

## Practice in Physics Question PHY4

### 1.51

- a) Blade frequency = 2.5 rpm  $\rightarrow$  1 min = 60 s, 2.5 revs = 2.5\*360 = 900 deg =  $5\pi$  rad  
i)  $900/60 = 15 \text{ deg.s}^{-1}$   
ii)  $5\pi/60 = 0.83\pi \text{ rad.s}^{-1} = 0.26 \text{ rads}^{-1}$
- b) Minute Hand Frequency = 1 rev/hour = 1/60 rpm = 1/3600 rev.s<sup>-1</sup>  
i)  $360/3600 = 0.1 \text{ deg.}^{-1}$   
ii)  $2\pi/3600 = \pi/1800 = 0.001745 \text{ rad.s}^{-1}$

### 1.52

$$r = 6.4 \times 10^3 \text{ km} = 6.4 \times 10^6 \text{ m}, \omega = 7.3 \times 10^{-5} \text{ rad.s}^{-1}, v = r\omega$$
$$v = 6.4 \times 10^6 * 7.3 \times 10^{-5} = 467 \text{ ms}^{-1}$$

### 1.53

$$v = r\omega, f \cdot 2\pi = \omega$$
$$v = 340 \text{ ms}^{-1} \quad f = 260 \text{ rpm} \rightarrow \omega = 2\pi (260/60)$$
$$\omega = 27.23 \text{ rad.s}^{-1}$$
$$r = v/\omega = 340/27.23$$
$$r = 12.49 \text{ m is the max length of blade.}$$

### 1.54

- $$v = 1.30 \text{ ms}^{-1}$$
- a)  $d = 12.0 \text{ cm} = 0.120 \text{ m} \rightarrow r = 0.06 \text{ m}$   
i)  $\omega = v/r = 1.3/.12 = 10.83 \text{ rad.s}^{-1}$   
ii)  $f = \omega/2\pi = 20.7/2\pi = \text{ rev.s}^{-1} \rightarrow *60 \text{ rpm} = 103 \text{ rpm}$
- b)  $r = 2.55 \text{ cm} = 0.0255 \text{ m}$   
i)  $\omega = v/r = 1.3/.0255 = 50.98 \text{ rad.s}^{-1}$   
ii)  $f = \omega/2\pi = 50.98/2\pi = 8.11 \text{ rev.s}^{-1} \rightarrow 8.11 * 60 \text{ rpm} = 486.83 \text{ rpm}$

### 1.55

- a)  $10.1 \text{ ms}^{-1}$   
b)  $10.1 \text{ ms}^{-1}$   
c)  $0 \text{ ms}^{-1}$   
d)  $6.4 \text{ ms}^{-1}$   
e)  $9.1 \text{ ms}^{-1}$