K23U 1137

Reg. No. : ....

Name : ....

IV Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, April 2023
(2019 Admission Onwards)
CORE COURSE IN PHYSICS
4B04PHY : Electronics – I

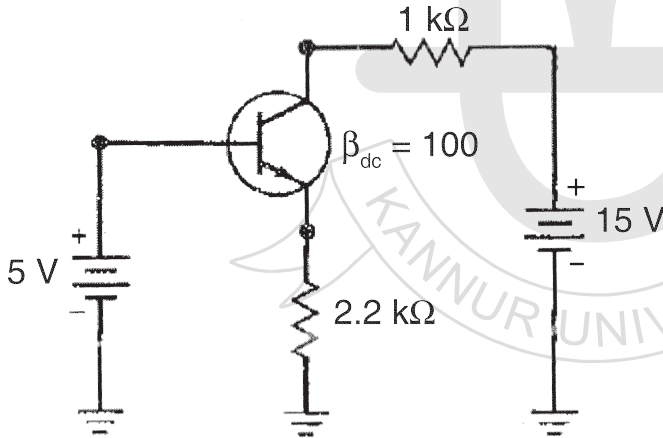Time : 3 Hours   Max. Marks : 40

PART – A

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

1. What is a Zener diode used for ?

2. Using second diode approximation find the collector current in the given circuit.

3. What is a switching circuit and what is its application ?

4. What is the difference between JFET and BJT ?

5. What is the purpose of using Gray code in digital circuits ?

6. How can a NAND gate be used as a universal gate in digital logic circuits ? **(6×1=6)**

PART – B

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

7. Explain the difference between the ideal diode model and the piecewise linear diode model.

8. What is the purpose of biasing in a BJT circuit ?

9. Explain the operation of a BJT amplifier in the common emitter configuration.

10. What is the difference between a JFET and a MOSFET ?

11. Explain the operation of an E-MOSFET.

12. Convert the decimal number 45 to binary, and hexadecimal numbers.

13. What is ASCII code and how is it used in computing ?

14. What is the universal property of NAND and NOR gates and how can it be used to simplify logic circuits ? **(6×2=12)**
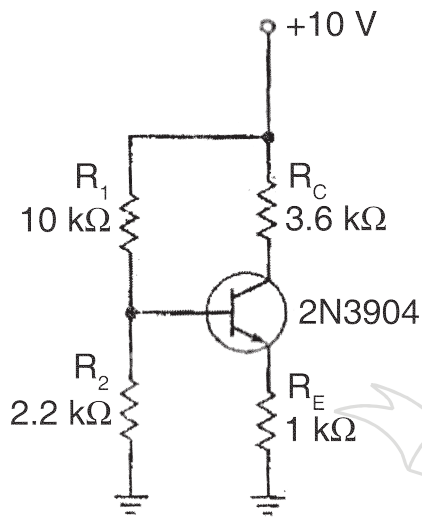
PART – C

(Problems, Answer **any 4** questions. **Each** question carries **3** marks.)

15. Calculate the load voltage, load current and diode power in the given figure using diode second approximation.
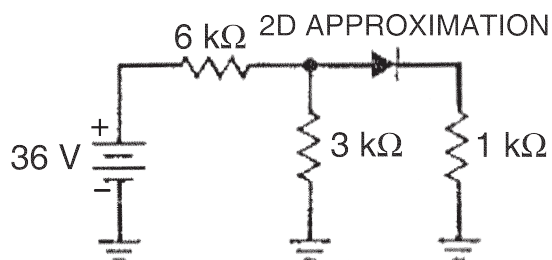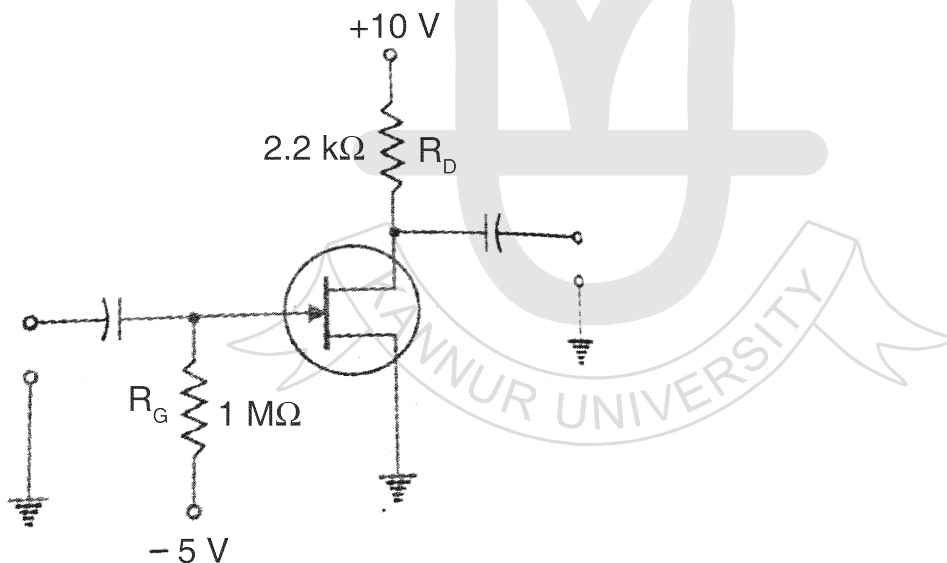
16. Calculate the collector-emitter voltage in the circuit below.

17. A JFET in the below circuit has values $V_{GS(off)} = -8$ V and $I_{DSS} = 16$ mA. Determine the values of V_{GS}, I_D and V_{DS} for the circuit.

18. Perform the subtraction 1011 – 0101 using 2's complement representation.

19. Using Boolean algebra techniques, simplify the expression
    AB + A(B + C) + B(B + C).

20. Implement the following Boolean expression using only NOR gates :
    F = A + BC.   (4×3=12)

PART – D

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

21. Explain with schematic diagram, the working principle of a half-wave rectifier and its limitations. How can these limitations be overcome ?

22. Explain the characteristics and working principle of common collector configuration in a bipolar junction transistor amplifier. What are the advantages and disadvantages of using a common collector configuration in BJT amplifiers ?

23. Explain the operation of a MOSFET and compare it to a BJT.

24. Explain the concept of binary arithmetic and how it is used in digital electronics. Discuss the significance of signed numbers and the use of 2's complement in performing subtraction. **(2×5=10)**

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