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18ELN14/24

First/Second Semester B.E. Degree Examination, July/August 2022
Basic Electronics

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the diode characteristics under forward and reverse biased condition with neat diagram. **(06 Marks)**

b. What is a voltage regulator? Explain with a neat diagram the working of a zener voltage regulator. **(06 Marks)**

c. With a neat diagram and waveforms, explain the working of a bridge rectifier. Derive the efficiency of this rectifier. **(08 Marks)**

OR

2 a. Explain the working of a centre tap full wave rectifier, with a neat diagram and waveform. Derive the ripple factor for it. **(08 Marks)**

b. What is an LED? Explain the working of an LED, with a neat diagram. **(06 Marks)**

c. In the zener voltage regulator, $V_Z = 10V$, $R_S = 1\ K\Omega$, $R_L = 2\ K\Omega$. If the input voltage V_i is varied from 22 V to 40 V, find the maximum and minimum value of zener current. [Refer Fig.Q2(c)]

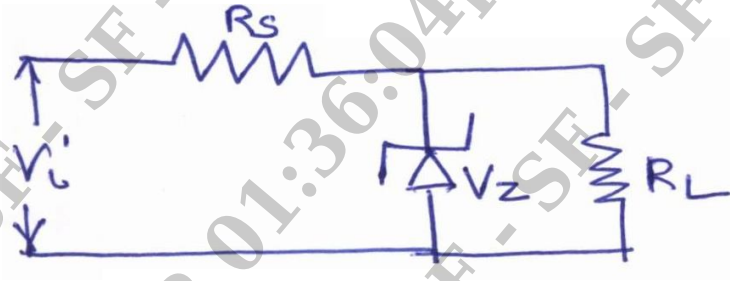

Fig.Q2(c) **(06 Marks)**

Module-2

3 a. With a neat graph for the drain characteristics of an N channel JFET, explain the following:
(i) Cut-off voltage (ii) ohmic region
(iii) Pinch off voltage (iv) Break-down **(08 Marks)**

b. What is commutation? Explain one method of commutation of an SCR with neat diagram. **(06 Marks)**

c. For an n channel JFET, $I_{DSS} = 9$ mA and $V_{GS(off)} = -8$ V (maxm), using these values determine the drain current for VGS = 0V; –1 V, and –4 V. **(06 Marks)**

OR

4 a. With neat circuit diagrams, explain the construction and operation of an enhancement type MOSFET. **(08 Marks)**

b. How is CMOS used as an inverter? Explain with neat diagram. **(06 Marks)**

c. Explain the switching action of an SCR using two transistor model. **(06 Marks)**

Module-3

5 a. With neat diagrams and explanation analyze a differential input op-amp amplifier. **(06 Marks)**

b. With respect to an op-amp, explain the following and give their ideal values:
(i) CMRR
(ii) PSRR
(iii) Input offset voltage
(iv) Input offset current **(08 Marks)**

c. With relevant diagram and derivation show how an op-amp can be used as inverting summing amplifier (Adder). **(06 Marks)**

OR

6 a. Explain how an op-amp can be used as a difference amplifier with neat diagram. **(08 Marks)**

b. For the circuit of the inverting amplifier shown in Fig.Q6(b), calculate the following:
(i) Closed loop gain A_f (ii) Output voltage V_0
(iii) Input current I_1 (iv) Feedback current I_f

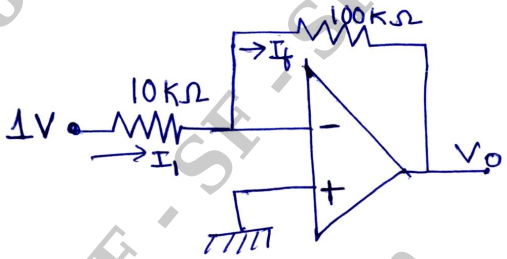

Fig.Q6(b) **(06 Marks)**

c. For the circuit Fig.Q6(c), calculate the output voltage of V_{01} and V_{02}.

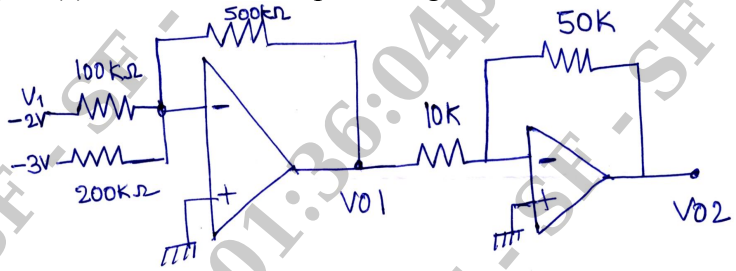

Fig.Q6(c) **(06 Marks)**

Module-4

7 a. How does a transistor voltage amplifier work? Explain and also derive the equation for voltage gain. **(08 Marks)**

b. With relevant diagrams and equations, explain the concept of positive and negative feedback amplifier concept. **(06 Marks)**

c. Determine the voltage gain and the ac output voltage if r′e = 50 Ω for the circuit shown in Fig.Q7(c). What value of R_C will get a voltage gain of 50?

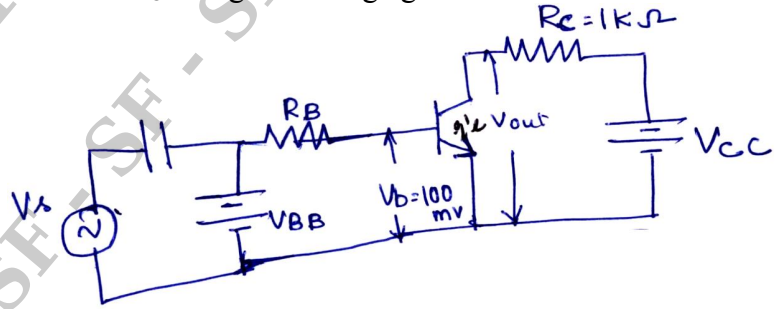

Fig.Q7(c) **(06 Marks)**

OR

8 a. How does a transistor function like a switch? Explain with relevant diagrams. **(06 Marks)**

b. With a neat circuit diagram, explain RC phase shift oscillator. Write the equation for the frequency of oscillation. **(08 Marks)**

c. With relevant diagram, explain the internal block diagram of IC 555 Timer. **(06 Marks)**

Module-5

9 a. Realize a full adder using two half adders. Derive the expression for sum and carry. **(08 Marks)**

b. Convert the following as indicated:

(i) $(FACE)_{16} = (\quad)_2$

(ii) $(1001101)_2 = (\quad)_8$

(iii) $(126)_8 = (\quad)_{10}$

(iv) $(1689)_{10} = (\quad)_{16}$ **(08 Marks)**

c. Subtract 11010 from 10111 using 2's complement method. **(04 Marks)**

OR

10 a. With a neat circuit diagram, explain the block diagram of a GSM system. **(08 Marks)**

b. Explain the working of a RS latch with neat diagram and function table. **(06 Marks)**

c. Prove the following identities using truth table:

(i) $\overline{A \cdot B} = \overline{A} + \overline{B}$

(ii) $A \cdot (A + B) = A$ **(06 Marks)**

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