

# 11.2 Power Generation & Transmission

## Question Paper

Course	DPIB Physics
Section	11. Electromagnetic Induction (HL only)
Topic	11.2 Power Generation & Transmission
Difficulty	Medium

**Time allowed:** 20  
**Score:** /10  
**Percentage:** /100

### Question 1

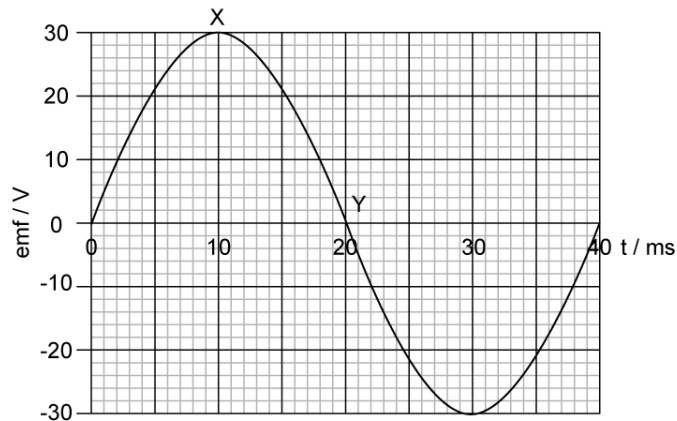
Two identical resistors  $R$  are connected in parallel to an ac power supply with root mean squared (rms) voltage which provides rms current,  $I$ . What is the maximum power developed in one of the resistors in the circuit?

- A.  $\frac{IV}{\sqrt{2}}$
- B.  $IV$
- C.  $\sqrt{2}IV$
- D.  $2IV$

[1 mark]

### Question 2

A square loop of conducting wire is rotated at a constant rate in a region of magnetic field. The graph shows the variation with time  $t$  of the induced emf in the loop during one cycle.



The resistance of the coil is  $10.0 \Omega$ . Which of the following values gives the average power dissipated in the loop?

- A. 90 W
- B. 45 W
- C.  $\frac{90}{\sqrt{2}}$  W
- D.  $90\sqrt{2}$  W

[1 mark]

### Question 3

What is the maximum instantaneous power delivered by a sinusoidal ac power supply with rms voltage  $V$  supplying rms current  $2I$ ?

- A.  $IV$
- B.  $2IV$
- C.  $4IV$
- D.  $\frac{2}{\sqrt{2}}IV$

[1 mark]

### Question 4

An ac generator produces a root mean squared emf  $\varepsilon$  at frequency  $f$ . The rotational speed of the coil in the generator is increased by a factor of three. Which of the following correctly identifies the new values of frequency and output emf<sub>rms</sub>?

	emf	frequency
A.	$3\varepsilon$	$\frac{f}{3}$
B.	$3\varepsilon$	$3f$
C.	$3\sqrt{2}\varepsilon$	$3f$
D.	$3\sqrt{2}\varepsilon$	$\frac{f}{3}$

[1 mark]

### Question 5

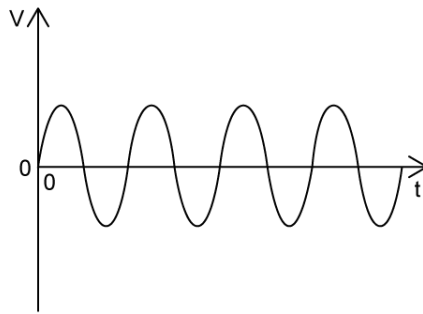
An ideal transformer is supplied with power  $P$ . The transformer has  $N_p$  turns on the primary coil and  $N_s$  turns on the secondary coil. Select the correct power output from the secondary coil.

- A.  $\frac{N_p V_s I_p}{N_s}$
- B.  $\frac{N_p}{N_s} \times P$
- C.  $P$
- D.  $P^{-1}$

[1 mark]

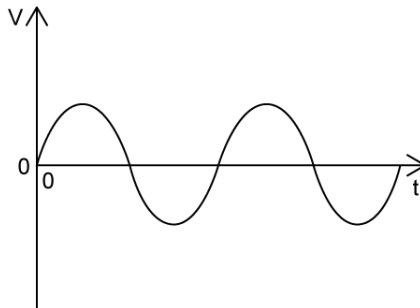
**Question 6**

The graph shows the variation with time  $t$  of the output voltage  $V$  of an ac generator.

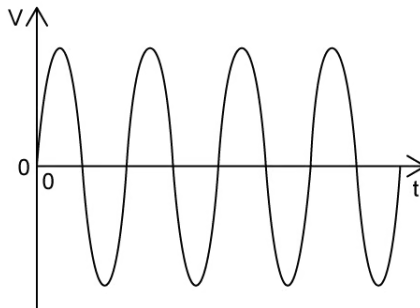


Which graph, with identical scales on the axes, shows the output when the speed of rotation is doubled?

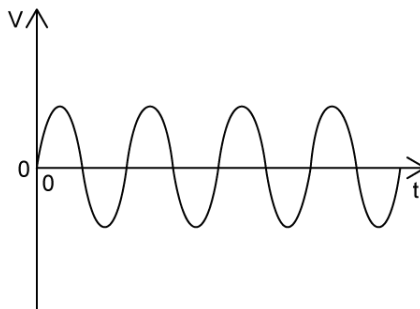
A.



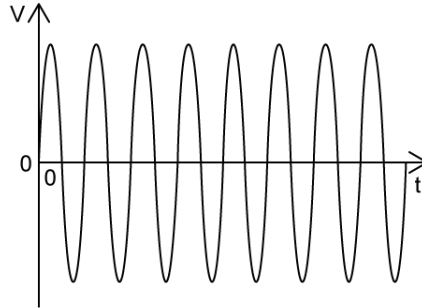
B.



C.



D.



[1 mark]

### Question 7

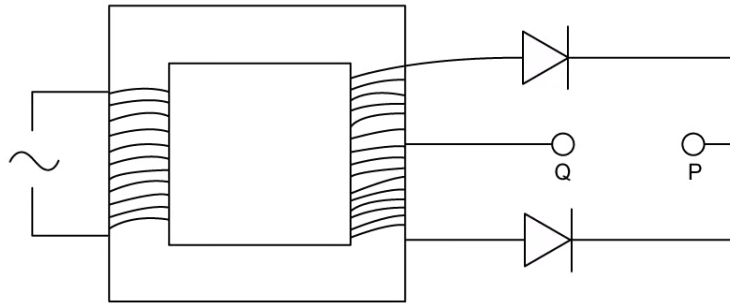
A power station produces ac voltage which is stepped up by a factor of  $10^4$ . This reduces the power loss in the transmission cables by a factor of

- A.  $10^2$
- B.  $10^4$
- C.  $10^8$
- D.  $10^{12}$

[1 mark]

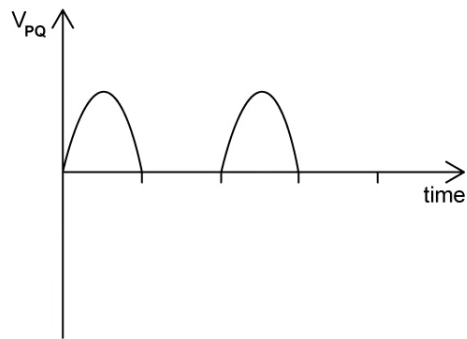
**Question 8**

The secondary coil of an ac transformer is connected to two diodes as shown.

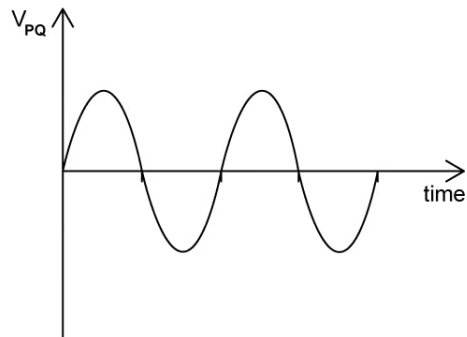


Which graph correctly shows the variation with time of the potential difference  $V_{PQ}$  between P and Q?

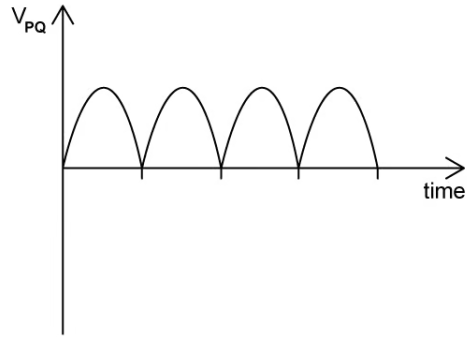
A.



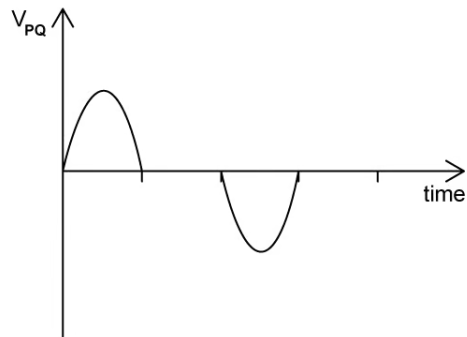
B.



C.



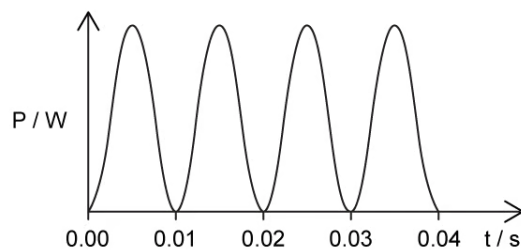
D.



[1 mark]

### Question 9

A resistor of  $3.0 \text{ k}\Omega$  is connected to an alternating current (ac) power supply of root mean square voltage  $120 \text{ V}$ . The graph shows the power dissipated in the resistor.



Which row correctly shows the frequency of the ac power supply and the average power dissipated in the resistor?

	frequency / Hz	power / W
A.	50	4.8
B.	50	9.6
C.	100	4.8
D.	100	9.6

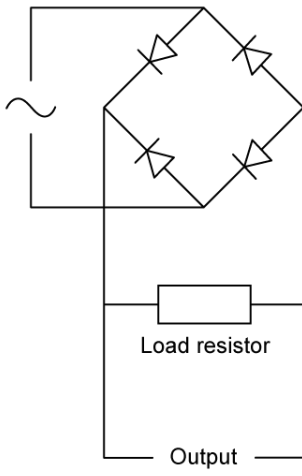
[1 mark]





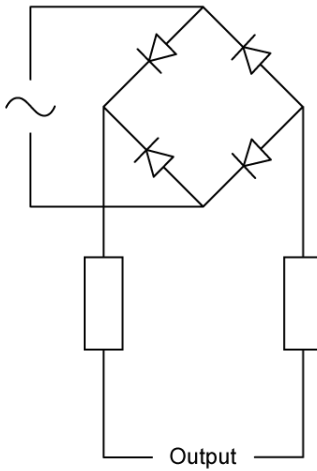
### Question 10

The diagram shows a diode bridge rectification circuit connected to a load resistor.

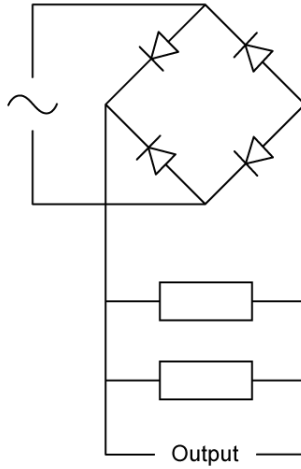


Which change to the circuit will produce an output signal showing the most smoothing?

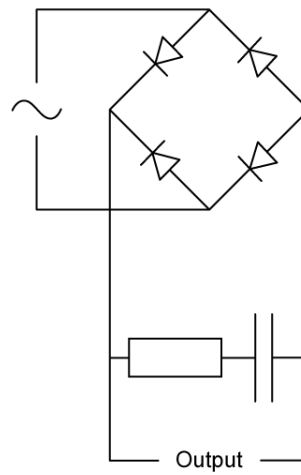
A.



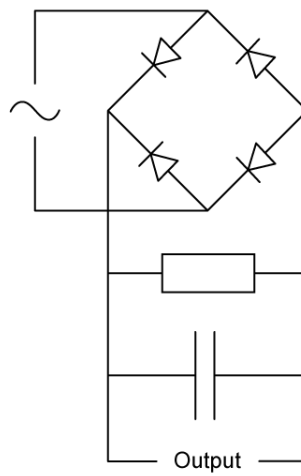
B.



C.



D.



[1 mark]

