

2023
B.E. (Electronics and Communication Engineering)
First Semester
EC-103: Introduction to Electronics

Time allowed: 3 Hours

Max. Marks: 50

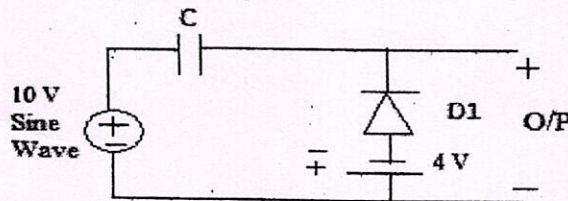
NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section. Use of scientific calculator is allowed.

x-x-x

1. Answer the following:-
- (a) Why the doping of collector region in BJT is kept moderate? (1)
 - (b) What is the difference between Work function and Ionization energy of a crystal lattice? (1)
 - (c) Which type of materials are preferred for the high speed electronic devices and why? (1)
 - (d) Why semiconductors have negative temperature coefficient of resistance? (1)
 - (e) Two ceramic capacitors with markings 102 and 103 are connected in parallel. Find the effective capacitance value. (1)
 - (f) What is the difference between steady state and equilibrium condition? (1)
 - (g) Write the formulae for RMS current in Half wave rectifiers. (1)
 - (h) Explain the difference between dc load line and ac load line. (1)
 - (i) Which configuration is used as a last stage in multistage amplifier and why? (1)
 - (j) Write any four applications of Electronics in Defence sector. (1)

SECTION A

2. (a) Find the output voltage waveform of the circuit shown below - (5)



- (b) With appropriate circuit diagram explain the DC load line analysis of semiconductor diode. (5)
3. (a) Draw the voltage divider bias circuit and also find the expressions for operating point in terms of circuit parameters like I_C , V_{CE} and I_B ? (5)
- (b) Discuss diffusion capacitance of PN junction diode. Obtain an expression for the same. (5)
4. Discuss Zener Diode as a Voltage Regulator. Design Zener voltage regulator for the following specifications: Input Voltage= $10V \pm 20\%$, Output Voltage= $5V$, $I_L=20mA$, $I_{zmin}=5mA$ and $I_{zmax}=80mA$ (10)

SECTION B

5. In a full wave rectifier, the input is from 30-0-30V transformer. The load and diode forward resistances are 100Ω and 10Ω respectively. Calculate the average voltage, dc output power, ac input power, rectification efficiency and percentage regulation. (10)
6. (a) For a PNP transistor the base current and collector current are $45\mu A$ and $5.45mA$ respectively. Determine (i) values of α , β and (ii) base current required to make collector current of $10mA$. (5)
- (b) In a common source amplifier, drain resistance $R_D = 5k\Omega$, $\mu = 50$ and $r_d = 35k\Omega$. Evaluate voltage gain and output resistance. (5)
7. (a) Determine the operating point for a silicon transistor biased by base bias method with $\beta = 100$, $R_B = 500K\Omega$, $R_C = 2.5K\Omega$ and $V_{CC} = 20V$. Also draw the DC load line (5)
- (b) A silicon diode has $I_S = 20nA$ operating at $25^\circ C$. Calculate I_D for a forward bias of $0.6V$. (5)