Q.1 Match the column I and column II correctly.

Column-I		Column-II	
A	Interference of light (p)	P.	$I = I_0\cos^2\theta$
B	Brewster's law	q.	Obstacle/aperture size $\approx \lambda$
C	Diffraction of light	r.	$\mu = \tan i_p$
D	Law of Malus	s.	Coherent sources

(A) A − r, B − s, C − q, D − p
(B) A − p, B − q, C − r, D − s
(C) A − s, B − r, C − p, D − q
(D) A − s, B − r, C − q, D − p

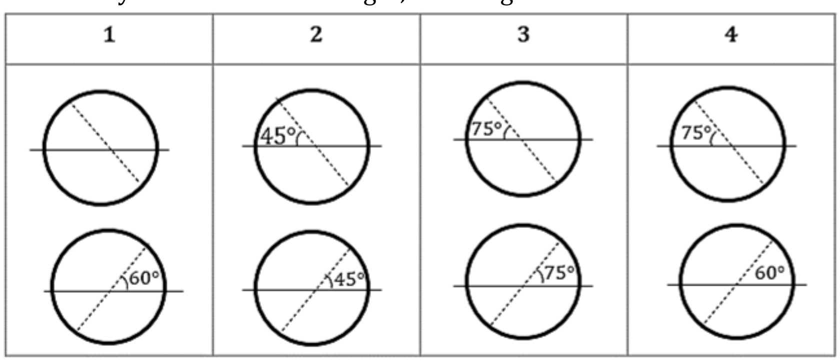
Q.2 For a given medium, the polarizing angle is 60°. The critical angle for this medium is $\left(\sin^{-1}(0.5773) = 35°16' \text{ and } \sin^{-1}(0.886) = 60°\right)$

(A) 60° **(B)** 35°16′ **(C)** 30° **(D)** 45°30′

Q.3 A system of three polarizers P_1, P_2, P_3 is set up such that the pass axis of P_3 is crossed with respect to that of P_1. The pass axis of P_2 is inclined at 60° to the pass axis of P_3. When a beam of depolarized light of intensity I_0 is incident on P_1 the intensity of light transmitted by three polarizers is I. The ratio $\left(\frac{I_0}{I}\right)$ equals (nearly)

(A) 16/3 **(B)** 3/32 **(C)** 32/3 **(D)** 3/16

Q.4 The diagram shows four pairs of polarizing sheets, with the polarizing directions indicated by dashed lines. The two sheets of each pair are placed one behind the other, and the front sheet is illuminated by unpolarized light. The incident intensity is the same for all pairs of sheets. Rank the pairs according to the intensity of the transmitted light, least to greatest.



(A) 1, 2, 3, 4 **(B)** 4, 2, 1, 3 **(C)** 2, 4, 3, 1 **(D)** 2, 1, 4, 3

Q.5 Unpolarized light of intensity I passes through an ideal Polarizer A. Another identical polarizer B is placed behind A. The intensity of light beyond B is found to be I_2. Now another identical polarizer C is placed between A and B. The intensity beyond B is now found to be I_8. The angle between polarizer A and C is

(A) 60° **(B)** 0° **(C)** 30° **(D)** 45°

Q.6 Unpolarized light of intensity 32 W/m^2 passes through three polarizers such that the transmission axis of the last polarizer is crossed with the first. If the intensity of emerging light is 3 W/m^2, the angle θ between the transmission axes of the first two polarizers and the angle ϕ at which transmitted intensity will be maximum are

(A) $\theta = 30°, \phi = 60°$ **(B)** $\theta = 45°, \phi = 45°$ **(C)** $\theta = 30°, \phi = 45°$ **(D)** $\theta = 45°, \phi = 30°$

Q.7 When the angle of incidence on a material is 60°, the reflected light is completely polarized. The velocity of the refracted ray inside the material is (in m/s)

(A) 3×10^8 (B) $\frac{3}{\sqrt{2}} \times 10^8$ (C) $\sqrt{3} \times 10^8$ (D) 0.5×10^8

Q.8 The polarizing angle for a piece of glass for green light is 60°. Find the angle of minimum deviation for green light for its passage through 60°prism, made of same glass.

(A) 30° (B) 15° (C) 60° (D) 45°

Q.9 A beam of light AO is incident on a glass slab ($\mu = 1.732$) in the direction shown. The reflected ray OB is passed through a Nicol prism. On viewing through a Nicol prism, we can find on rotating the prism that

(A) the intensity is reduced down to zero and remains zero.
(B) the intensity reduces down somewhat and rises again.
(C) there is no change in intensity.
(D) the intensity gradually reduces to zero and then again increases.

Q.10 A beam of plane polarized light falls normally on a polarizer (cross-sectional area $3 \times 10^{-4}\ \text{m}^2$) which rotates about the axis of the ray with an angular velocity of 31.4 rad/s. Find the energy of light E passing through the polarizer per revolution and the intensity I_{avg} of the emergent beam if the flux of energy of the incident ray is 10^{-3} W.

(A) $E = 10^{-4}$ J, $I_{avg} = 1.67\ \text{W/m}^2$ (B) $E = 10^{-3}$ J, $I_{avg} = 1.97\ \text{W/m}^2$
(C) $E = 10^{-4}$ J, $I_{avg} = 1.97\ \text{W/m}^2$ (D) $E = 10^{-3}$ J, $I_{avg} = 1.67\ \text{W/m}^2$

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(D)	(B)	(C)	(D)	(D)	(C)	(C)	(C)	(D)	(A)