KATHMANDU UNIVERSITY
End Semester Examination
July/August 2024

Level : B.E.
Year : II
Time : 2 hrs. 30mins.

0 2 AUG 2024

Course : EEEG 211
Semester : I
F. M. : 40

SECTION "B"

[5 Q. × 8 = 40 marks]

Attempt *ANY FIVE* questions. Assume suitable data, if necessary. Symbol has their usual meaning.

1.

a. Discuss the characteristics curve of rectifier diode. Also, derive the expression of efficiency calculation for center tap full wave rectifier circuit. [2+2=4]

b. What is a clipper circuit? Draw and explain the output waveform for the circuit provided in **Fig. 1.** [2+2=4].

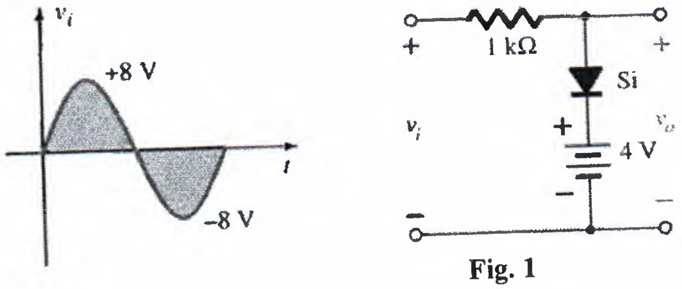

Fig. 1

2.

a. Derive the expressions of gains for, [2+2=4]
   i. Non-inverting amplifier.
   ii. Differential input amplifier.

b. In the reference **Fig. 2**, determine the output voltage (V_o) for the given op-amp circuit. [4]

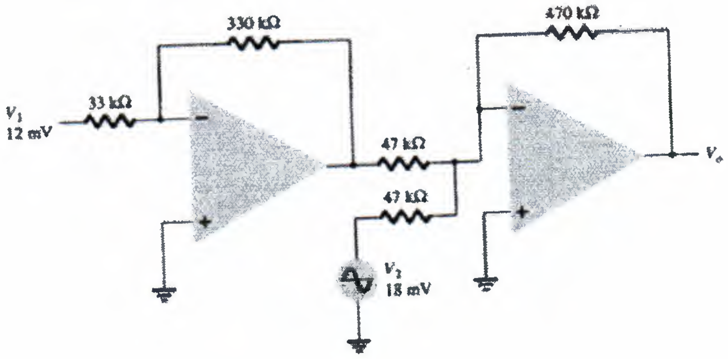

Fig. 2

P.T.O.

3.

a. For Fig. 3, $I_{CQ} = \frac{1}{2} I_{sat}$, $I_{sat} = 8mA, V_c = 18V, \beta = 100$. Determine $Rc\ , R_E, and\ R_B,$ & V_{CEQ} for **Fig.3**. [4]

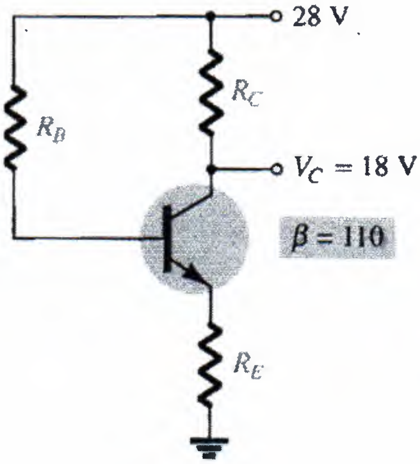

Fig. 3

b. For a single stage amplifier shown in **Fig 4**, derive the expression for the following parameters and estimate the values: [3+1=4]

   a. Determine r_e
   b. Input impedance (Z_i)
   c. Output impedance (Z_O)
   d. Voltage Gain (A_V)

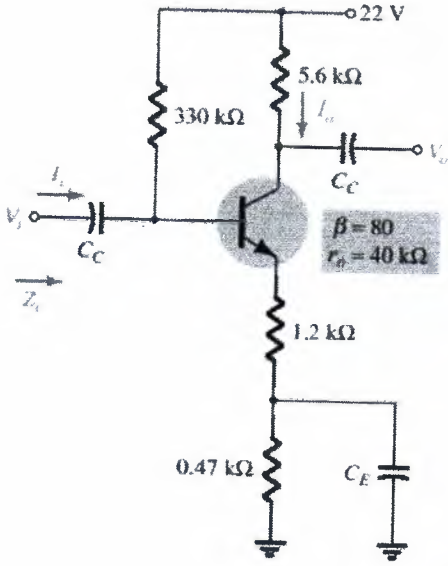

Fig. 4

4.

a. Derive the efficiency of Class A type power amplifier. How the efficiency of Class A amplifier can be increased? Discuss it with transformer coupled concept. [2+1+1=4]

b. For a class B amplifier providing a 20-V peak signal to a 16-ohm load (speaker) and a power supply of VCC = 30 V, determine the input power, output power, and circuit efficiency. [4]

5.

a. Explain the construction and working principle of n-channel E-MOSFET with its drain characteristics.

b. Determine the required values of drain current(I_D) and V_{DS} for a given circuit in **Fig.5**

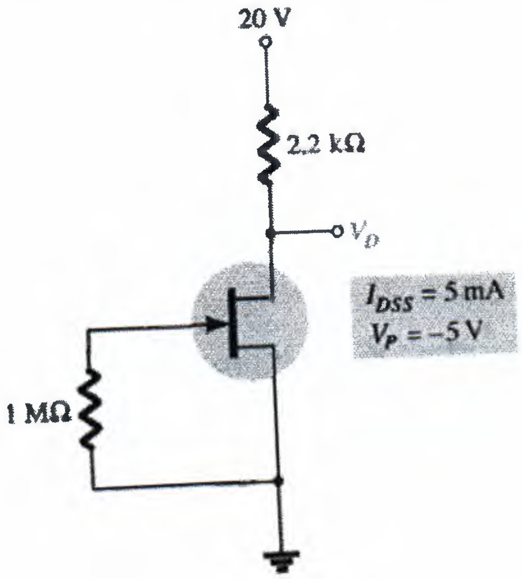

Fig. 5

[4]

6.

a. Using the information provided in **Fig. 6**, Determine I_C, V_E, V_B and R_1.

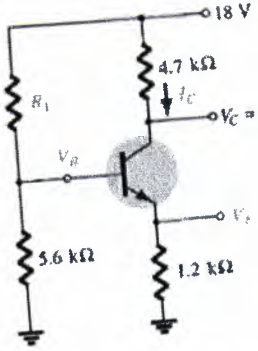

Fig. 6

[4]

b. Discuss the design procedure of low frequency amplifier using BJT.

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Marks Scored:

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Registration No.:

Time: 30 mins.

Course : EEEG 211
Semester : I
F. M. : 10
Date : 0 2 AUG 2024

SECTION "A"

[20Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate option from each set of choices. Symbols have their usual meaning.

1. P-N junction diode is used for ______.
   [ ] regulator IC
   [ ] rectifier circuit
   [ ] everywhere in circuit
   [ ] amplifier

2. Addition of pentavalent impurity to a pure semiconductor creates many ______
   [ ] free electrons
   [ ] valence electrons
   [ ] free holes
   [ ] bound holes

3. Which of the following parameter will be very high in the CB configuration of a BJT?
   [ ] current gain
   [ ] voltage gain
   [ ] input resistance
   [ ] output resistance

4. The value of Rs required for an n-channel JFET with $V_p = -10\ V, I_{DSS} = 40\ mA$, and $V_{GSQ} = -5V$ is ______.
   [ ] 500 Ω
   [ ] 750 Ω
   [ ] 1155 Ω
   [ ] 1500 Ω

5. The value of ripple factor in full wave rectifier circuit is nearly equal to ______.
   [ ] 0.41
   [ ] 0.48
   [ ] 0.82
   [ ] 1.21

6. Which of the following is NOT a necessary component in a clamper circuit?
   [ ] Resistor
   [ ] Diode
   [ ] DC supply
   [ ] Capacitor

7. The input impedance of a transistor is ______.
   [ ] very high
   [ ] high
   [ ] almost zero
   [ ] low

8. The current amplification factor in CC configuration is ____________.
   [ ] α
   [ ] $\beta+1$
   [ ] β
   [ ] γ

9. In BJT, the equation $I_C = \alpha I_E +$ ____________.
   [ ] I_B
   [ ] I_{CBO}
   [ ] I_{CEO}
   [ ] βI_B

10. In a transistor, $IC = 100\ mA\ and\ IE = 100.2\ mA$. The value of β is ______.
    [ ] about 1
    [ ] 50
    [ ] 100
    [ ] 200

11. As the temperature of a transistor goes up, the base-emitter resistance ________
    [ ] decrease
    [ ] increase
    [ ] remains constant
    [ ] fluctuates

12. NPN transistors are preferred over NPN transistors because they have_______
[ ] high mobility of holes
[ ] high mobility of electrons
[ ] high mobility of electrons compares to holes
[ ] low mobility of holes

13. The input/output relationship of CB amplifier is _______.
[ ] 180-degree [ ] 270degree [ ] 0-degree [ ] -180 degree

14. The Fig. 1 is _______.

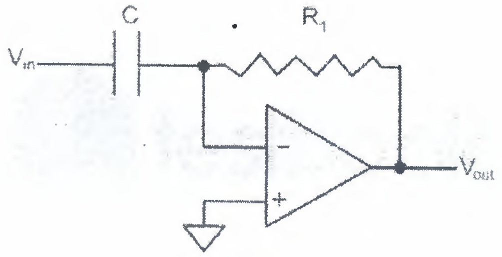

Fig. 1

[ ] an integrator circuit. [ ] differentiator circuit.
[ ] high pass filter. [ ] low pass filter.

15. The cross-over distortion does not occur in _______amplifiers.
[ ] push-pull [ ] Class B [ ] Class A [ ] Class AB

16. A power amplifier delivers 25W of ac power to a 4 ohm speaker load. If the dc input power is 40W, what is the efficiency of this amplifier? _______.
[ ] 62.5 % [ ] 78 % [ ] 50 % [ ] 25 %

17. In case of Class A amplifier, the efficiency can be increased by ________ times using transformer coupled concept.
[ ] 3 [ ] 2 [ ] 1.5 [ ] 1

18. In class B amplifier, the output current flows for________
[ ] less than half input cycle [ ] more than half input cycle
[ ] half input cycle [ ] entire input cycle

19. When a sine wave of 1 Volt peak amplitude is passed through an operational amplifier of very high gain, it converts into __________.
[ ] cosine wave [ ] square wave [ ] random wave [ ] triangular wave

20. The 'slew rate' of an operational amplifier indicates__________.
[ ] how fast its output current can be changed.
[ ] how fast its output impedance can be changed.
[ ] how fast its output power can be changed.
[ ] how fast its output voltage can be changed.