



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

PART – A

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

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

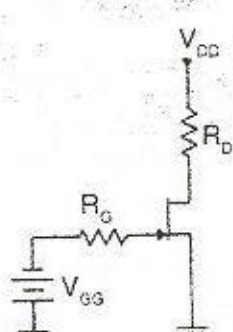


Figure 1

- Recall how to obtain the original binary number from the 2's complement.
- 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)

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

PART – C

Problems, answer **any 4** questions. **Each** question carries 3 marks. (4×3=12)

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

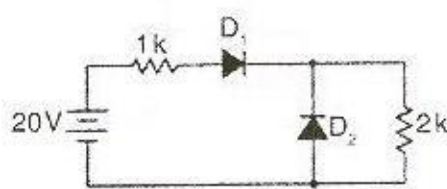


Figure 2

- In a BJT, $I_B = 68$ μ A, $I_E = 30$ mA and $\beta = 440$. Determine the α rating of the transistor. Then determine the value of I_C using both the α rating and β rating of the transistor.



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

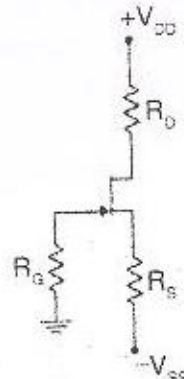


Figure 3

- Convert the numbers $(137.24)_8$, $(5230.17)_8$ into decimal format.
- Draw circuits using logic gate symbols for the following Boolean expressions :
 - $Q = \bar{A} + BC(D\bar{A})$
 - $Q = A(\overline{BC}) + B\bar{A} + C$
 - $Q = \overline{A + B + C} + BC\bar{A}$
- 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. (2×5=10)

- 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.
- Explain the DC load line and bias point in a BJT. Show how BJT can be employed in switching circuits using diagrams.
- Compare the basic bias circuits of a JFET in detail with circuit diagrams.
- 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.