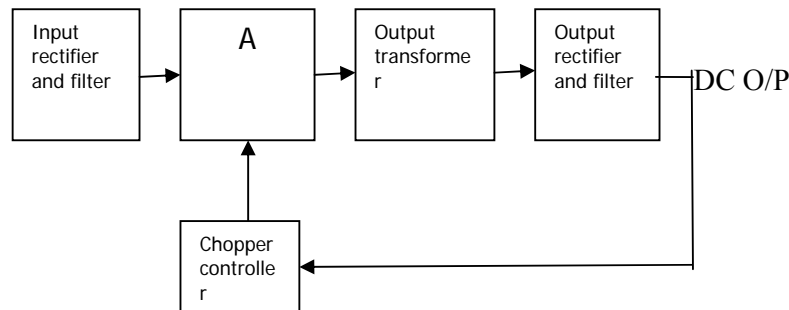


Figure No.- 1

Q.5) Attempt any TWO of the following.

12 Marks

- (a) Explain with circuit diagram , the working of RC phase shift oscillator.
 (b) Compare class A, class B, class C and class AB power amplifiers on the basis of angle of conduction, efficiency, position of operating point power dissipation, distortion and application.
 (c) Sketch the neat-labeled diagram and frequency response of two-stage RC coupled amplifier and two-stage transformer coupled amplifier.

Q.6) Attempt any TWO of the following.

12 Marks

- a) Calculate bandwidth of a Direct coupled amplifier, having frequency response with upper 3 db cutoff frequency as 4KHz .Sketch the frequency response.
 b) An amplifier has gain ‘A’ of 300 without feedback, output impedance is 1K Ω . If negative feedback with feedback factor 0.03 is introduced in the circuit then calculate the gain with feedback and output impedance of this feedback amplifier.
 c) A complementary symmetry push pull amplifier is operated using +/- 10 volt and deliver power to load $R_L= 5 \Omega$. calculate
 i. Maximum power output
 ii. Power rating of transistor
 iii. D.C. input at maximum power output

Scheme – I

Sample Test Paper - I

Program Name : Computer and Electronics Engineering Program Group

Program Code : CO/CM/CW/DE/EJ/ET/EN/EX/IE/IS/IC/MU

Semester : Third

Course Title : Applied Electronics

Marks : 20

22329

Time: 1 Hour

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.

08 Marks

- a) Classify tuned amplifiers on the basis of tuned circuit.
- b) Calculate gain of two stage amplifier if stage 1 has gain 20 and stage 2 has gain 5.
- c) State two advantages of class B push-pull amplifier.
- d) State classification of power amplifier.
- e) Sketch circuit diagram of class C power amplifier.

Q.2 Attempt any THREE.

12 Marks

- a) Describe working principle of Single tuned amplifier with the help of frequency response.
- b) Determine the value of collector current and collector to emitter voltage at the point of saturation and cutoff under a.c signal operation ,Draw A.C. load line, assume silicon NPN transistor with $\beta = 100$. Values of $R_{B1} = 10K\Omega$, $R_{B2} = 5 K\Omega$, $R_E = 500 \Omega$, $R_C = 1 K\Omega$, $R_L = 1.5 K\Omega$, transistor is operated in CE configuration with $V_{CC} = 10\text{volt}$.
- c) State the need of stagger tuned amplifier and explain its operation.
- d) State the difference between voltage amplifier and power amplifier with respect to given parameters.
 - iv. Current gain
 - v. Input resistance
 - vi. Inter stage coupling component
 - vii. Physical size of transistor

Scheme – I

Sample Test Paper - II

Program Name : Computer and Electronics Engineering Program Group

Program Code : CO/CM/CW/DE/EJ/ET/EN/EX/IE/IS/IC/MU

Semester : Third

Course Title : Applied Electronics

Marks : 20

22329

Time: 1 Hour

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.

08 Marks

- a) List features of IC 723 Voltage Regulator.
- a) Write the type of feedback used in oscillator.
- b) Name IC's suitable for fixed and variable voltage regulator.
- c) List four advantages of negative feedback amplifier.
- d) List the types of sinusoidal oscillator based on feedback component used.

Q.2 Attempt any THREE.

12 Marks

- a) Sketch the block diagram of a series voltage feedback amplifier and describe its working.
- b) Sketch the circuit diagram of Miller Sweep generator and describe its working.
- c) Sketch the circuit diagram of voltage regulator using LM 723 to obtain dc regulated +6 volt
- d) Describe the working principle of Crystal oscillator.

22329

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define :
 - (i) Amplification
 - (ii) Bandwidth
- (b) Draw circuit diagram of transistor as an amplifier.
- (c) Define : Cross over distortion
- (d) State any two advantages of negative feedback.
- (e) Draw block diagram of negative feedback with its input and output waveforms.
- (f) Define : Time Base Generator
- (g) List two application of Switch Mode Power Supply (SMPS).

2. Attempt any THREE of the following :**12**

- (a) Define the following amplifier characteristics :
 - (i) Voltage gain
 - (ii) Current gain
- (b) Compare voltage series and voltage shunt feedback amplifier on following basis :
 - (i) Distortion
 - (ii) Output resistance
 - (iii) Bandwidth
 - (iv) Gain
- (c) Explain working of switch mode power supply with neat diagram.
- (d) With neat output waveform of sweep generator explain following terms :
 - (i) Retrace time
 - (ii) Sweep time

3. Attempt any THREE of the following :**12**

- (a) Compare Class A and Class B power amplifier on the basis of :
 - (i) Position of Q point
 - (ii) Distortion in output voltage
 - (iii) Efficiency
 - (iv) Power dissipation in transistor
- (b) List any four applications of power amplifier.
- (c) Draw +15V and – 15V dual polarity regulated power supply.
- (d) Draw pin configuration of adjustable voltage regulator IC LM 723 and state function of each Pin.

4. Attempt any THREE of the following :

12

- (a) Explain working of transformer coupled class A power amplifier with neat circuit diagram.
- (b) Explain working of FET as an amplifier with neat diagram.
- (c) Compare positive and negative feedback on basis of :
 - (i) Voltage gain
 - (ii) Distortion
 - (iii) Noise in output signal
 - (iv) Stability of circuit
- (d) Draw RC phase shift oscillator and explain how phase shift occurs.
- (e) Identify the circuit given below in Fig-1 and explain its working.

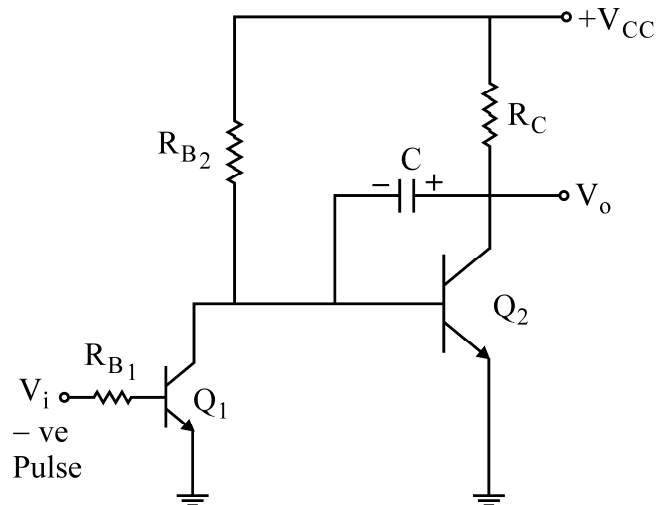


Fig.-1

5. Attempt any TWO of the following :

12

- (a) Draw circuit diagram and waveform of Bootstrap sweep generator.
- (b) Explain working of Class B power amplifier with neat diagram.
- (c) Draw circuit diagram of RC coupled transistor two stage amplifier and explain its working with its frequency response.

P.T.O.

6. Attempt any TWO of the following :**12**

- (a) Sketch frequency response of single stage common emitter CE amplifier and label the following :
- (i) 3 dB lower cutoff frequency
 - (ii) 3 dB upper cutoff frequency
 - (iii) 3 dB bandwidth
- (b) Draw current series and current shunt feedback amplifier.
Compare them on the basis of :
- (i) Bandwidth
 - (ii) Voltage gain
- (c) Draw circuit diagram of Class AB Push Pull amplifier and list its any three advantages.
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22329

11920

3 Hours / 70 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following: **10****
- a) List the types of coupling used in BJT amplifier. (any four)
 - b) Compare small signal amplifier with power amplifier (any four)
 - c) State four advantages of negative feedback used in feedback amplifier.
 - d) State the Barkhausen criteria of oscillation.
 - e) Differentiate between positive feedback and negative feedback. (four points)
 - f) State the need of tuned amplifier in electronic circuits. (four points)
 - g) List the uses of heat sink. (four points)

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Explain the working principle of FET amplifier and list its two applications.
 - b) Compare the performance of voltage series and current series type of negative feedback amplifiers. (four points)
 - c) Draw the block diagram of SMPS and state its working principle.
 - d) Design a RC phase shift oscillator to generate the frequency of 500 kHz. Assume suitable values for $R_1 = R_2 = R_3 = R$ and $C_1 = C_2 = C_3 = C$. Justify your answer.
- 3. Attempt any THREE of the following:** **12**
- a) Classify the power amplifiers on the basis of operation and input / output waveforms.
 - b) Describe the operation of class - C type of power amplifier with the help of neat sketch.
 - c) Justify the need of current time base generator to obtain the specified sawtooth waveform with one example.
 - d) Design a voltage regulator using IC LM317, draw the circuit diagram and state the output voltage equation.
- 4. Attempt any THREE of the following:** **12**
- a) Draw the two stage BJT amplifier. State the formula for overall gain of this amplifier.
 - b) Draw the circuit diagram of class AB power amplifier and describe its working.
 - c) With the help of neat circuit diagram, explain the operation of voltage shunt type of feedback amplifier.
 - d) Compare between RC phase shift oscillator and crystal oscillator.
 - e) Compare the fixed voltage regulators using 78XX and 79XX. (Any four points)

5. Attempt any TWO of the following:**12**

- a) Describe the operation of double tuned amplifier with the help of neat circuit diagram and mention its applications.
- b) Sketch the labelled diagram of class A and class B types of power amplifier. Also draw the input and output waveforms. State one application of each.
- c) Draw the neat labelled diagram of miller sweep generator and mention its two applications.

6. Attempt any TWO of the following:**12**

- a) For a BJT ac amplifier, with a midband voltage gain of 200, if the cutoff frequencies are $f_1 = 20$ Hz and $f_2 = 20$ kHz. Draw the frequency response for amplifier. Draw the frequency response in case of mid gain of 100 and $f_1 = 500$ Hz to $f_2 = 5$ kHz.
 - b) Draw a class AB push pull amplifiers and comment on its usefulness in the output stage as compared to other power amplifiers and the relationship between maximum transistor power dissipation wrt the supply voltage.
 - c) Comment on the effect of negative feedback on the gain, input and output resistance of the feedback amplifiers. Describe the gain bandwidth product term used in this context and its importance.
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22329

21819

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data, if necessary.
- (5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
- (6) Preferably write the answers in sequential order.

Marks

1. Attempt any FIVE of the following: 10
- a) State classification of Amplifiers.
- b) Define the terms related to tuned amplifier.
- (i) Resonant Frequency (F_r)
- (ii) Q Factor
- c) State the need of multistage amplifier.
- d) List the types of power amplifiers.
- e) List advantages of negative feedback (any four)
- f) Define:
- (i) Sweep time
- (ii) Retrace time
- g) State fixed voltage regulator IC'S.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Sketch circuit diagram of RC coupled single stage CE amplifier. State the function of each component.
 - b) Describe the working of single stage class A amplifier with circuit diagram.
 - c) Explain principle of feedback amplifier.
 - d) Draw circuit diagram of RC phase shift oscillator and state its working.
- 3. Attempt any THREE of the following:** **12**
- a) Sketch circuit diagram of common source FET Amplifier. State working principle of it.
 - b) Explain the term crossover distortion. State methods to overcome it.
 - c) Compare positive feedback and negative feedback on the basis of:
 - (i) Gain
 - (ii) Bandwidth
 - (iii) Phase shift
 - (iv) Stability
 - d) Draw block diagram of SMPS. State its working principle.
- 4. Attempt any THREE of the following:** **12**
- a) Calculate Resonant frequency of single tuned amplifier, if inductor $L = 10\text{mH}$ and capacitor $C = 4.7 \mu\text{f}$ of tank circuit.
 - b) An amplifier has gain 'A' of 300 without feedback, output impedance is $1\text{K}\Omega$. If negative feedback with feedback factor 0.03 is introduced in the circuit then calculate the gain with feedback and output impedance of this feedback amplifier.
 - c) Describe miller sweep generator circuit with neat input output waveforms.
 - d) Draw block diagram of IC 723 regulator. State the working principle of IC 723.

5. Attempt any TWO of the following:

- a) Compare RC coupled, transformer coupled, direct coupled amplifier on the basis of:
- Type of coupling
 - Frequency response
 - Gain
 - Application
- b) A complementary symmetry push pull amplifier is operated using ± 10 volt and deliver power to load $R_L = 5\Omega$. Calculate.
- Maximum power output
 - Power rating of transistor
 - D.C input at maximum power output.
- c) Identify the circuit given in Figure No. 1. Calculate output frequency of the given circuit if $R_1 = R_2 = R_3 = 2K\Omega$ and $G = C_2 = C_3 = 0.1 \mu\text{f}$.

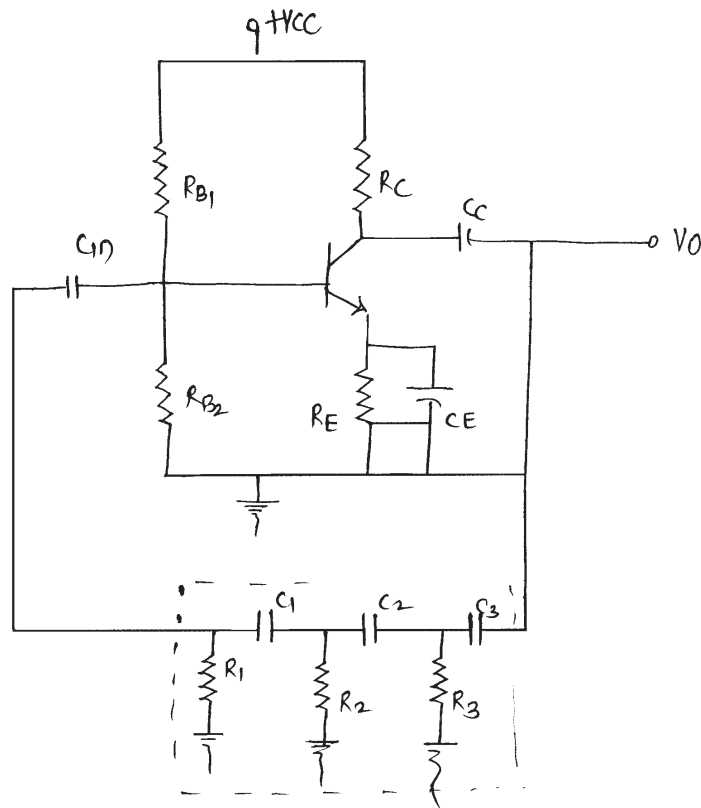


Fig. No. 1

6. Attempt any TWO of the following:**12**

- a) Compare Class A, Class B, Class C and class AB power amplifiers on the basis of:
- (i) Angle of conduction
 - (ii) Efficiency
 - (iii) Position of operating point in power dissipation
 - (iv) Distortion
 - (v) Application
- b) Draw Bootstrap sweep generator circuit. Compare Miller Integrator and bootstrap sweep generator with respect to the technique used.
- c) Build the circuit diagram of dual voltage regulator to get +12Vdc and -12Vdc using IC 7812 and IC 7912 along with rectifier.
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22329

11819

3 Hours / 70 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following: **10****
- a) Define the term related to power amplifier.
 - (i) Efficiency
 - (ii) Voltage gain
 - b) List any four applications of RC coupled amplifier.
 - c) State the role of tuned LC circuit in tuned amplifier.
 - d) List different types of feedback amplifiers.
 - e) List the advantages of negative feedback over positive feedback.
 - f) Compare amplifier and oscillator.
 - g) State use of heat sink.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Explain with the help of waveforms, the working principle of single stage CE amplifier.
 - b) Compare positive and negative feedback.
 - c) Define oscillator and state the Barkhausen criterion for the generation of sustained oscillations.
 - d) Explain the working of SMPS with neat block diagram.
- 3. Attempt any THREE of the following:** **12**
- a) Explain with sketch the working of class B push pull amplifier.
 - b) Compare different types of power amplifier on basis of -
 - (i) Efficiency
 - (ii) Power dissipation in transistor.
 - (iii) Conduction angle of collector current
 - (iv) Position of Q.
 - c) Draw miller sweep generation and give its applications.
 - d) Sketch the circuit diagram for dual voltage regulator using IC 78XX and 79XX to obtain $\pm 12V$ output.
- 4. Attempt any THREE of the following:** **12**
- a) State the necessity of regulated power supply. Define load and line regulation.
 - b) Explain the working principle of crystal oscillator with diagram.
 - c) Compare the performance of current series and current shunt feedback amplifier.
 - d) Describe with help of circuit diagram working of class A power amplifier.
 - e) Compare single tuned and double tuned amplifier with respect to operating principle, frequency response, efficiency and applications.

5. Attempt any TWO of the following:**12**

- a) Explain with diagram the working of phase shift oscillator. Also a phase shift oscillator has $R = 220 \text{ k}\Omega$ and $C = 500 \text{ pf}$. Calculate the frequency of sine wave generated by the oscillator.
- b) Explain operation of FET common source amplifier with applications.
- c) Explain with circuit diagram and waveform the operation of class AB push pull power amplifier.

6. Attempt any TWO of the following:**12**

- a) Explain stagger tuned amplifier with the help of waveforms.
 - b) Draw the circuit of complementary, symmetry push pull amplifier and explain its working.
 - c) In voltage amplifier output voltage without negative feedback is 10V. If 25% of output voltage is feedback in series with input voltage. Find feedback voltage, also give value of the feedback factor.
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22329

12223

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.
 - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define Amplifier. Define the term voltage gain.
- (b) State important features of power amplifier.
- (c) Define the term 'feedback' in amplifier.
- (d) State Barkhausens criteria for generation of sustained oscillations.
- (e) State the meaning of positive and negative feedback with neat sketches.
- (f) Explain need/necessity of heat sink.
- (g) State advantages and disadvantages of transformer coupled amplifier.

2. Attempt any THREE of the following :

12

- (a) Explain the working principle of single stage CE amplifier with help of waveform.



- (b) Draw a single stage transistor amplifier with voltage series negative feedback. Write its effect on voltage gain, input resistance, output resistance and harmonic distortion.
- (c) Sketch the circuit diagram of Dual Voltage Regulator using IC 78XX and 79XX to obtain ± 12 V output voltage.
- (d) Describe working of RC phase shift oscillator with neat sketch. Write formula for frequency of oscillation.

3. Attempt any THREE of the following :

12

- (a) Compare different types of power amplifier on the basis of
 - (i) Efficiency
 - (ii) Power dissipation in transistor
 - (iii) Conduction angle of collector current
 - (iv) Position of Q point.
- (b) Explain with circuit diagram the working of Class B push pull amplifier.
- (c)
 - (i) State types of LC and RC oscillators.
 - (ii) Compare LC and RC oscillators on any four points.
- (d) State the necessity of regulated power supply. Define Load and Line regulation.

4. Attempt any THREE of the following :

12

- (a) Compare small signal amplifier and power amplifier (any four points).
- (b) Draw a neat labelled diagram of a two stage RC coupled amplifier. Draw its frequency response. State its two advantages.
- (c) Draw the block diagram of voltage series and current series feedback.
- (d) Draw Miller sweep generator and give its application.
- (e) Draw the high voltage regulator using IC723 and explain its operation in brief.

5. Attempt any TWO of the following :**12**

- (a) Draw the circuit diagram of crystal oscillator. Give basic principle of piezoelectric crystal. Give advantages of crystal oscillator.
- (b) Compare class A, class B, class AB and class C with efficiency, conduction angle, Q point location and distortion.
- (c) Draw common source FET amplifier. Describe its operation. Give its application.

6. Attempt any TWO of the following :**12**

- (a) Draw circuit diagram of single tuned and double tuned amplifier. Compare single tuned and double tuned amplifier on the basis of (i) Selectivity (ii) Q-factor (iii) Bandwidth (iv) Response of gain Vs frequency.
 - (b) In single stage voltage amplifier, voltage gain without feedback is 80, input resistance $R_i = 800 \Omega$ and output resistance $R_o = 8k \Omega$. If 20% output voltage is feedback in series with input, determine A_{vf} , R_{if} , R_{of} of the negative feedback amplifier.
 - (c) Sketch the complementary symmetry push pull amplifier and explain working with waveform.
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22329

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define :
 - (i) Amplification
 - (ii) Bandwidth
- (b) Draw circuit diagram of transistor as an amplifier.
- (c) Define : Cross over distortion
- (d) State any two advantages of negative feedback.
- (e) Draw block diagram of negative feedback with its input and output waveforms.
- (f) Define : Time Base Generator
- (g) List two application of Switch Mode Power Supply (SMPS).

2. Attempt any THREE of the following :**12**

- (a) Define the following amplifier characteristics :
 - (i) Voltage gain
 - (ii) Current gain
- (b) Compare voltage series and voltage shunt feedback amplifier on following basis :
 - (i) Distortion
 - (ii) Output resistance
 - (iii) Bandwidth
 - (iv) Gain
- (c) Explain working of switch mode power supply with neat diagram.
- (d) With neat output waveform of sweep generator explain following terms :
 - (i) Retrace time
 - (ii) Sweep time

3. Attempt any THREE of the following :**12**

- (a) Compare Class A and Class B power amplifier on the basis of :
 - (i) Position of Q point
 - (ii) Distortion in output voltage
 - (iii) Efficiency
 - (iv) Power dissipation in transistor
- (b) List any four applications of power amplifier.
- (c) Draw +15V and – 15V dual polarity regulated power supply.
- (d) Draw pin configuration of adjustable voltage regulator IC LM 723 and state function of each Pin.

4. Attempt any THREE of the following :

12

- (a) Explain working of transformer coupled class A power amplifier with neat circuit diagram.
- (b) Explain working of FET as an amplifier with neat diagram.
- (c) Compare positive and negative feedback on basis of :
 - (i) Voltage gain
 - (ii) Distortion
 - (iii) Noise in output signal
 - (iv) Stability of circuit
- (d) Draw RC phase shift oscillator and explain how phase shift occurs.
- (e) Identify the circuit given below in Fig-1 and explain its working.

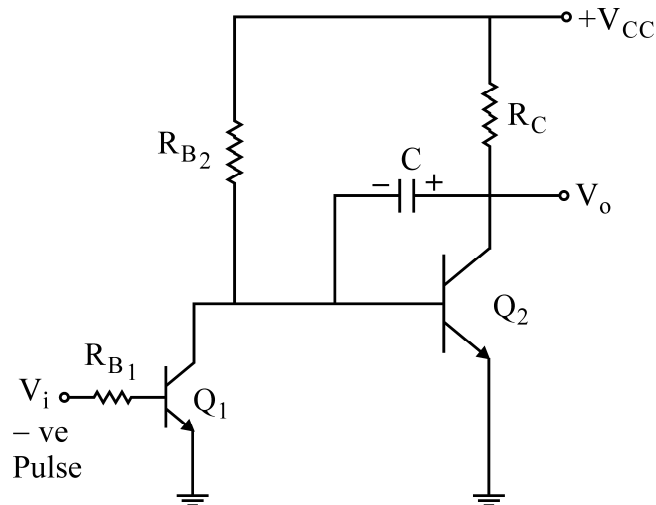


Fig.-1

5. Attempt any TWO of the following :

12

- (a) Draw circuit diagram and waveform of Bootstrap sweep generator.
- (b) Explain working of Class B power amplifier with neat diagram.
- (c) Draw circuit diagram of RC coupled transistor two stage amplifier and explain its working with its frequency response.

P.T.O.

6. Attempt any TWO of the following :**12**

- (a) Sketch frequency response of single stage common emitter CE amplifier and label the following :
- (i) 3 dB lower cutoff frequency
 - (ii) 3 dB upper cutoff frequency
 - (iii) 3 dB bandwidth
- (b) Draw current series and current shunt feedback amplifier.
Compare them on the basis of :
- (i) Bandwidth
 - (ii) Voltage gain
- (c) Draw circuit diagram of Class AB Push Pull amplifier and list its any three advantages.
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22346

12223

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.

Marks**1. Attempt any FIVE of the following :****10**

- (a) Draw labelled symbol of NPN & PNP transistor.
- (b) Name different types of coupling methods used in amplifier.
- (c) State Barkhausen's criteria for sustained oscillations.
- (d) State the types of feedback. Name the type of feedback used in amplifier.
- (e) Name any four waveshaping circuits.
- (f) Draw block diagram of DC regulated power supply with necessary waveforms.
- (g) Define load regulation and line regulation.

2. Attempt any THREE of the following :**12**

- (a) Define biasing. Draw neat circuit of voltage divider bias and explain it.
- (b) With the help of neat construction, explain working of N-channel JFET.



- (c) Draw neat circuit of two stage RC coupled CE amplifier and draw it's frequency response.
- (d) Draw labelled characteristics of UJT and explain different regions in it.

3. Attempt any THREE of the following :

12

- (a) Draw neat circuit diagram of transistor as a switch and explain it's working with I/P, O/P waveforms.
- (b) Define the terms related to JFET
 - (i) Pinch-off Voltage
 - (ii) AC Drain Resistance
 - (iii) Transconductance
 - (iv) Amplification factor
- (c) Draw following types of feedback connections :
 - (i) Voltage series feedback.
 - (ii) Current shunt feedback.
- (d) Compare linear waveshaping circuit and non-linear waveshaping circuit on the basis of (i) Circuit element used, (ii) Function performs by circuit.

4. Attempt any THREE of the following :

12

- (a) Draw labelled output characteristics of CE configuration of transistor.
- (b) Explain working of UJT, with the help of neat internal circuit diagram.
- (c) Compare Class A, Class B, Class C amplifier on the basis of (i) operating point, (ii) efficiency, (iii) output voltage waveforms, (iv) applications.
- (d) Explain working of Class A transformer coupled amplifier with circuit diagram.
- (e) Draw circuit of zener diode as a voltage regulator and explain it's working with characteristics of zener diode.

- 5. Attempt any TWO of the following :** **12**
- (a) Define α and β of transistor. Also derive relation between them.
 - (b) Draw circuit diagram of Class B push-pull amplifier and explain it's working with neat waveforms.
 - (c) Draw circuit of RC integrator and write its output voltage equation. If square wave is applied at the input, what will be the output waveform ? Draw them.
- 6. Attempt any TWO of the following :** **12**
- (a) Draw circuit of RC phase shift oscillator. Explain it's working. Give formula for frequency of oscillation and application of circuit.
 - (b) Draw neat circuit diagram of DC regulated power supply for obtaining output voltage = ± 12 V. Also explain working of the circuit.
 - (c) Draw the circuit diagram and input, output waveforms of diode clipper to clip a 5 V sinewave input signal at +2V.
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22346

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE :

10

- (a) Define the following terms w.r.t. JFET :
 - (i) Transconductance
 - (ii) Pinch-off voltage
- (b) State the need of multistage amplifier. Enlist different types of coupling methods used in multistage amplifier.
- (c) Draw the symbols of PNP and NPN bipolar junction transistor.
- (d) State Barkhausen's criteria for sustained oscillations.
- (e) Define α and β of a transistor. Write their typical values.
- (f) Draw RC differentiator circuit and state the equation of its output voltage.
- (g) State the function of rectifier and filter circuit used in voltage regulator circuit.

2. Attempt any THREE :**12**

- (a) What is cross-over distortion ? How it can be minimized ?
- (b) For the given value $V_P = -2V$, $I_{DSS} = 1.55 \text{ mA}$. It is desired to bias the circuit at $I_D = 0.8 \text{ mA}$ and $V_{DD} = 24 \text{ V}$. Find (i) V_{GS} (ii) g_m .
- (c) Draw output characteristics of BJT in CE configuration and label operating regions.
- (d) Enlist the different types of feedback connections. Draw the block diagram of voltage series current shunt feedback connection.

3. Attempt any THREE :**12**

- (a) Draw the structure of N-channel JFET and state its working principle.
- (b) Describe the working principle of crystal oscillator with its circuit diagram.
- (c) Design a regulated dual power supply for $\pm 5V$ using regulator IC's.
- (d) Define load regulation and line regulation. Calculate load regulation if a voltage regulator produces 10.2V and 10V output at no load and full load conditions respectively.

4. Attempt any THREE :**12**

- (a) Describe voltage divider bias method of field effect transistor.
- (b) Compare linear and non-linear circuits (Any Four points).
- (c) A single stage transistor is operating as an ideal Class-B amplifier with $1 \text{ k}\Omega$ load. A dc meter in collector reads 10 mA . Calculate how much signal power is delivered to the load.
- (d) Draw the circuit diagram of RC phase shift oscillator and explain how 360° phase shift occurs in it.
- (e) Draw transistorised shunt voltage regulator and describe its working principle.

5. Attempt any TWO :**12**

- (a) State the need of transistor biasing. Draw the circuit diagram of voltage divider bias and state the function of each component.
- (b) Draw the circuit diagram of single stage BJT-CE amplifier and describe the function of each component.
- (c) The dc level of + 3V is to be added to the given input signal ($V_i = 3 \sin\omega t$). Explain the working principle of this application along with the circuit diagram and input output waveforms.

6. Attempt any TWO :**12**

- (a) Draw the circuit diagram of a transformer coupled class-A amplifier and describe its operation. Draw its frequency response.
 - (b) Define DC loadline. Draw the circuit diagram of BJT as a switch and describe its operation. State any two applications of a BJT switch.
 - (c) Draw circuit diagram of RC integrator for a sinusoidal input. Derive the expression for output voltage. Also draw the output waveform if square wave input is applied.
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22346

11920

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
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(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following:** **10**
- a) Define following parameter for JFET along with mathematical relation:
- (i) Transconductance
 - (ii) Amplification factor
- b) Draw the symbol of:
- (i) NPN transistor
 - (ii) PNP transistor
- c) List any two applications of crystal oscillator.
- d) Determine the output voltage of regulated power supply using following ICs -
- (i) IC 7915
 - (ii) IC 7824
- e) Define load and line regulation.

P.T.O.

- f) Compare linear and non-linear wave shaping circuits on the basis of :
 - (i) Components used
 - (ii) Applications
- g) State Barkhausen criteria for sustained oscillations.

2. Attempt any THREE of the following: 12

- a) Compare RC integrator and differentiator on the basis of :
 - (i) Circuit diagram
 - (ii) O/p voltage equation
 - (iii) Time constant condition
 - (iv) Output voltage waveform for square wave input.
- b) Draw and describe working of negative clamper with neat circuit diagram and input/output waveforms.
- c) Derive the relation between α and β of transistor.
- d) Draw VI characteristics of UJT and show its operating regions on it.

3. Attempt any THREE of the following: 12

- a) Compare class A, class B, power amplifiers on the basis of :
 - (i) Current flow in terms of cycle
 - (ii) Efficiency
 - (iii) Distortion
 - (iv) Place of Q point
- b) List types of feedback connections used in amplifiers and derive gain expression for voltage series feedback with neat block diagram.
- c) Draw and describe working of voltage divider bias used as biasing circuit in BJT.
- d) Draw single stage BJT CE amplifier and describe function of each component used in it.

4. Attempt any THREE of the following: 12

- a) Compare BJT and JFET on the basis of:
 - (i) Signal controlling in terms of voltage or current
 - (ii) Input resistance
 - (iii) Thermal stability
 - (iv) Switching speed
- b) Describe the operation of UJT relaxation oscillator with neat circuit diagram.
- c) Draw circuit diagram for positive clipper and describe its operation with input and output waveforms.
- d) Identify linear waveshaping circuit used to generate following waveforms and draw the circuit diagram for it.
 - (i) Narrow pulses from square wave.
 - (ii) Triangular wave from square wave.
- e) Describe controlling action of transistorised shunt regulator with neat circuit diagram.

5. Attempt any TWO of the following: 12

- a) Draw circuit diagram of zener diode as voltage regulator and describe its operation for:
 - (i) Variable input voltage and constant load resistance.
 - (ii) Constant input voltage and variable load resistance.
- b) Draw circuit diagram for transformer coupled two stage amplifier. Also draw its frequency response and explain it.
- c) Draw input and output characteristics for CE configuration of BJT and show different operating regions on it.

6. Attempt any TWO of the following:

- a) Compare CB, CE configurations of BJT on the basis of:
 - (i) Current gain
 - (ii) Voltage gain
 - (iii) Input impedance
 - (iv) Output impedance
 - (v) Applications
 - (vi) Phase shift
 - b) Describe working of N-ch JFET with neat circuit diagram. Also draw its drain characteristics with labelled operating regions on it.
 - c) Draw neat circuit diagram for class B push pull amplifier and describe its working with output current and voltage waveforms.
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22346

21819

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data, if necessary.
- (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
- (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: 10
- a) Draw symbol of :-
- (i) NPN transistor
- (ii) PNP transistor
- b) List various transistor biasing methods.
- c) Draw symbol of :-
- (i) FET-P channel
- (ii) EMOSFET-N channel.
- d) Define collector efficiency of power amplifier.
- e) State Barkhausen criteria for sustained oscillation.
- f) Compare linear and Non-linear wave shaping circuits.
(Any two points.)
- g) Draw circuit of zener diode as voltage regulator.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Define α , β and γ with respect to transistor configuration. State relation between α and β .
 - b) Draw circuit diagram of FET biasing.
 - (i) Self-bias method
 - (ii) Voltage divider bias.
 - c) Describe FET as an amplifier with circuit diagram.
 - d) Describe UJT as relaxation oscillator with neat circuit diagram.
- 3. Attempt any THREE of the following:** **12**
- a) Draw the circuit diagram of two stages R-C coupled amplifier and describe it's working.
 - b) Draw construction and describe working of N-channel JFET with neat sketch.
 - c) Describe the working of transistorized crystal oscillator with the help of circuit diagram.
 - d) Describe the working of transistor as a switch and give the application of it.
- 4. Attempt any THREE of the following** **12**
- a) Draw the block diagram of DC regulated power supply and describe the working of each block.
 - b) Compare power amplifiers- class A, class B class AB and class C on the basis of:
 - (i) Angle of conduction.
 - (ii) Position of Q point.
 - (iii) Efficiency.
 - (iv) Distortion in output voltage.

- c) Define the terms with respect of JFET.
- (i) Pinch – off voltage
 - (ii) Dc drain resistance.
 - (iii) Transconductance
 - (iv) Amplification factor.
- d) Compare CB, CE, CC on the basis of following points:-
- (i) Input resistance
 - (ii) Output resistance
 - (iii) Current gain
 - (iv) Voltage gain.

5. Attempt any TWO of the following

12

- a) In common emitter configuration if $\beta=150$ leakage current $I_{CEO} = 100\mu\text{A}$ and base current is 0.5mA determine I_C and I_E . Draw CE configuration circuit diagram.
- b) List four applications of wave shaping circuits. Describe the working of RC integrator with neat waveforms.
- c) Build the circuit diagram to get $+10V_{dc}$ and $-10V_{dc}$ using IC 7810 and IC 7910 along with rectifier. Calculate load regulation if regulator produces 10.2 V and 10 V output at no-load and full-load conditions respectively.

6. Attempt any TWO of the following:**12**

- a) Single stage class B amplifier is operating with $1\text{K}\Omega$ load. A dc meter in the collector reads 10mA . How much signal power is delivered to the load?
 - b) In a single stage voltage amplifier, voltage gain without feedback is 80, input resistance (R_i) = 800Ω and output resistance (R_o) is $8\text{K}\Omega$. If 20% output voltage is feedback in series with input, determine A_{vf} , R_{if} and R_{of} of negative feedback amplifier.
 - c) The dc level of $+3\text{V}$ is to be added to the given input signal ($V_i = 5 \sin \omega t$). Name the circuit required for this and describe the working principle along with circuit diagram and input-output waveforms.
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11819

3 Hours / 70 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
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 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following:

10

- a) State the types of BJT and draw their symbol.
- b) Define amplifier. State the types of coupling in multistage amplifier.
- c) State Barkhausen's criteria for sustained oscillations.
- d) List the types of feedback connections. Identify the feedback connection given in Figure No. 1.

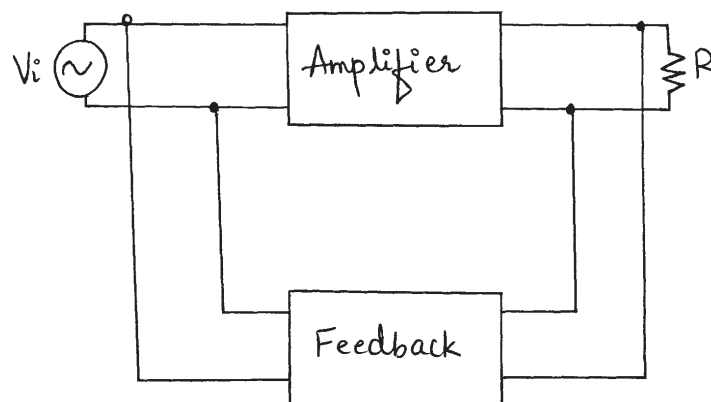


Fig. No. 1

P.T.O.

- e) State the need of wave shaping circuits.
- f) Define the following terms:
 - (i) Load regulation
 - (ii) Line regulation
- g) State the functions of rectifier and filter circuit in regulated power supply.

2. Attempt any THREE of the following: 12

- a) Draw the circuit diagram of transistor in CE configuration and draw input and output characteristics.
- b) Explain the working of n -channel JFET with neat diagram.
- c) Compare class A, class B and class C power amplifiers on the basis of :
 - (i) Conduction angle of collector current
 - (ii) Position of Q - point
 - (iii) Distortion in output voltage
 - (iv) Efficiency
- d) Define the following parameters of JFET
 - (i) DC drain resistance (r_d)
 - (ii) Amplification factor (μ)
 - (iii) Trans conductance (g_m)State the relation between μ , r_d and g_m .

3. Attempt any THREE of the following: 12

- a) Explain the operation of transistor as a switch with neat diagram.
- b) Describe the self biased method for FET with neat diagram.
- c) Draw and explain UJT relaxation oscillator with circuit diagram.
- d) The negative half cycles are to be clipped from the given input signal. ($V_i = 10 \sin \omega t$). Name and draw the circuit with input - output waveforms.

- 4. Attempt any THREE of the following:** **12**
- a) Define α and β of transistor and derive the relation between α and β .
 - b) Find the values of V_{DS} and V_{GS} for given values of $I_D = 5 \text{ mA}$, $V_{DD} = 10\text{V}$, $R_D = 1\text{k}\Omega$ and $R_s = 500 \Omega$.
 - c) Draw the circuit diagram of class B push pull amplifier and describe its working.
 - d) Explain what is cross - over distortion. How it is overcome, show with circuit diagram?
 - e) Design regulated dual power supply for $\pm 5\text{V}$ using regulator IC's.
- 5. Attempt any TWO of the following:** **12**
- a) Explain thermal runaway in transistor. How can it be avoided? List any two methods of biasing of transistor.
 - b) Draw circuit diagram and explain the operation of transformer coupled class A power amplifier. State its advantages.
 - c) Draw circuit diagram of RC differentiator for a sinusoidal input. Derive the expression for output voltage. In case, if same circuit is connected to a square wave input, draw the output waveform.
- 6. Attempt any TWO of the following:** **12**
- a) A phase shift oscillator has $R = 220 \text{ k}\Omega$ and $C = 500 \text{ pF}$. Calculate the frequency of sine wave generated by the oscillator. State the applications of RC oscillators.
 - b) A dc level of $+2\text{V}$ is to be added to the given input signal ($V_i = 10 \sin \omega t$). Explain the working principle of this application with circuit diagram and input - output waveforms.
 - c) Draw the circuit diagram of DC regulated dual power supply for $+ 12\text{V}$ using IC's 78XX and 79XX. State the necessity of regulated power supply.
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11920

3 Hours / 100 Marks

Seat No.

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- Instructions :**
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 - (3) Illustrate your answers with neat sketches wherever necessary.
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Marks

1. (A) Attempt any SIX :

12

- (a) Draw symbols of npn and pnp transistors.
- (b) Define α with respect to transistor.
- (c) State applications of JFET.
- (d) State any two advantages and disadvantages of RC coupled amplifiers.
- (e) Compare positive feedback and negative feedback with reference to phase difference and noise.
- (f) Draw symbol of UJT and define intrinsic stand off ratio (η).
- (g) Define g_m and γ_d w.r. to JFET.
- (h) State Barkhausen criteria.

(B) Attempt any TWO :

8

- (a) Draw circuit diagram of CB configuration. Draw input and output characteristics.
- (b) Describe voltage divider bias method with the help of circuit diagram.
- (c) Draw the circuit of UJT relaxation oscillator. Determine value of C if $R = 1 \text{ m}\Omega$, $t = 10 \text{ ms}$. Consider $\eta = 0.65$.

[1 of 4]

P.T.O.

2. Attempt any FOUR :**16**

- (a) Draw pin configuration and block diagram of IC 723 and list its applications.
- (b) Draw circuit diagram of transistorised series voltage regulator and describe its working.
- (c) Draw and describe working of bootstrap sweep generator.
- (d) Draw the circuit of RC phase shift oscillator and describe its working.
- (e) Draw circuit diagram of negative feedback single stage voltage amplifier and describe its working.
- (f) Draw class B push pull amplifier circuit & describe its working.

3. Attempt any FOUR :**16**

- (a) How p-channel JFET is used as an amplifier ? Justify your answer along with circuit and waveforms.
- (b) Compare transformer coupling and direct coupling techniques.
- (c) Draw the construction of D type MOSFET. Describe working with I-V Characteristics.
- (d) Draw VI characteristics of JFET. Show ohmic region, saturation region and breakdown region.
- (e) Draw diagram of emitter bias method for BJT and describe its operation.
- (f) State the effect of negative feedback on following parameters :
 - (i) Bandwidth
 - (ii) Noise
 - (iii) Gain
 - (iv) Distortion

4. Attempt any FOUR :**16**

- (a) In CE configuration if $\beta = 99$, leakage current $I_{CEO} = 50 \mu\text{A}$ & if base current is 0.5 mA. Determine I_C & I_E .
- (b) Compare CB, CE and CC configuration.
- (c) Describe self bias method for FET with circuit diagram.
- (d) Draw and describe working of single tuned amplifier.
- (e) Draw the circuit diagram of zener diode as voltage regulator. Describe its working.
- (f) Draw and describe class A power amplifier.

5. Attempt any FOUR :**16**

- (a) A certain JFET has $I_{DSS} = 12 \text{ mA}$ and pinch off voltage $V_p = -6 \text{ V}$. Calculate the value of transconductance for $V_{GS} = -1 \text{ V}$.
- (b) State the types of negative feedback. Draw their block diagrams.
- (c) State specifications of 79XX series.
- (d) Describe working of transistor as a switch with neat diagram.
- (e) Define following terms with respect to time base signals :
 - (i) Sweep speed
 - (ii) Linearity
- (f) Draw circuit diagram of two stage transformer coupled amplifier. Draw its frequency response.

6. Attempt any FOUR :**16**

- (a) Draw and describe exponential sweep generator circuit.
 - (b) Draw output characteristics of CE configuration and show various regions on it.
 - (c) Name the circuit in which power dissipating component is in series with load resistance. Draw the circuit of same.
 - (d) Define line regulation and load regulation. Give the formula for regulation.
 - (e) Define stability factor of biasing circuits. Give its significance.
 - (f) Compare class A, class B, class AB and class C amplifiers with respect to
 - (i) conduction angle, (ii) position of Q point on load line.
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3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.

Marks

1. (A) Attempt any SIX :

12

- (a) Name two types of BJT & draw their symbols.
- (b) Define Q-point.
- (c) State the need and types of amplifier coupling.
- (d) Draw symbol for n-channel and p-channel MOSFET.
- (e) State the necessity of tuned amplifier.
- (f) List applications of power amplifier.
- (g) Sketch p-channel JFET construction.
- (h) State the working principle of UJT.

(B) Attempt any TWO :**8**

- (a) Compare between CE, CB & CC configuration. (Any four points)
- (b) Draw the circuit diagram of based biased with emitter feedback. How stability point is obtained ?
- (c) State the need of regulation. Explain the concept of load & line regulation.

2. Attempt any FOUR :**16**

- (a) State the need of biasing and describe the concept of DC load line.
- (b) Define the following terms :
 - (i) Stabilization
 - (ii) Thermal runaway
- (c) Draw the transfer characteristics for N-channel JFET.
- (d) Draw the circuit of using transistor as a switch & explain its working.
- (e) Compare between positive and negative feedback. (four points)
- (f) List the ICs used for positive and negative voltage regulation with two example each.

3. Attempt any FOUR :**16**

- (a) In CE configuration if $\beta = 90$, leakage current $I_{CEO} = 40 \mu\text{A}$, base current is 0.4 mA , determine I_C and I_E .
- (b) Compare FET and BJT. (four points)

- (c) Draw the circuit and explain the operation of UJT relaxation oscillator.
- (d) Draw the frequency response of DC amplifier. Comment on it.
- (e) Draw the block diagram of DC regulated power supply and explain the function of each.
- (f) Draw the circuit of Zener diode as a voltage regulator and explain its working.

4. Attempt any FOUR :

16

- (a) Draw the drain characteristics of p-channel FET and explain.
- (b) Draw the multistage amplifier circuit diagram using RC coupling. State its advantages.
- (c) Draw the construction of p-channel D-MOSFET and state its working principle.
- (d) Draw the circuit diagram of complementary symmetry Class B push-pull amplifier and describe its working.
- (e) Compare between class A and class B amplifier on the basis of
 - (i) Efficiency
 - (ii) Power
 - (iii) Position of Q-point
 - (iv) O/P distortion
- (f) Draw the circuit diagram of Bootstrap's time base generator and explain its working.

P.T.O.

5. Attempt any FOUR :**16**

- (a) Draw the input and output characteristics of CE configuration.
- (b) An RC phase shift oscillator has $R = 4.7 \text{ k}\Omega$, $C = 0.01 \text{ }\mu\text{I}$, $R_1 = 1 \text{ k}\Omega$ and $R_F = 22 \text{ k}\Omega$.
 - (i) Determine whether the oscillations will be sustained.
 - (ii) What will be the frequency of oscillations ?
- (c) Draw the single stage class A power amplifier circuit diagram and draw the input and output waveforms.
- (d) State and explain the working principle of FET amplifier and list its applications.
- (e) State the basic principle of piezoelectric crystal and draw the circuit diagram of crystal oscillator.
- (f) Explain the use of IC LM723 as a voltage regulator.

6. Attempt any FOUR :**16**

- (a) Draw the circuit of voltage divider for BJT & explain its working.
 - (b) Draw the transistorized series voltage regulator circuit and explain its working.
 - (c) State and explain Barkhausen's criteria of oscillators.
 - (d) Draw the circuit of single tuned amplifier and state its operating principle.
 - (e) Draw the labelled circuit of RC phase shift oscillator. State the formula for frequency of oscillator.
 - (f) Draw the characteristics of UJT and state its working principle.
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11819

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
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Marks

1. (A) Attempt any SIX :

6 × 2 = 12

- (a) State any four applications of transistor.
- (b) Define term stability factor.
- (c) Define gain and band width.
- (d) Which type of MOSFET is called “Normally ON MOSFET” ? Why ?
- (e) Sketch the single tuned amplifier.
- (f) List the types of power amplifier.
- (g) State 2 advantages of JFET over BJT.
- (h) Define intrinsic standoff ratio.

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[2 of 4]

(B) Attempt any TWO :

2 × 4 = 8

- (a) Explain the operating principle of PNP transistor.
- (b) What is thermal runaway in transistor ? How it can be avoided ?
- (c) Explain how Zener diode is used as voltage regulator.

2. Attempt any FOUR :

4 × 4 = 16

- (a) Define α and β of transistor and derive the relation between them.
- (b) Explain need of biasing. List any two methods of biasing.
- (c) With the help of diagram, explain the working of N-channel JFET.
- (d) Compare CB, CC, CE configuration (any 4 points).
- (e) Draw block diagram of voltage series and current series feedback.
- (f) Draw the functional block diagram of IC 723. Describe its working.

3. Attempt any FOUR :

4 × 4 = 16

- (a) Draw the circuit diagram for common base configuration and draw its output characteristics.
- (b) Describe source self bias method of FET with neat circuit diagram.
- (c) Draw miller sweep generator and give its two applications.
- (d) Compare the different types of coupling (any 4 points).
- (e) Draw the circuit diagram of -5 V regulator using 7905 and describe its working.
- (f) Define the following : (1) Load Regulation (2) Line Regulation.

4. Attempt any FOUR :**4 × 4 = 16**

- (a) List 4 applications of FET. Draw the drain and transfer characteristics of JFET.
- (b) Draw the diagram of single stage CE amplifier and state the function of each component.
- (c) Describe the construction, operation of E-MOSFET.
- (d) Describe class B push pull amplifier with neat circuit diagram.
- (e) Compare class A, class B and class C power amplifier on (1) position of operating point (2) efficiency (3) conduction angle (4) O/P waveform.
- (f) What is oscillator ? State applications of oscillator.

5. Attempt any FOUR :**4 × 4 = 16**

- (a) In C.E. configuration if $\beta = 150$, leakage current $I_{CEO} = 100 \mu\text{A}$ and base current in 0.5 mA , determine I_C and I_E .
- (b) State the advantages and disadvantage of crystal oscillator.
- (c) Compare small signal amplifier (voltage amplifier) and power amplifier.
- (d) Draw common source FET amplifier. Describe its operation.
- (e) Describe the working principle of UJT as relaxation oscillator with neat circuit diagram.
- (f) Draw pin diagram of IC 78XX and IC 79XX and state their features and advantages.

P.T.O.

6. Attempt any FOUR :**4 × 4 = 16**

- (a) Explain with a neat circuit, voltage divider bias method for biasing a transistor.
 - (b) Draw the circuit of series transistor voltage regulator and describe its operation.
 - (c) State the meaning of positive and negative feedback.
 - (d) Draw the circuit of double tuned amplifier and sketch the frequency response.
 - (e) Draw circuit of RC phase shift oscillator and describe its working.
 - (f) Explain the construction of UJT and draw its symbol.
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17319

21718

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. (A) Attempt any SIX :

12

- (a) List different operating regions of transistor.
- (b) Define the term stability factor.
- (c) Draw the symbol of n-channel and p-channel JFET.
- (d) List the types of amplifier coupling.
- (e) Define intrinsic stand-off ratio of UJT.
- (f) State the need of voltage regulator.
- (g) Define efficiency of power amplifier.
- (h) State the condition for sustained oscillations.

- (B) Attempt any TWO :** **8**
- (a) Draw the circuit diagram for Common Base (CB) configuration and draw its input and output characteristics.
 - (b) List the types of transistor biasing. Draw neat circuit diagram of voltage divider biasing.
 - (c) Draw and explain zener diode as a voltage regulator.
- 2. Attempt any FOUR :** **16**
- (a) Describe the concept of thermal runaway. How it should be avoided ?
 - (b) Draw the circuit diagram of two stage RC coupled amplifier. Draw its frequency response.
 - (c) Explain the working of N-channel JFET with neat diagram.
 - (d) List the types of feedback connection. Draw block diagram representation of them.
 - (e) Draw and explain UJT relaxation oscillator with input and output waveforms.
 - (f) Draw and explain transistorised series regulator.
- 3. Attempt any FOUR :** **16**
- (a) Compare CB, CE and CC configuration on the basis of,
 - (i) Input Impedance (R_i)
 - (ii) Output Impedance (R_o)
 - (iii) Voltage gain (A_v)
 - (iv) Current gain (A_i)

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- (b) Draw the circuit diagram of self-bias method of JFET and describe its working.
- (c) Draw the circuit diagram of double tuned amplifier and describe its working.
- (d) Draw pin diagram of IC 723. Give any four important features of IC 723.
- (e) Draw and explain transistorised crystal oscillator.
- (f) Draw and explain class-B push pull amplifier.

4. Attempt any Four :

16

- (a) Define α and β of the transistor. Derive the relationship between α & β .
- (b) Compare Class A, Class B, Class C & Class AB power amplifier.
- (c) Explain the working of N-channel D-MOSFET.
- (d) Draw and explain transistor as a switch with neat input and output waveforms.
- (e) In UJT sweep circuit, calculate time period and frequency of oscillation if $\eta = 0.65$ and $R = 2 \text{ k}\Omega$.
- (f) Draw the block diagram of regulated power supply. State the function of each block.

5. Attempt any FOUR :

16

- (a) Explain the concept of dc load line analysis.
- (b) Draw the circuit diagram of single stage CE amplifier. State the function of each component.
- (c) Draw drain characteristics of JFET and explain ohmic and pinch-off region.
- (d) Draw common source FET amplifier and describe its operation.
- (e) Construct the circuit diagram of DC regulated power supply for $\pm 12\text{V}$ using IC 78XX and IC 79XX.
- (f) Draw Bootstrap amplifier and describe its working.

P.T.O.

6. Attempt any FOUR :**16**

- (a) Compare RC coupled, direct coupled and transformer coupled amplifier.
 - (b) State the meaning of positive and negative feedback. State four advantages of negative feedback.
 - (c) Define the terms Line and Load regulation.
 - (d) Draw I-V characteristics of UJT and label different regions on it.
 - (e) Draw the circuit diagram of fixed bias circuit. Write its working.
 - (f) Compare BJT and FET (any four points).
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3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.

- | | | Marks |
|-----------|---|--------------|
| 1. | (A) Attempt any SIX : | 12 |
| | <ol style="list-style-type: none">(a) List any two applications of transistor.(b) Draw symbol of n-channel and p-channel JFET.(c) What is coupling ? List the types of amplifier coupling.(d) Which type of feedback is used in amplifier and in oscillator ?(e) Compare BJT & UJT (any two points).(f) List the types of biasing of transistor. Which type of biasing is used mostly ?(g) Draw neat symbol of E-MOSFET & D-MOSFET.(h) Write any two application of tuned amplifier. | |
| | (B) Attempt any TWO : | 8 |
| | <ol style="list-style-type: none">(a) Compare CB, CE & CC on the basis of<ol style="list-style-type: none">(i) Input Resistance (R_i)(ii) Output Resistance (R_o)(iii) Current Gain (A_i)(iv) Voltage gain (A_v) | |

- (b) Explain working of UJT with the help of VI characteristics.
- (c) Draw labelled pin diagram of IC 78 XX and IC 79 XX. Also write the function of these IC's.

2. Attempt any FOUR :**16**

- (a) Draw labelled Input and Output character of transistor in CE configuration.
- (b) Compare BJT & FET (any four points).
- (c) List types of feedback connection. Draw any one type of connection diagram.
- (d) What is biasing ? Explain the concept of DC load line.
- (e) Explain working of E-MOSFET with the help of neat constructional diagram.
- (f) Describe the concept of thermal runaway. How it can be avoided ?

3. Attempt any FOUR :**16**

- (a) Explain working of transistor as a switch with neat circuit and waveforms.
- (b) Draw circuit of Zener diode as a voltage regulator and explain it's working.
- (c) List types of FET biasing and explain any one type with circuit diagram.
- (d) Describe working of single stage CE amplifier with sketch.
- (e) With the help of circuit diagram explain UJT relaxation oscillator with necessary waveforms.
- (f) Draw block diagram of DC regulated power supply and explain each block in detail.

4. Attempt any FOUR :**16**

- (a) Draw labelled drain and transfer characteristics of JFET.
- (b) Compare class A, class B, class C power amplifier on the basis of
(i) Operating pt. (ii) Efficiency (iii) Conduction angle (iv) nature of O/P waveforms.
- (c) Draw neat circuit of crystal oscillator and give significance of piezoelectric effect.
- (d) Draw neat circuit of two stage RC coupled amplifier and also draw it's frequency response.
- (e) Describe working of Bootstrap time base generator with neat diagram and waveforms.
- (f) Draw and explain common source FET amplifier.

5. Attempt any FOUR :**16**

- (a) Explain operation of NPN transistor with neat constructional diagram.
- (b) Define parameters of JFET
 - (i) r_d
 - (ii) g_m
 - (iii) μ andDerive relation between them.
- (c) Explain working of class B push pull amplifier with i/p and output waveforms.
- (d) Enlist different types of time base generator. Write any four applications of it.

P.T.O.

- (e) Draw and explain transistorised series voltage regulator.
- (f) Draw neat circuit diagram of double tuned amplifier. Write any two advantages and two applications of it.

6. Attempt any FOUR :

16

- (a) List any four advantages of negative feedback.
 - (b) Define :
 - (i) Load Regulation
 - (ii) Line Regulation
 - (c) Draw neat circuit of two stage transformer coupled amplifier and draw its frequency response.
 - (d) Draw neat circuit of Miller sweep generator and explain it with waveforms.
 - (e) Describe working of RC phase shift oscillator with neat sketch. Write formula for frequency of oscillation.
 - (f) Draw neat circuit of DC regulated dual power supply for ± 12 V using IC 78 XX & IC 79 XX.
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3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. (A) Attempt any SIX :

12

- (a) What is transistor ? State any two applications of transistor.
- (b) Define operating point (Q) of the transistor as an amplifier.
- (c) Draw the circuit diagram and waveforms of single stage CE amplifier.
- (d) Draw the symbol of N-channel MOSFET. State any two application of MOSFET.
- (e) Define tuned amplifier. State types of resonant circuit.
- (f) What is cross-over distortion ?
- (g) Draw the transfer characteristics of N-channel JFET.
- (h) Draw the symbol and equivalent circuit of UJT.

- (B) Attempt any TWO :** **08**
- (a) Explain how transistor works as a switch. Also draw its input and output waveforms.
 - (b) Explain the concept of DC load line and operating point for biasing circuit.
 - (c) Describe the action of zener voltage regulator with neat diagram. Write any two limitations of unregulated power supply.
- 2. Attempt any FOUR :** **16**
- (a) List the types of biasing method of transistor. Explain any one method.
 - (b) What is thermal runaway ? How it can be avoided ?
 - (c) Sketch the drain characteristics of N-channel JFET for various values of V_{GS} . State the condition at which the drain current essentially becomes constant.
 - (d) Draw and explain the input and output characteristics of CE configuration.
 - (e) List different types of negative feedback. Draw their diagrams.
 - (f) Explain the block diagram of regulated power supply and also state its need.
- 3. Attempt any FOUR :** **16**
- (a) Compare CB, CC & CE configurations (any 4 points).
 - (b) With the help of neat circuit diagram explain the working of self bias method for FET.
 - (c) Draw and explain the working of miller sweep generator.
 - (d) Describe how excellent impedance matching is achieved with transformer coupling.
 - (e) State load and line regulation.
 - (f) Draw the dual power supply capable of giving ± 12 V using three terminal regulator IC's and describe its working.

4. Attempt any FOUR :**16**

- (a) Explain the construction and working of N-channel JFET.
- (b) Draw the circuit diagram and frequency response of two stage RC coupled amplifier.
- (c) Differentiate the MOSFET and FET for the following points :
 - (i) Schematic symbol
 - (ii) Trans conductance curve
 - (iii) Modes of operation
 - (iv) Input impedance
- (d) Compare the small signal amplifier and power amplifier w.r. to following points :
 - (i) Input voltage
 - (ii) output power
 - (iii) output impedance
 - (iv) Applications
- (e) Sketch the output waveforms of class A, class AB and class C with respect to operating point on load line.
- (f) Draw V-I characteristics of UJT. State any two applications of UJT.

P.T.O.

5. Attempt any FOUR :**16**

- (a) Derive relation between α & β with respect to BJT.
- (b) The phase shift oscillator uses equal resistances of $1\text{ M}\Omega$ & equal capacitances of 68 PF . At what frequency does the circuit oscillate ? And also find value of resistance to produce a frequency of 800 kHz if phase shift oscillator uses 5 PF capacitor.
- (c) Explain the working of class-B push-pull amplifier.
- (d) Explain with neat sketch how FET can be used as an amplifier.
- (e) State Barkhausen criterion of oscillation.
- (f) Draw the functional block diagram of IC 723. State any two features of 723.

6. Attempt any FOUR :**16**

- (a) Discuss steps to be taken to design transistor biasing and stabilizing circuit.
 - (b) Draw circuit diagram of transistorised series voltage regulator and explain its working.
 - (c) State the meaning of positive and negative feedback with neat sketch.
 - (d) Plot frequency response of doubled tuned amplifier and explain it.
 - (e) The ac equivalent circuit of crystal has these values $L = 1\text{H}$, $C = 0.01\text{ PF}$, $R = 1000\ \Omega$ & $C_m = 20\text{ PF}$. Determine the series resonant and parallel resonant frequencies.
 - (f) Draw circuit diagram & waveforms of voltage sweep generator using UJT.
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