Physicsaholics

DPP – 2 (EM Waves)

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Q 1. The sun delivers $10^4 \text{W}/m^2$ of electromagnetic flux to earth's surface. The total power that is incident on a roof dimensions $(10\times10)m^2$ will be:
(a) 10^4 W (b) 10^5 W
(c) 10^6 W (d) 10^7 W

Q 2. The sun delivers about 1.4 $\text{KW}m^{-2}$ of electromagnetic flux to the earth's surface. Calculate the solar energy in joules incident on the roof of dimensions 8m×20m in 1 hour
(a) 205.6 MJ (b) 806.4 MJ
(c) 122 J (d) 102.3 MJ

Q 3. The sun delivers $10^3 \text{W}/m^2$ of electromagnetic flux to the earth's surface. The total power that is incident on a roof of dimensions 8m×20m is 1.6×10^5W, the radiation force on the roof will be- (The whole incident electromagnetic flux is absorbed by the earth)
(a) 53 N (b) 5.3 N
(c) 5.3×10^{-4} N (d) 5.3×10^{-6} N

Q 4. Electromagnetic radiation with energy flux 50 $\text{W}cm^{-2}$ is incident on a totally absorbing surface normally for 1 hour. If the surface has an area of 0.05 m^2, then the average force due to the radiation pressure, on it is,
(a) 8.3×10^{-7} N (b) 8.3×10^{-5} N
(c) 1.2×10^{-7} N (d) 1.2×10^{-5} N

Q 5. Light with an energy flux of 25×10^4 $\text{W}m^{-2}$ falls on a perfectly reflecting surface at normal incidence. If the surface area is 15 cm^2, the average force exerted on the surface is
(a) 1.25×10^{-6} N (b) 2.5×10^{-6} N
(c) 1.20×10^{-6} N (d) 3×10^{-6} N

Q 6. Light with energy flux of 18 W/cm^2 falls on a non reflecting surface of area 20 cm^2 at normal incidence the momentum delivered in 30 minutes is
(a) 1.2×10^{-6} Kg-m/s (b) 2.16×10^{-3} Kg-m/s
(c) 1.18×10^{-3} Kg-m/s (d) 3.2×10^{-3} Kg-m/s

Q 7. Light with energy flux 18 $\text{W}cm^{-2}$ is incident on a mirror of size 2cm×2cm normally. The momentum delivered in one minute is
(a) 28.8 μKg-m/s (b) 2.88 μKg-m/s
(c) 4.8 μKg-m/s (d) 48 μKg-m/s

Q 8. Light with energy flux of 24 Wm^{-2} is incident on a well polished disc of radius 3.5 cm for one hour. The momentum transferred to the disc is

(a) 1.1 μKg-m/s (b) 2.2 μKg-m/s
(c) 3.3 μKg-m/s (d) 4.4 μKg-m/s

Q 9. Find the amplitude of the electric field in a parallel beam of light of intensity 8.0 W/m^2

(a) 77.7 N/C (b) 33.3 N/C
(c) 28.8 N/C (d) 83.6 N/C

Q 10. Find the amplitude of magnetic field in parallel beam of light of intensity 4.0W/m^2

(a) 18.3×10^{-5} T (b) 1.83×10^{-6} T
(c) 28.3×10^{-7} T (d) 1.83×10^{-7} T

Answer Key

Q.1 c	**Q.2 b**	**Q.3 c**	**Q.4 b**	**Q.5 b**
Q.6 b	**Q.7 a**	**Q.8 b**	**Q.9 a**	**Q.10 d**