KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

Marks Scored:

Level : B.E./B.Sc.
Year : II

Course : EEEG 211
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date 30 JUN 2023

SECTION "A"

[20 Q. × 0.5 = 10 marks]

Encircle the most appropriate answer. Symbols have their usual meanings.

1. A semiconductor is formed by ______________ bonds.
   a. electrovalent   b. covalent   c. ionic   d. electronic

2. Addition of pentavalent impurity to a pure semiconductor creates many ______.
   a. free electrons   b. valence electrons   c. free holes   d. bound holes

3. During the construction of BJT, ______ is made the smallest in size.
   a. collector   b. emitter   c. base   d. gate

4. For a JFET, when V_{DS} is increased beyond the pinch off voltage, the drain current _____.
   a. remains constant   b. decreases
   c. increases   d. first decreases and then increases

5. Rectification efficiency of a full-wave rectifier without filter is nearly equal to ______.
   a. 41 %   b. 61 %   c. 71 %   d. 81 %

6. Which of the following parameters will be very high in the common base configuration of a bipolar junction transistor?
   a. current gain   b. voltage gain   c. input resistance   d. output resistance

7. The input impedance of a transistor is ______.
   a. very high   b. high   c. almost zero   d. low

8. The current amplification factor in CE configuration is ___________.
   a. α b. $\beta+1$ c. β d. γ

9. In BJT, the equation $I_C = \alpha I_E +$ ___________.
   a. I_B b. I_{CBO} c. I_{CEO} d. d. βI_B

10. Bipolar Junction Transistors (BJTs) are _____.
    a. gated controlled devices   b. voltage controlling devices
    c. both (a) and (b) are correct   d. current controlling devices

11. The common collector amplifier is also known as ________

a. collector Follower
b. base Follower
c. emitter Follower
d. source Follower

12. NPN transistors are preferred over NPN transistors because they have_______.

a. high mobility of holes
b. high mobility of electrons
c. high mobility of electrons than holes
d. low mobility of holes

13. For BJT to act as an amplifier, which operating region is preferred?

a. linear
b. cut-off
c. saturation
d. threshold

14. Which of the following statements is **INCORRECT** for an ideal Op-Amp?

a. input current is zero
b. output resistance is infinite
c. input resistance is infinite
d. gain is infinite

15. The cross-over distortion behavior characteristics is shown in _______.

a. Class A amplifier
b. Class B amplifier
c. Class AB amplifier
d. Class C amplifier

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? ________.

a. 62.5 %
b. 78 %
c. 50 %
d. 25 %

17. In Class-A amplifier, the output current flows for _________.

a. a part of the cycle or the input signal
b. the full cycle of the input signal
c. half the cycle of the input signal
d. ¾th of the cycle of the input signal

18. The maximum efficiency of Class A amplifier is ______, when output is coupled by transformer.

a. decreased by half
b. increased by 25%
c. increased by 50%
d. increased by 100%

19. When a sine wave of 1 Volt peak amplitude is passed through an operational amplifier of very high gain, it converts into ___________.

a. cosine wave
b. square wave
c. random wave
d. triangular wave

20. If a capacitor is placed in the feedback path of an op-amp circuit, then the circuit acts as ___________.

a. integrator
b. differentiator
c. subtractor
d. inverting-divider

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SECTION "B"

[5Q × 8 = 40 marks]

Attempt *ANY FIVE* questions. Symbols have their usual meanings. Assume suitable data if necessary.

1.

a. Discuss the operation of 6-0-6 full-wave rectifier circuit and calculate its efficiency.

b. Explain the operation of positive clamper circuit with waveform.

2.

a. Determine Rc , R_E, R_B, & V_{CEQ} for Figure1.

b. Draw one common emitter type single stage voltage divider amplifier and derive the expression for the following parameters:
   i. Input impedance (Z_i)
   ii. Output impedance (Z_O)
   iii. Voltage Gain (A_V)

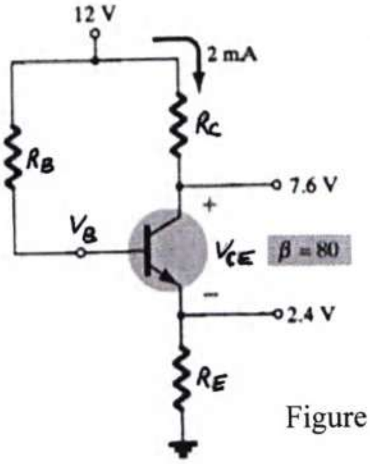

Figure 1

3.

a. Explain the construction and working principle of D-MOSFET with its drain characteristics.

b. Determine the required values of R_D and R_S for a given circuit in Figure 2 to maintain the drain current of 2.5 mA.

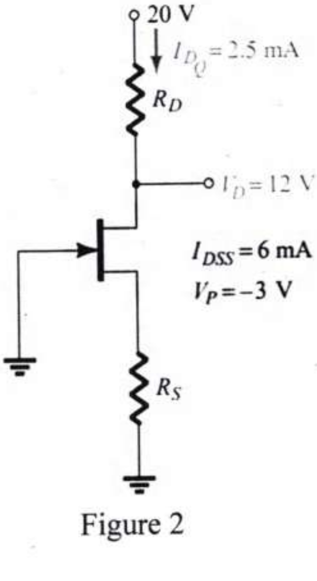

Figure 2

4.

a. Using the information provided in Figure 3, Determine I_C, V_E, V_B and R_1

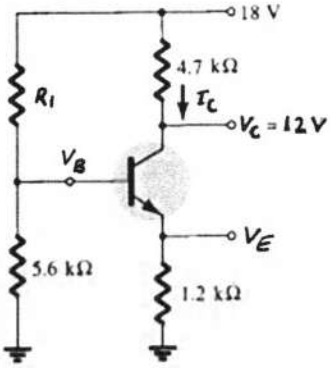

Figure 3

b. Design an amplifier circuit having gain of 10, using BJT transistor.

5.

a. Draw and explain the circuit diagram of transformer coupled class-A NPN power amplifier. Discuss about the cross-over distortion problem.

b. Derive the expression for efficiency of transformer-coupled class B amplifier. For a class B amplifier using a supply of $V_{CC} = 30V$ and driving a load of 8 Ω, determine the maximum input power, output power and efficiency.

6.

a. Discuss any four ideal characteristics of Op-Amp. Derive the expression for integrating operational amplifier.

b. Design an n-number of input summer operational amplifier-based circuit to obtained $V_O = 20(V_1 + V_2 + V_3 + V_2 + ... + V_n)$, where, V_O is the output, V_1, V_2 and V_3 are three inputs.