



SNS COLLEGE OF ALLIED HEALTH SCIENCES- COIMBATORE 35



DEPARTMENT : RADIOGRAPHY AND IMAGNG TECHNOLOGY

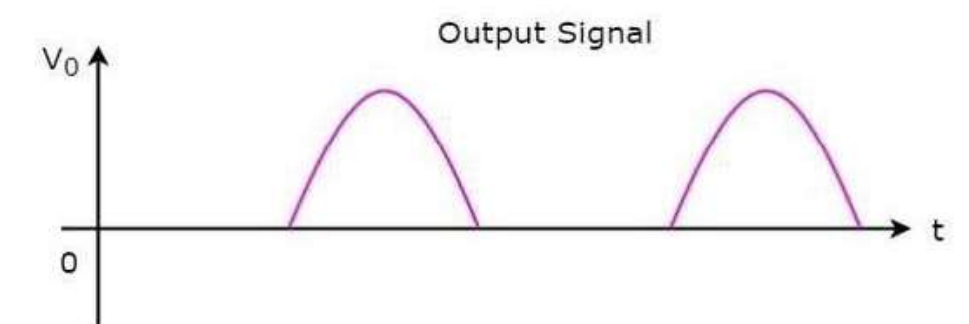
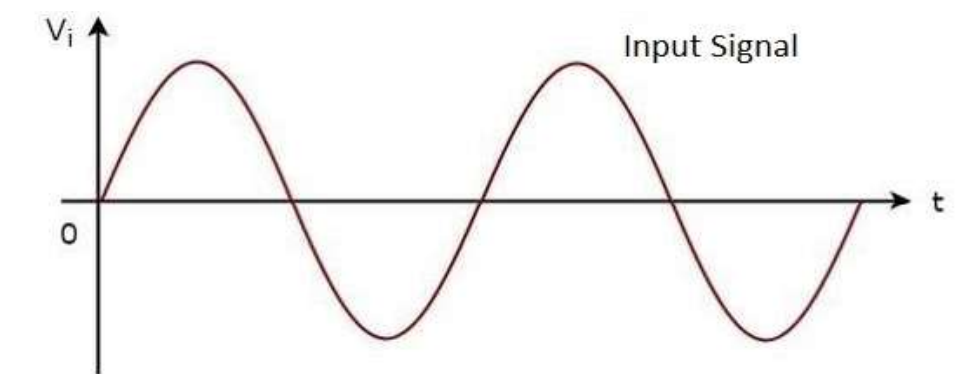
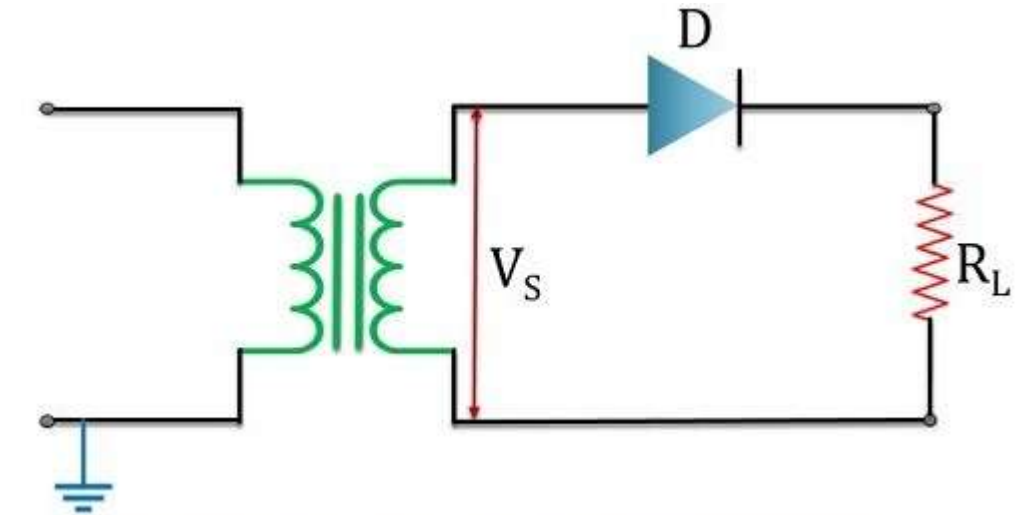
SUBJECT : GENERAL PHYSICS, RADIATION PHYSICS AND PHYSICS OF
DIAGNOSTIC RADIOLOGY

PAPER : PAPER II (UNIT 5 – PHYSICS OF DIAGNOSTIC RADIOLOGY : X-ray TUBE)

TOPIC : 2. HALF WAVE AND FULL WAVE RECTIFIER

HALF WAVE RECTIFIER

- Vacuum tube diodes or solid state (semiconductor) diodes can be used for rectification. In a half wave rectifier, a single diode is used, as shown in the Figure.
- An alternating voltage is applied to the diode as input. The output is obtained across the resistance R_L .
- When the plate is positive, the diode will allow the current to flow. When the plate is negative, the diode will not allow the current.
- Therefore, the diode will allow the current only during those half cycles when the plate is positive. Hence, the output current is always in one direction.
- This circuit is known as half wave rectifier and it is mainly used in mobile and dental X-ray units. A single solid state diode cannot prevent reverse current at higher voltages. Hence, many diodes are placed in series in a stick to do rectification.



FULL WAVE RECTIFIER

- In the half wave rectifier, the input voltage is used only in one half of the cycle.
- The other half of the cycle is not used.
- Therefore, there is a need for a rectifier, which will use the full cycle of the input.
- This is possible by having two or more number of diodes, as shown in the Figure.
- The alternating voltage is applied between A and B. The output is obtained across the resistance R.

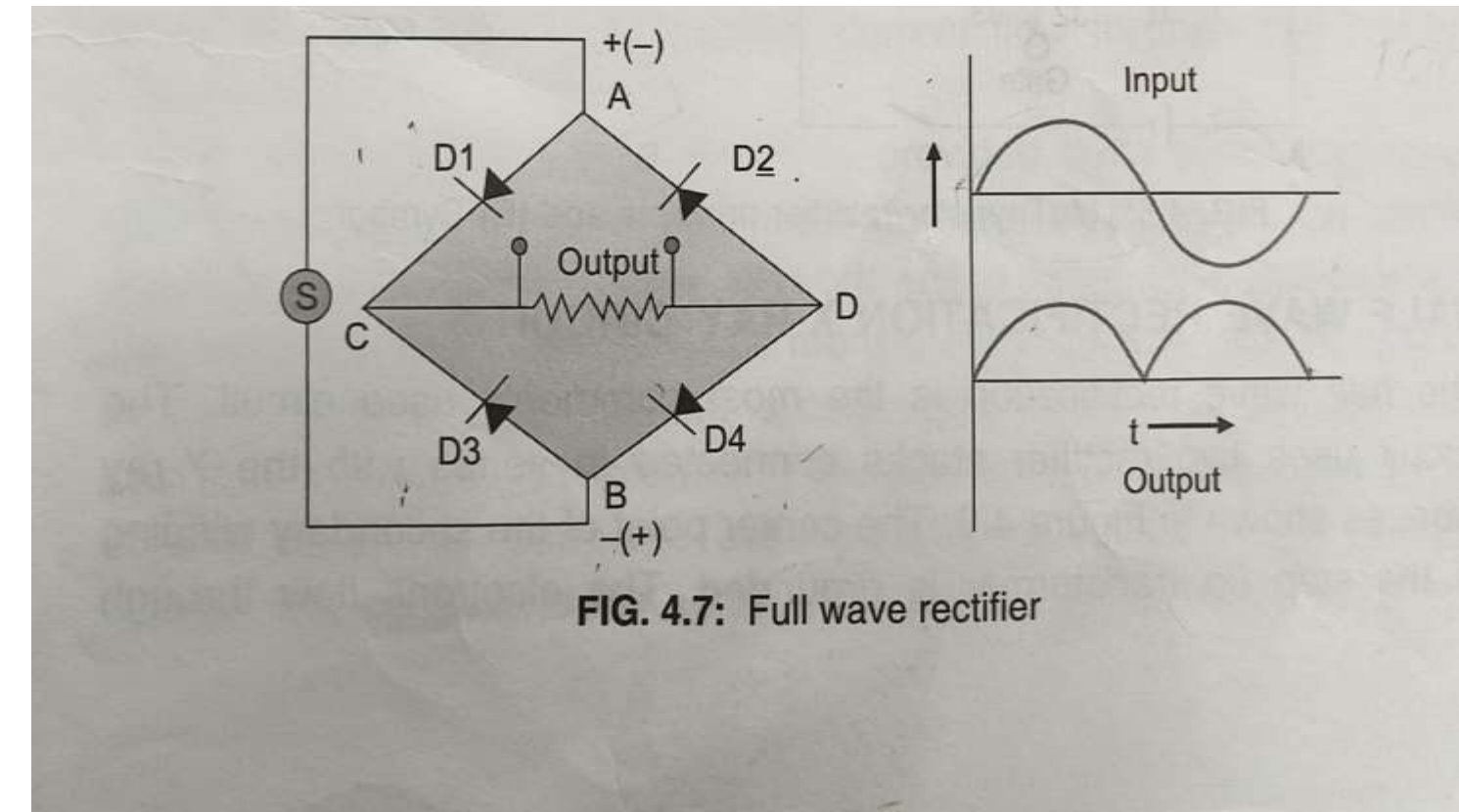


FIG. 4.7: Full wave rectifier

FULL WAVE RECTIFIER

- When end A is positive, D1 and D4 will conduct and a current flows through R.
 - During the next half of the cycle end A is negative, and end B is positive. Now, the diodes D2 and D3 will conduct and a current flows through R.
 - Thus, the current flows through the resistance R during full cycle of the input voltage, in the same direction.
 - X-rays are produced in two pulses per cycle, irrespective of the polarity of the transformer.
 - Three phase generator employ multiple rectifiers in the secondary circuit
- Full wave rectifiers are used in high end X-ray tubes which employ rotating anode X-ray tubes.

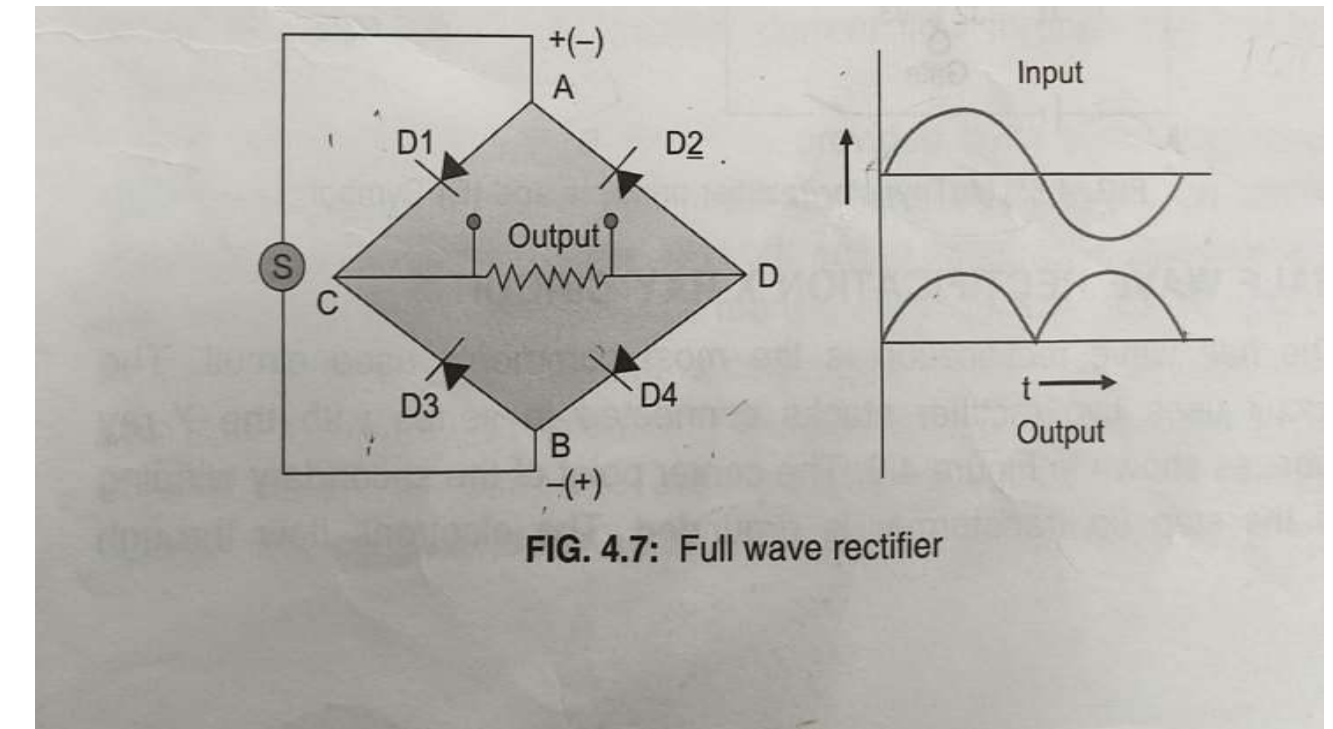
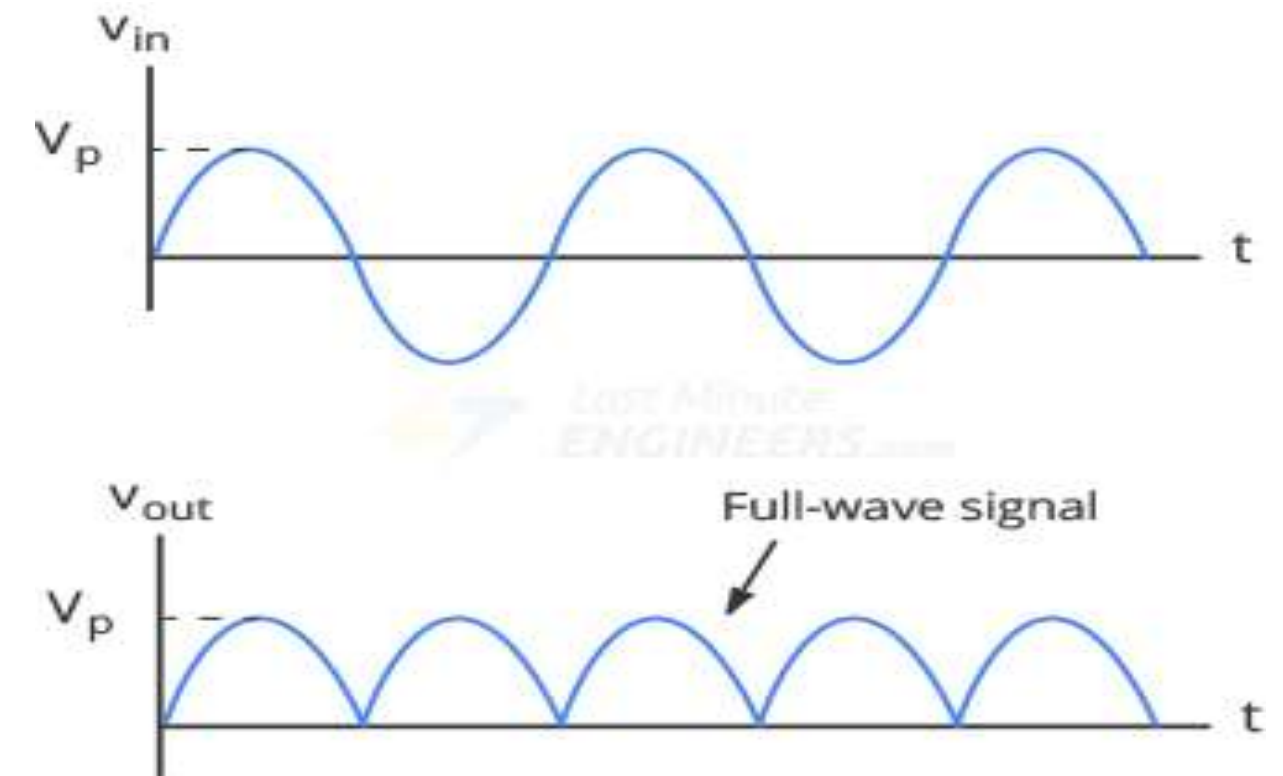


FIG. 4.7: Full wave rectifier





INTERROGATIONS



1. Use of full wave and half wave rectifier
2. Working principle of full wave rectifier
3. Applications of full wave rectifier



INTERROGATIONS



1. What is Attenuation ?
2. What is Absorption ?
3. What is Scattering ?



REFERENCES

1. Physics for Radiography - Hay and Hughs
2. Ball and mores essential physics radiographers, IV edition, Blackwell publishing.
3. Basic Medical Radiation physics – Stanton.
4. Christensen's Physics of Diagnostic Radiology – Christensen.
5. The physics of Radiology and Imaging – K Thayalan.



THANK YOU