



K24U 0741

Reg. No. : .....

Name : .....

**IV Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/Improvement) Examination, April 2024  
(2019 to 2022 Admissions)  
CORE COURSE IN PHYSICS  
4B04PHY : Electronics – I**

Time : 3 Hours

Max. Marks : 40



Short answer questions. Answer **all** questions. **Each** question carries **1** mark. **(6×1=6)**

1. Is Zener voltage same as knee voltage for a Zener diode working in reverse bias ? If not, explain why ?
2. List out some applications of a BJT.
3. Comment on the relevance of Q-point.
4. For the circuit of Figure 1, determine  $I_D$  and  $V_{DS}$ . Given  $I_{DSS} = 40 \text{ mA}$ ,  $V_{GS(off)} = -4 \text{ V}$ ,  $V_{DD} = 26 \text{ V}$ ,  $V_{GG} = -2 \text{ V}$ ,  $R_G = 220 \text{ k } \Omega$ ,  $R_D = 1.2 \text{ k } \Omega$ .

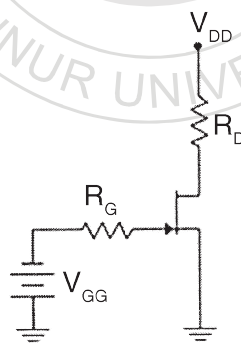


Figure 1

5. Recall how to obtain the original binary number from the 2's compliment.
6. Draw the logic symbol of any one universal gate.

P.T.O.



## PART – B

Short essay questions. Answer **any 6** questions. **Each** question carries **2** marks.

(6×2=12)

7. Discuss the parameter ripple factor. How does its value vary between full wave and half wave rectifiers ?
8. List the important features of a BJT.
9. Illustrate the CC configuration for BJT using circuit diagram.
10. Which are the different types of JFET ?
11. Explain the self-bias condition in a JFET.
12. Justify how BCD coding is different than normal binary representation.
13. Does binary addition give similar answer as normal decimal addition ? Show with example of adding decimal 2 and 3.
14. Write down the following laws in Boolean algebra :
  - a) Idempotent Law
  - b) Identity Law
  - c) Commutative Law
  - d) Associative Law.

## PART – C

Problems, answer **any 4** questions. **Each** question carries **3** marks.

(4×3=12)

15. Determine the diode and resistor voltages for the circuit (Figure 2). Assume  $V_D = 0.7$  V.

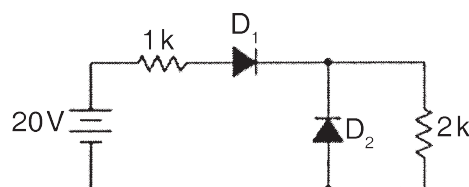


Figure 2

16. In a BJT,  $I_B = 68 \mu\text{A}$ ,  $I_E = 30 \text{ mA}$  and  $\beta = 440$ . Determine the  $\alpha$  rating of the transistor. Then determine the value of  $I_C$  using both the  $\alpha$  rating and  $\beta$  rating of the transistor.



17. For Figure 3, determine  $I_D$  and  $V_{DS}$ .  $I_{DSS} = 16 \text{ mA}$ ,  $V_{DD} = 25 \text{ V}$ ,  $V_{GS(off)} = -3\text{V}$ ,  $V_{SS} = -9\text{V}$   $R_G = 680 \text{ k}\Omega$ ,  $R_S = 2\text{k}\Omega$ ,  $R_D = 2.7\text{k}\Omega$ .

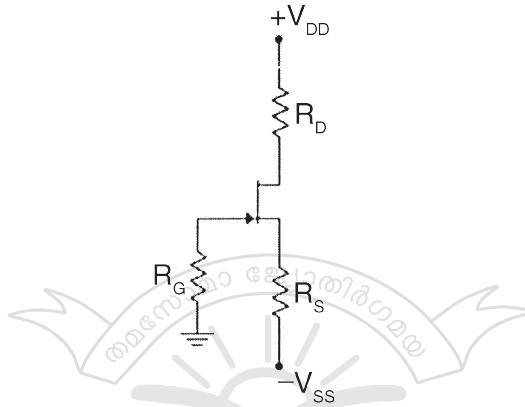


Figure 3

18. Convert the numbers  $(137.24)_8$ ,  $(5230.17)_8$  into decimal format.
19. Draw circuits using logic gate symbols for the following Boolean expressions :
- a)  $Q = \bar{A} + BC(D\bar{A})$
  - b)  $Q = \overline{A(\bar{BC})} + B\bar{A} + C$
  - c)  $Q = \overline{A + B + C} + BC\bar{A}$
20. Using Boolean algebra simplify the expression :  $BC + B(C+A) + C(C+B)$ .

PART – D

Long essay questions. Answer **any 2** questions. **Each** question carries **5** marks.

**(2x5=10)**

21. Elaborate on the working of Zener diode as a voltage regulator. Demonstrate with suitable diagrams and mathematical expressions. List out other applications of Zener diode.
22. Explain the DC load line and bias point in a BJT. Show how BJT can be employed in switching circuits using diagrams.
23. Compare the basic bias circuits of a JFET in detail with circuit diagrams.
24. Justify the importance of binary arithmetic for digital electronics. What is the underlying concept for using binary arithmetic ? Discuss the significance of signed numbers and 2's complement in subtraction.