

B.Tech-1st
Basic Electronics

Full Marks : 50

Time : $2\frac{1}{2}$ hours

Answer all questions

The figures in the right-hand margin indicate marks

Symbols carry usual meaning

Any supplementary materials to be provided

1. Answer *all* questions : 2×5

(a) Find the PIV requirement of diodes employed in center-tapped full wave rectifier circuit.

(b) Discuss the transfer characteristic of JFET.

(c) Analyze the influence of negative feedback on gain of an amplifier.

(2)

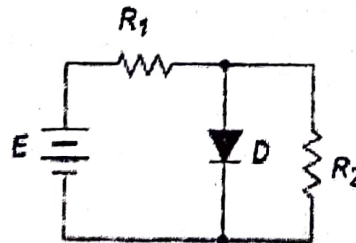
- (d) Find the decimal number whose signed magnitude representation is 1110.
- (e) What is the purpose of control grid and deflecting plates in the cathode ray tube ?

2. (a) Draw and compare the V-I characteristics of Ge diode and ideal diode. Are threshold voltage and break down voltage same for a diode ? 4

(b) Find the current through R_1 , R_2 and voltage across R_1 , R_2 . Given $E=10$ V, $R_1 = 1$ K Ω , $R_2 = 3$ K Ω . Assuming diode (D) to be 4

(i) Ideal Diode

(ii) Ge Diode



(3)

Or

(a) What do you understand by biasing in a transistor ? Based on biasing discuss various region of operation of transistor and mention their application. 4

(b) The β value for a transistor in common base configuration is 110. Find the collector current (I_C). Given the emitter current (I_E) is 13 mA and I_{CBO} is 250 μ A. 4

3. (a) Explain the construction and operation principle of D-MOSFET. 4

(b) Explain the fabrication process of monolithic IC for NPN transistor in detail. 4

Or

(a) Write the current equations (I_D) for JFET and E-MOSFET. For given $I_{DSS} = 15$ mA, $V_P = -3$ V, find the drain current (I_D), source current (I_S) and gate current (I_G) in a JFET when $V_{GS} = -2$ v. 4

(4)

(b) What do you understand by IC and VLSI ? Discuss limitations of VLSI in detail.

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4. (a) Explain the concept of feedback with suitable diagram. Compare positive feedback and negative feedback. Mention the advantages of negative feedback.

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(b) Define CMRR and Slew rate for an Op-Amp. Determine the output voltage of an Op-Amp if the input voltages are $V_1 = 150\mu\text{V}$, $V_2 = 140\mu\text{V}$. Given $A_d = 4000$ and $\text{CMRR} = 1000$.

4

Or

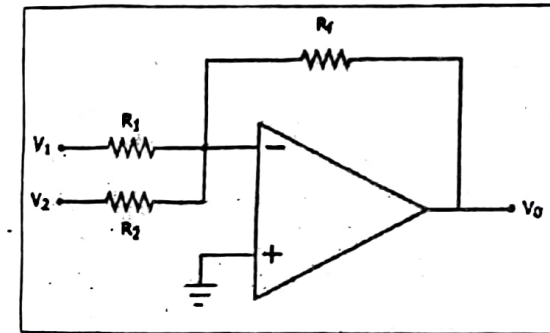
(a) Describe four different topologies of feedback amplifier with block diagrams having all required notations.

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(b) Write the characteristics of practical Op-Amp. For the circuit below find the output voltage V_o . Given $V_1 = 2.5\text{ V}$, $V_2 = 1.8\text{ V}$, $R_1 = 2.5\text{ K}\Omega$, $R_2 = 5\text{ K}\Omega$, $R_f = 25\text{ K}\Omega$.

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(5)



5. (a) (i) Compute the equivalent decimal number of $(A0.5)_{16}$, $(565.10)_8$.

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(ii) Divide the binary number 1101.11 with 11.

(b) Explain the rules for binary subtraction using 1's and 2's complement methods with suitable examples.

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Or

(a) Simplify the expression (Y1 and Y2) and draw logic circuit for the simplified expression :

4

(i) $Y1 = ABC + ABC' + AB'C + AB'C' + A'B'C$

(ii) $Y2 = AB + A'C + BC$

- (b) Which gates are called as universal gate and why ? Implement NOR, Ex-OR and AND gates using minimum number of NAND gates. 4
6. (a) Provide a detailed explanation of how a digital storage oscilloscope differs from a Cathode ray oscilloscope. 4
- (b) Explain how a wave form is getting displayed in the CRO screen. 4

Or

- (a) Explain the working of CRT with a neat diagram. 4
- (b) Why modulation is essential ? Make a comparison between various modulation schemes. 4
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