

Seat No. : \_\_\_\_\_

**LG-110**

April-2014

B.Sc., (Sem.-VI)

CC-310 : Physics

Time : 3 Hours]

[Max. Marks : 70

સૂચના : (1) બધા જ પ્રશ્નોના ગુણ સરખા છે.

Instructions : All questions carry equal marks.

(2) સંજ્ઞાઓ તેમના પ્રચલિત અર્થ ધરાવે છે.

Symbols have their usual meaning.

(3) જમણી બાજુના અંક પ્રશ્નોના ગુણ દર્શાવે છે.

Number to right hand side of questions indicates marks.

1. (a) વેનબ્રીજ (Wien-bridge) ઓસ્સિલેટરની સ્વચ્છ આકૃતિ દોરો અને તેની કાર્યપદ્ધતિ સમજાવો.  
ઓસ્સિલેટરની આવૃત્તિ માટેનું સમીકરણ મેળવો. 7

Draw a neat circuit diagram of Wien-bridge oscillator and explain its working.  
Obtain an equation for frequency of oscillation.

અથવા/OR

પ્રતિપુષ્ટિ વિવર્ધક (feedback amplifier)નો જરૂરી બ્લોક ડાયગ્રામ દોરીને પ્રતિપુષ્ટિનો સિદ્ધાંત જણાવો અને

$$A_{vf} = \frac{A_v}{1 - k A_v} \text{ સૂત્ર તારવો.}$$

જ્યાં,  $A_v$  = વોલ્ટેજ ગેઈન પ્રતિપુષ્ટિ વગર

$k$  = ફીડબેક અંક (feedback factor)

$A_{vf}$  = પ્રતિપુષ્ટિ સાથેનો વોલ્ટેજ ગેઈન 3

Give the general theory of feedback by drawing block diagram of a feedback amplifier. Derive an equation

$$A_{vf} = \frac{A_v}{1 - k A_v}$$

Where  $A_v$  = voltage gain without feedback

$k$  = feedback factor

$A_{vf}$  = voltage gain with feedback

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P.T.O.

- (b) ઓસ્સિલેટર પરિપથ માટેની જરૂરિયાતો જણાવો.

State the requirements of an Oscillator Circuit.

અથવા/OR

તમારા શબ્દોમાં સમજાવો કે કેવી રીતે ઋણ પ્રતિપુષ્ટિ એમ્પ્લિફાયરની બેન્ડવિડ્થમાં વધારો કરે છે ?

Explain in your own words how negative feedback can increase the value of bandwidth of an amplifier.

- (c) એક એમ્પ્લિફાયરનો વોલ્ટેજ ગેઈન 100 અને બેન્ડવિડ્થ 200 kHz છે. જો 5% ઋણ પ્રતિપુષ્ટિ (-ve feedback) આપવામાં આવે તો ફીડબેક બાદમાં વોલ્ટેજ ગેઈન અને બેન્ડવિડ્થ શોધો. ફીડબેક પહેલા અને પછી ગેઈન બેન્ડવિડ્થ ગુણાકારનું મૂલ્ય શોધો.

If an amplifier has a band width of 200 kHz and a voltage gain of 100. What will be the new bandwidth and gain if 5% negative feedback is introduced ? What is the gain bandwidth product before and after adding negative feedback ?

અથવા/OR

R-C ફેઝ શિફ્ટ દોલક (R-C phase-shift oscillator) માં  $R_1 = R_2 = R_3 = 680 \text{ k}\Omega$  અને  $C_1 = C_2 = C_3 = 100 \text{ PF}$  હોય તો દોલકની આવૃત્તિનું મૂલ્ય શોધો.

A phase-shift oscillator has the following circuit components  $R_1 = R_2 = R_3 = 680 \text{ k}\Omega$  and  $C_1 = C_2 = C_3 = 100 \text{ PF}$ . Calculate the frequency of oscillation.

2. (a) (1) નોન ઈન્વર્ટીંગ Op-Amp પરિપથ દોરો. વર્ચ્યુઅલ ગ્રાઉન્ડ (virtual ground) સિદ્ધાંતનો ઉપયોગ કરી વોલ્ટેજ ગેઈનનું સૂત્ર મેળવો.

Draw the circuit of Non-inverting Op-Amp. Obtain the formula for voltage gain using virtual ground theory.

- (2) Op-Ampની આદર્શ લાક્ષણિકતાઓ આપો.

Give the ideal characteristics of Op-Amp.

અથવા/OR

JFETનો કોમન સોર્સ (common source) એમ્પ્લિફાયર પરિપથ દોરો અને તેની કાર્યપદ્ધતિ સમજાવો તેનો સમતુલ્ય પરિપથ દોરો અને વોલ્ટેજ ગેઈનનું સૂત્ર મેળવો.

Draw a circuit diagram of JFET common source amplifier and explain its operation. Draw equivalent circuit and derive the expression for voltage gain.

- (b) રૈવાજિક ટ્રાન્ઝીસ્ટર (Conventional transistor) કરતાં FETની વધુ ફાયદાકારકતાઓ (advantages) જણાવો.

What are the advantages of FET over a conventional transistor (BJT) ?

અથવા/OR

વર્ચ્યુઅલ ગ્રાઉન્ડ (virtual ground) સિદ્ધાંતનો ઉપયોગ કરી Op-Ampનો સર્મીંગ એમ્પ્લિફાયર (summing amplifier) તરીકે ઉપયોગ સમજાવો.

Explain the working of Op-Amp as summing amplifier using virtual ground theory.



- (c) એક ઇન્વર્ટિંગ ઓપેરેટિંગ એમ્પ્લિફાયર (Op-Amp) માં  $R_1 = 10 \text{ k}\Omega$  અને  $R_f = 100 \text{ k}\Omega$  છે તો 1 વોલ્ટના ઇનપુટ વોલ્ટેજ માટે આઉટપુટ વોલ્ટેજ શોધો. 2  
An inverting amplifier (Op-Amp) has  $R_1 = 10 \text{ k}\Omega$  and  $R_f = 100 \text{ k}\Omega$ . Find the output voltage for an input voltage of 1 volt.

**અથવા/OR**

આપેલ JFET માટે ફોરવર્ડ ટ્રાન્સકન્ડક્ટન્સ (transconductance)  $5000 \mu\text{A/V}$  અને એમ્પ્લિફિકેશન ફેક્ટર 60 છે તેના માટે ડ્રેઇન (drain) અવરોધ શોધો.

For a JFET forward transconductance is  $5000 \mu\text{A/V}$  and amplification factor is 60. Calculate the drain resistance.

3. (a) (1) ડીમલ્ટીપ્લેક્સર એટલે શું ? 1 થી 16 ડીમલ્ટીપ્લેક્સરની સમજૂતી આપો. 10  
What is demultiplexer ? Explain 1 to 16 demultiplexer.  
(2) ડેસીમલ (decimal) to બીસીડી એનકોડર સમજાવો.  
Explain decimal to BCD encoder.

**અથવા/OR**

EX-OR ગેટ અને પૂર્ણ એડર (full adder) નો ઉપયોગ કરી એડર-સબટ્રેક્ટર (Adder Subtrater) પરિપથ દોરો અને સમજાવો.

Draw Adder-subtractor circuit using EX-OR gate and full adder and explain it.

- (b) 2's complement નો ઉપયોગ કરી +125 અને -68 નું 8 બીટ (bit) માં સરવાળો કરો. 4  
Do 8 bit addition of decimal number +125 and -68 using 2's complement.

**અથવા/OR**

2's complement નો ઉપયોગ કરી +83 માંથી +16 ની બાદબાકી કરો.  
Subtract +16 from +83 using 2's complement.

4. (a) CR Tube ની ઇલેક્ટ્રોસ્ટેટિક ડિફ્લેક્શન સંવેદિતા માટેનું સમીકરણ તારવો. 7  
Derive an equation of electrostatic deflection sensitivity of CR Tube.

**અથવા/OR**

ટ્રાન્ઝીસ્ટર શ્રેણી વોલ્ટેજ રેગ્યુલેટર પરિપથની વિસ્તૃત સમજૂતી આપો.  
Explain in detail transistor series voltage regulator circuit.

- (b) CRO નો ઉપયોગ કરી અજ્ઞાત (unknown) આવૃત્તિ કેવી રીતે માપી શકાય તે સમજાવો. 4  
Explain how unknown frequency can be measure using CRO.

**અથવા/OR**

વોલ્ટેજ નિયમન એટલે શું ? ઝેનર ડાયોડ વોલ્ટેજ રેગ્યુલેટરની મર્યાદાઓ કઈ છે ?

What is voltage stabilization ? What are the limitations of a zener diode regulator ?

- (c) CR ટ્યુબની વિચલન સંવેદિતા (deflection sensitivity)  $0.01 \text{ mm/V}$  છે. શિરોલંબ (vertical) પ્લેટને 400V નો વિદ્યુત સ્થિતિમાનનો તફાવત લાગુ પાડતા (spot) સ્પોટમાં જોવા મળતી શિફ્ટ (shift) શોધો. 3

The deflection sensitivity of CR Tube is  $0.01 \text{ mm/V}$ . Find the shift produced in the spot when 400 V are applied to vertical deflection plate.

**અથવા/OR**

C.R.O. ના ઉપયોગો લખો.  
Write uses of C.R.O.



5. નીચેના પ્રશ્નોના અતિ ટૂંકા જવાબ આપો : (દરેક પ્રશ્નનો ગુણ 1 છે.)  
Give answers of following questions in short (each of 1 marks.)

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- (1) દોલક માટેની બર્કહાઉસેન જરૂરિયાત (criterion) જણાવો.  
What is the Barkhausen criterion for oscillation ?
- (2) ફેઝ શિફ્ટ ઓસ્સિલેટરમાં ઓછામાં ઓછા કેટલા R-C વિભાગ (section) જરૂરી છે ?  
How many minimum number of R-C section require in R-C phase shift oscillator ?
- (3) પ્રતિપુષ્ટિ એટલે શું ?  
What is feedback ?
- (4) ધન પ્રતિપુષ્ટિ (positive feedback) આપવામાં આવેલ હોય ત્યારે વિવર્ધક (amplifier) ની નિમ્ન કટઓફ આવૃત્તિ અને ઉર્ધ્વ કટઓફ આવૃત્તિ પર શી અસર થાય છે ?  
What is the effect on lower cutoff and upper cutoff frequency in amplifier when positive feedback is applied ?
- (5) P-ચેનલ FETની પરિપથ સંજ્ઞા દોરો.  
Draw the circuit symbol of P-channel FET.
- (6) વ્યાખ્યા આપો : અન્યોન્યવાહકતા (FET માટે)  
Define transconductance (for FET).
- (7) Op-Ampના પ્રાયલ “ઈનપુટ ઓફસેટ વોલ્ટેજ”ની વ્યાખ્યા આપો.  
Define Op-Amp parameter “input offset Voltage”.
- (8) વ્યાખ્યા આપો : CMRR  
Define : CMRR
- (9) માઈક્રોપ્રોસેસરમાં કેરીફ્લેગ શું છે ?  
What is carry flag in a microprocessor ?
- (10) મલ્ટીપ્લેક્સર એટલે શું ?  
What is multiplexer ?
- (11) 10011000નું 2's કોમ્પ્લીમેન્ટ જણાવો.  
What is the 2's complement of 10011000 ?
- (12) આદર્શ પાવર સપ્લાય માટે આઉટપુટ અવરોધનું મૂલ્ય જણાવો.  
For ideal power supply give the value of output resistance.
- (13) એનકોડર શું છે ?  
What is encoder ?
- (14) CROના વિવિધ ભાગોના નામ જણાવો.  
Mention the various parts of CRO.

Seat No. : \_\_\_\_\_

**AF-111**

**April-2015**

**B.Sc., Sem.-VI**

**CC-310 : Physics**

**(Linear & Non-linear Electronics Circuits)  
(New)**

**Time : 3 Hours]**

**[Max. Marks : 70**

- Instructions :** (1) All questions carry equal marks.  
(2) Symbols have their usual meanings.

1. (a) (i) Give the requirements of an electronic oscillator and classify them into different types.  
(ii) Draw the circuit diagram of an R-C phase shift oscillator and explain its working. Obtain an equation for frequency of oscillation. 10

**OR**

- (i) Give the general theory of feedback by drawing block diagram of a feedback amplifier. Derive an equation for voltage gain with feedback.  
(ii) What is effect of negative feedback on bandwidth and input resistance of an amplifier ?  
(b) In Wienbridge oscillator resistance  $R_1 = R_2 = 220 \text{ k}\Omega$  and  $C_1 = C_2 = 250 \text{ pF}$ . Determine the frequency of oscillation. 4

**OR**

An amplifier has a voltage gain of 100 and a bandwidth of 200 kHz. If 5% negative feedback is introduced, find the new bandwidth and voltage gain.



2. (a) (i) Draw the circuit of inverting Op-Amp. Obtain the formula for voltage gain using virtual ground theory. 10
- (ii) Explain the working of Op-Amp as summing amplifier using virtual ground theory.

OR

- (i) Define the FET parameters and obtain the relation between them.
- (ii) Describe the construction and working of a FET.
- (b) Determine the output voltage of an Op-Amp for input voltage of  $V_1 = 120 \mu\text{V}$ ,  $V_2 = 80 \mu\text{V}$ . The Op-Amp has a differential mode gain  $A_d = 10^3$  and CMRR is (i) 100 (ii)  $10^6$ . 4

OR

The following reading were obtained experimentally from a JFET.

$V_{GS}$	0V	0V	- 0.2 V
$V_{DS}$	7 V	15 V	15 V
$I_D$	10 mA	10.25 mA	9.65 mA

- Determine : (i) ac drain resistance
- (ii) transconductance
- (iii) amplification factor

3. (a) Draw Adder-subtractor circuit using EX-OR gate and full adder and explain it. 10

OR

- (i) Explain multiplexer block diagram, 4 to 1 multiplexer truth table and its logic circuit.
- (ii) Explain decimal to BCD encoder.

- (b) Do 8 bit addition of decimal number + 37 and - 115 using 2's complement.

4

**OR**

Subtract - 27 from + 68 using 2's complement.

4. (a) Derive an equation of electrostatic deflection sensitivity of C.R. Tube.

7

**OR**

Discuss transistor shunt voltage regulator.

- (b) Write limitations of a zener diode regulator. Explain transistor series voltage regulator.

7

**OR**

- (i) Explain how unknown frequency can be measure using CRO.

- (ii) In a CR Tube a pair of deflecting plates are 4 cm long and are spaced 0.5 cm apart. The distance between screen and deflecting plate is 16 cm. The final accelerating anode voltage is 2000 Volt. Calculate (i) displacement produced by a deflecting voltage of 20 volt; (ii) angle of beam with tube axis on emerging from the field.

5. Give answers of following questions in short : (Each of 1 marks)

14

- (1) What is an oscillator ?
- (2) What kind of circuit elements used in feedback network to obtain feedback factor more than 1 ?
- (3) What is effect on lower cut-off and upper cutoff frequency in amplifier when negative feedback is applied ?
- (4) Write the frequency range of AFO.



- (5) Why FET is known as voltage controlled device ?
  - (6) What effect on saturation drain current when reverse bias voltage on gate is increase ?
  - (7) Define CMRR.
  - (8) Draw the pinout diagram of Op-Amp.
  - (9) What is the largest decimal number that can be represented with an 8 bit unsigned binary number ?
  - (10) A logic circuit with one input and many output is called a \_\_\_\_\_.
  - (11) What is 2's complement of 10110000 ?
  - (12) Write the name of main parts of CRO.
  - (13) Define magnetostatic deflection sensitivity of CR Tube.
  - (14) For ideal power supply give the value of output resistance.
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Seat No. : \_\_\_\_\_

**AE-101**

April-2016

B.Sc., Sem.-VI

CC-310 : Physics

Time : 3 Hours]

[Max. Marks : 70

- Instructions :** (1) All questions carry equal marks.  
(2) Symbols have their usual meaning.  
(3) Number to right hand side of questions indicates marks.

1. (a) Draw neat and clean circuit diagram of current series negative feedback and explain. Derive the expression for  $k$  and  $R_{if}$ . 7

OR

Draw a neat circuit diagram of Colpitt's oscillator and explain its working. Obtain general equation for oscillation.

- (b) Derive an equation for general theory of feedback in Amplifier. 7

OR

Draw circuit diagram of Weinbridge oscillator and explain its working. Obtain an equation for frequency of oscillator.

2. (a) Discuss the construction of JFET. Draw output characteristics of FET and explain it. 7

OR

- (i) Define the FET parameters and obtain the relation between them. 3

- (ii) For JFET  $R_d = 6.6 \text{ k}\Omega$ ,  $I_m = 40$ , calculate amplification factor ( $\mu$ ). 4

- (b) List the characteristics of an ideal Op-Amp. Also write applications of an Op-Amp and discuss any two of them. 7

OR

- (i) Draw the circuit of non-inverting Op-Amp. Obtain the formula for voltage gain using virtual ground theory. 4

- (ii) An inverting Op-Amp has  $R_i = 20 \text{ k}\Omega$ ,  $R_f = 100 \text{ k}\Omega$ . Find output voltage for an input voltage for 1 volt. 3

AE-101

3

P.T.O.

3. (a) Draw a half adder and full adder circuit and explain it. 7
- OR**
- (i) Show the 8-bit addition of decimal no. (+45) + (+56) in 2's complement representation. 4
- (ii) Subtract the decimal no. (-27) - (+68) using 2's complement. 3
- (b) What is multiplexer ? Draw and explain 4 to 1 multiplexer. Realize  $Y = \bar{A}B + A\bar{B}$  using 4 to 1 multiplexer. 7
- OR**
- Explain decimal to BCD encoder.
4. (a) Explain in detail transistor series voltage regulator circuit. 7
- OR**
- Derive an equation of electrostatic deflection sensitivity of CR tube.
- (b) List out disadvantages of zener diode regulator. Draw the circuit of transistor shunt voltage regulator. 7
- OR**
- Write the uses of CRO and explain how unknown frequency can be measure using CRO.
5. Give the answer in short : 14
- (1) In which type of negative feedback impedance is maximum ?
  - (2) What will be the phase difference is required between input and output oscillator ?
  - (3) In RF oscillator : Give the name of feedback component.
  - (4) Write one advantage of FET over BJT.
  - (5) What is an input impedance of an ideal Op-Amp ?
  - (6) Write the fullform of CMRR.
  - (7) Define slew rate.
  - (8) Define transconductance for FET.
  - (9) What is pinch voltage ?
  - (10) Define load regulation.
  - (11) What is the hexadecimal equivalent of 1010 ?
  - (12) What is 2's complement of 1010 1010 ?
  - (13) What is Demultiplexer ?
  - (14) What is the largest number (decimal) that can be represented with an 8-bit signed number ?



Seat No. : \_\_\_\_\_

**AJ-112**

April-2017

B.Sc., Sem.-VI

**CC : 310 – Physics**  
**(Linear & Non-Linear Electronic Circuits)**

**Time : 3 Hours]**

**[Max. Marks : 70**

- Instructions :** (1) All questions carry equal marks.  
(2) Symbols have their usual meaning.  
(3) Number to right hand side of question indicates marks.

1. (a) (1) With necessary circuit diagram discuss voltage series negative feedback circuit and derive necessary equations. 6
- (2) An emitter follower has  $R_s = 600 \Omega$ ,  $R_L = 1 \text{ k} \Omega$ ,  $h_{fe} = 50$  and  $h_{ie} = 1 \text{ k} \Omega$ . Calculate current gain, input resistance with feedback, voltage gain with feedback and output resistance with feedback. 4

**OR**

- (1) Draw the circuit diagram of Hartley oscillator. Describe its working. Using general equation for oscillator derive equation for frequency of oscillation. 7
- (2) In the Hartley oscillator  $L_1 = 0.04 \text{ mH}$  and  $C = 0.004 \mu\text{F}$ . If the frequency of oscillation is 120 kHz find value of  $L_2$ . 3
- (b) Discuss effect of negative feedback on input resistance of an amplifier. 4

**OR**

Discuss conditions for oscillations and hence discuss Barkhausen criterion.

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P.T.O.

2. (a) (1) Define ideal differential Amplifier. Define difference signal  $V_d$  and common mode signal  $V_c$  hence discuss common mode rejection ratio. (CMRR). 5

- (2) In an OP-AMP two sets of input signals are (1)  $V_1 = +100 \mu V$  and  $V_2 = -100 \mu V$  (2)  $V_1 = 1100 \mu V$  and  $V_2 = 900 \mu V$ . If CMRR is 100, calculate % difference in output voltage. 3

OR

- (1) Draw the circuit diagram of Inverting OP-AMP and discuss principle of virtual ground.
- (2) An OP-AMP inverting amplifier has input resistor of  $10 k\Omega$  and a feedback resistor of  $50 k\Omega$ . If input voltage is  $0.5 V$  find output voltage and input current.
- (b) With necessary circuit diagram discuss operation of common source FET amplifier and derive equation of voltage gain by drawing equivalent circuit. 6

OR

- (1) Define FET parameters and obtain relation between them. 3
- (2) In a FET when  $V_{GS}$  changes from  $-1 V$  to  $-1.5 V$  keeping  $V_{DS}$  constant, drain current  $I_D$  drops from  $7 mA$  to  $5 mA$ . Find the transconductance of the FET. If drain resistance is  $200 k\Omega$  what is amplification factor? 3

3. (a) Do as directed. 8

- (1) Sum 15 and  $-28$  using 2's complement.
- (2) Sum B70D H and FA90 H
- (3) Sum  $(10111011)_2$  and  $(01000100)_2$
- (4) Subtract  $(01010101)_2$  from  $(11000000)_2$

OR

- (1) Explain Half Adder circuit. 4
- (2) Explain controlled Inverter circuit. 4



(b) Write a note on Demultiplexer.

6

**OR**

Write a note on Decimal to BCD Encoder.

4. (a) Explain in detail zener voltage regulator circuit.

6

**OR**

Explain in detail transistor series voltage regulator circuit.

(b) Explain deflection of electron beam in CRT. Derive expression for electrostatic deflection sensitivity.

8

**OR**

Derive expression of deflection for magnetic deflection system in CRT.

5. Give answers of following questions in short. (Each of 1 mark)

14

- (1) On application of negative feedback in an amplifier product of voltage gain and bandwidth remains \_\_\_\_\_.
- (2) An amplifier has a voltage gain of 100 without feedback. The gain is reduced to 40 with negative feedback. Find feedback fraction.
- (3) Define oscillator.
- (4) Draw the circuit symbol of N-channel FET.
- (5) Define input offset current for OP-AMP.
- (6) What will be the voltage gain of an ideal OP-AMP ?
- (7) How much phase shift is produced by each RC section in an RC phase shift oscillator ?

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P.T.O.

- (8) If 10101 is signed binary number: write its equivalent decimal number.
  - (9) Write 2's complement of -13.
  - (10) What is the meaning of multiplex?
  - (11) Define % voltage regulation.
  - (12) Write names of methods of focusing.
  - (13) Write two uses of CRO.
  - (14) What is deflection sensitivity?
-



Seat No. : 8575

**AE-107**

April -2018

B.Sc., Sem.-VI

CC-310 : Physics

[Max. Marks : 70]

Time : 3 Hours]

- Instructions :** (1) All questions carry equal marks.  
(2) Symbols have their usual meaning.

1. (a) Draw the circuit diagram of Colpitt's oscillator. Explain its working and obtain the equation for frequency of oscillation. 10

**OR**

Give the general theory of feedback by drawing block diagram of feedback amplifier. Derive an equation for voltage gain with feedback. Write the advantages and disadvantages of negative feedback.

- (b) An amplifier's total harmonic distortion is reduced from 8% to 2% when 5% negative feedback is used. Find.

(i) The initial voltage gain of amplifier when the distortion was 8%.

(ii) What was the voltage gain with distortion of 2% ? 4

**OR**

A Colpitt's oscillator is used as local oscillator in an AM radio receiver to produce frequency from 1 MHz to 2 MHz.

(i) What must be the inductance of coil if the obtainable minimum capacitance is 43 PF ?

(ii) What is the maximum value of capacitance ?

2. (a) (i) Draw a circuit diagram of JFET common source amplifier and explain its operation. Draw equivalent circuit and derive equation for voltage gain.  
(ii) What are advantages of JFET over a conventional transistor (BJT) ? 10

**OR**

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5

P.T.O.



- (i) Explain the function of differential amplifier. Show that

$$V_o = A_d V_d \left( 1 + \frac{1}{\rho} \frac{V_c}{V_d} \right)$$

- (ii) Explain the application of op-Amp as summing amplifier.

- (b) What is output voltage of an op-Amp summing amplifier for the following sets of input voltages and resistor  $R_f = 1M\Omega$ .

4

$$V_1 = 1V \quad V_2 = 2V \quad V_3 = 3V \text{ and}$$

$$R_1 = 500 k\Omega \quad R_2 = 1000 k\Omega \quad R_3 = 1M\Omega$$

OR

The following reading were obtained experimentally from a JFET.

$V_{GS}$	0V	0	-0.2 V
$V_{DS}$	7V	15V	15V
$I_D$	10 mA	10.25 mA	9.65 mA

Determine :

- ac drain resistance
- trans conductance
- amplification factor

3. Draw adder-subtractor circuit using EX-OR gate and full adder and explain how it perform the function of addition and subtraction.

10

OR

- Draw half adder and full adder circuit and explain it.
  - What is demultiplexer ? Explain 1 to 8 demultiplexer.
- Explain decimal to BCD encoder.

4

OR

Do 8 bit addition of decimal number (+ 87) and (- 37) using 2's complement.



4. (a) Draw neat schematic diagram of CR Tube and clearly label each parts. Explain its construction and function in short.

7

OR

Define magnetostatic deflection sensitivity of CR Tube, obtain mathematical expression for magnetostatic deflection sensitivity of CR Tube.

- (b) (i) Explain how unknown frequency can be measure using CRO.
- (ii) In a CR Tube having electric deflection system. The deflection plates are 2 cm long and have a uniform spacing of 4 mm between them. The fluorescent screen is 25 cm away from the centre of deflection plates. Calculate deflection sensitivity mm/V if the potential of a final accelerating anode is (1) 1000 V, (2) 2000 V.

7

OR

Write limitations of a zener diode regulator. Explain in detail transistor series voltage regulator.

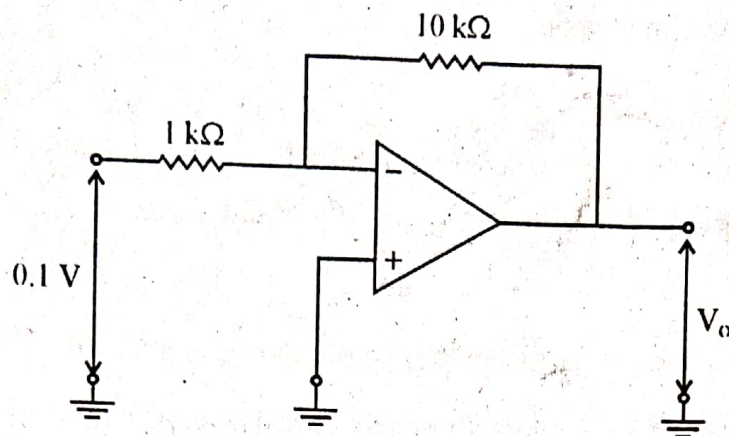
5. Give the answer in short (each of 1 mark)

14

- (1) What effect on lower cutoff and upper cutoff frequency in amplifier when positive feedback is applied ?
- (2) What is maximum value of feedback factor can be obtain when passive circuit element used in feedback network ?
- (3) What is an oscillator ?
- (4) What is the minimum voltage gain of amplifier requires in R-C phase shift oscillator ?
- (5) What is effect on saturation drain current when reverse bias voltage on gate is increase ?
- (6) What do the term unipolar and bipolar refer to ?
- (7) Define : Gate source cutoff voltage  $V_{Gsoff}$
- (8) What is the full form of CMRR ?



(9) For a given circuit



What is the value of output voltage ?

- (10) What is the largest decimal number that can be represented with an 8 bit unsigned binary number ?
- (11) What is carry flag in a microprocessor ?
- (12) What is 2's complement of 10110000 ?
- (13) What is the output resistance of ideal power supply ?
- (14) Write the name of main parts of C.R.O.