



BRAC University

Semester: Summer, 2025

CSE 251(Section:10)

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| Assignment: 3 | Deadline: 20 August,2025 | Marks: 100 |
| Q1-Q4: C03 | | |

1. Discuss in brief with necessary plots how HW and FW rectifier works [20]
2. Suppose, the AC input voltage $V_{in} = 20 \sin 100\pi t$ V is an input to a Half-Wave rectifier with a load resistance of $10\text{ k}\Omega$. Assume that the rectifier is designed with a diode whose forward voltage drop is 0.7 V. [30]

i) What is the peak value of the output? Plot the rectified voltage approximately labelling both axes and then also plot VTC of this rectifier.

ii) What is the DC Component/Average-Value of the output voltage?

Now, suppose a smoothing capacitor of $5\mu\text{F}$ is connected in parallel with the load given above.

iii). What will be the frequency of the ripple that is formed?

iv) What is the peak-to-peak and rms value of the ripple voltage? Plot the rectified voltage approximately labelling both axes.

v) What is the DC-Component of the output after connecting the capacitor?

vi) What value of capacitor should we connect if we want a peak-to-peak ripple of 0.05V?

vii) What value of capacitor should we connect if we want a $V_{out} = V_{dc} \pm 0.05$ V?

viii) What value of capacitor should we connect if we want a peak-to-peak ripple of 2% of output peak voltage

3. Repeat Question no 3 for a full wave rectifier.

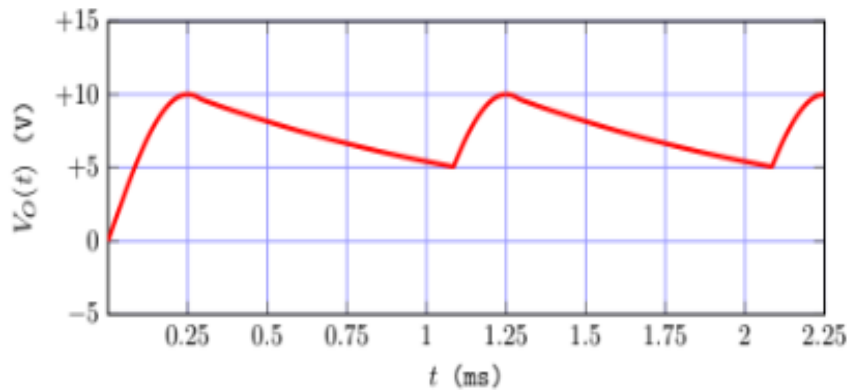
[30]

4). (i), (ii), (iii) are interlinked

(20)

(i)

(d) [4 marks] Analyze the graph of the output voltage waveform of a rectifier circuit in *Figure-3*, and calculate the output frequency, f_{out} & average output voltage, V_{avg} (i.e. dc value of the output voltage, V_{dc}).



(ii) If the AC input was of 500 Hz frequency, comment on what type of rectifier is shown in above question. If the diode on voltage is 0.6V then write the input AC voltage expression and rectifier circuit.

iii) If the load is a 10 K-Ohm resistor then find the value of the capacitor for above rectifier output .