

# National Testing Agency

<b>Question Paper Name :</b>	X RAY Crystallography 15 September 2020 Shift 1
<b>Subject Name :</b>	X-RAY Crystallography
<b>Creation Date :</b>	2020-09-15 13:26:34
<b>Duration :</b>	180
<b>Total Marks :</b>	100
<b>Display Marks:</b>	Yes
<b>Share Answer Key With Delivery Engine :</b>	Yes
<b>Actual Answer Key :</b>	Yes

## X-RAY Crystallography

<b>Group Number :</b>	1
<b>Group Id :</b>	89951422
<b>Group Maximum Duration :</b>	0
<b>Group Minimum Duration :</b>	120
<b>Show Attended Group? :</b>	No
<b>Edit Attended Group? :</b>	No
<b>Break time :</b>	0
<b>Group Marks :</b>	100
<b>Is this Group for Examiner? :</b>	No

## X-RAY Crystallography

<b>Section Id :</b>	89951422
<b>Section Number :</b>	1
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	50

<b>Number of Questions to be attempted :</b>	50
<b>Section Marks :</b>	100
<b>Display Number Panel :</b>	Yes
<b>Group All Questions :</b>	Yes
<b>Mark As Answered Required? :</b>	Yes
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	89951435
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 1 Question Id : 8995141800 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

For diffraction to occur, the condition for the slit width  $d$  and wavelength  $\lambda$  should be

- Wavelength shorter than the slit width
- Wavelength longer than the slit width
- Comparable
- Slit width should be integral multiple of wavelength

**Options :**

8995147160. 1
8995147161. 2
8995147162. 3
8995147163. 4

**Question Number : 2 Question Id : 8995141801 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

X-ray diffraction is mainly caused by

- a. Electrons
- b. Neutrons
- c. X-rays
- d. Nucleus

**Options :**

- 8995147164. 1
- 8995147165. 2
- 8995147166. 3
- 8995147167. 4

**Question Number : 3 Question Id : 8995141802 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Laue's equations in a lattice arise due to

- a. Interference
- b. Polarization
- c. Reflection
- d. Refraction

**Options :**

- 8995147168. 1
- 8995147169. 2
- 8995147170. 3
- 8995147171. 4

**Question Number : 4 Question Id : 8995141803 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

In the Bragg's equation when  $\theta$  is 0, then the incident ray

- a. Deviates from the normal
- b. Deviates close to normal
- c. The d spacing is zero
- d. Goes unaffected

**Options :**

8995147172. 1

8995147173. 2

8995147174. 3

8995147175. 4

**Question Number : 5 Question Id : 8995141804 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

The sphere constructed using  $1/\lambda$  as radius in diffraction is called

- a. Limiting sphere
- b. Ewald sphere
- c. Atomic sphere
- d. Laue sphere

**Options :**

8995147176. 1

8995147177. 2

8995147178. 3

8995147179. 4

**Question Number : 6 Question Id : 8995141805 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

For a given unit cell with parameters  $a \neq b \neq c$  and  $\alpha \neq \beta \neq \gamma$ , what will happen to the crystal system when  $\alpha = \beta = \gamma = 90^\circ$ .

- a. Monoclinic
- b. Trigonal
- c. Orthorhombic
- d. Cubic

**Options :**

- 8995147180. 1
- 8995147181. 2
- 8995147182. 3
- 8995147183. 4

**Question Number : 7 Question Id : 8995141806 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

The measurable reflections are within the limit of

- a. Laue sphere
- b. Sphere of reflection
- c. Intersection of Ewald sphere and Limiting sphere
- d. Sphere of the wavelength.

**Options :**

- 8995147184. 1
- 8995147185. 2
- 8995147186. 3
- 8995147187. 4

**Question Number : 8 Question Id : 8995141807 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

For a given value of  $\theta$ , what will happen to the diffracted intensity in X-ray diffraction experiments.

- a. Less the electron cloud more the intensity
- b. More the electron cloud, more the intensity
- c. Independent of the electrons
- d. Independent of the nucleus

**Options :**

- 8995147188. 1
- 8995147189. 2
- 8995147190. 3
- 8995147191. 4

**Question Number : 9 Question Id : 8995141808 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

The total number of point groups for the seven crystal systems are

- a. 230
- b. 32
- c. 7
- d. 4

**Options :**

- 8995147192. 1
- 8995147193. 2
- 8995147194. 3
- 8995147195. 4

**Question Number : 10 Question Id : 8995141809 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

The direct methods use the

- a. The amplitudes
- b. The square of the amplitudes
- c. The square root of the amplitudes
- d. only the phase angles

**Options :**

- 8995147196. 1
- 8995147197. 2
- 8995147198. 3
- 8995147199. 4

**Question Number : 11 Question Id : 8995141810 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

The number of unique point groups for the Cubic system are

- a. 7
- b. 4
- c. 6
- d. 5

**Options :**

- 8995147200. 1
- 8995147201. 2
- 8995147202. 3
- 8995147203. 4

**Question Number : 12 Question Id : 8995141811 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

Which of the pair of point groups could be converted to hexagonal system.

- a.  $3/m, 3/m$
- b.  $3m, 3/m$
- c.  $-3, 3/m$
- d.  $3m, 3/m$

**Options :**

- 8995147204. 1
- 8995147205. 2
- 8995147206. 3
- 8995147207. 4

**Question Number : 13 Question Id : 8995141812 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

What is the unique way to determine the space groups  $P2_1$  from  $Pm$ .

- a. The systematic absences
- b. From the unit cell
- c. From the point group
- d. Not possible

**Options :**

- 8995147208. 1
- 8995147209. 2
- 8995147210. 3
- 8995147211. 4

**Question Number : 14 Question Id : 8995141813 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**



What are the centrosymmetric point groups in a trigonal crystal system.

- a.  $\bar{3}, \bar{3}m$
- b.  $\bar{3}, 3/m$
- c.  $3/m, 3/m$
- d.  $\bar{3}m, 3/m$

**Options :**

8995147212. 1

8995147213. 2

8995147214. 3

8995147215. 4

**Question Number : 15 Question Id : 8995141814 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Where is the  $2_1$  screw along b-axis located in the space group  $P2_12_12_1$ .

- a. 000 along b
- b. 000 along c
- c. c/4 along b
- d. None of the above

**Options :**

8995147216. 1

8995147217. 2

8995147218. 3

8995147219. 4

**Question Number : 16 Question Id : 8995141815 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

What is the third symmetry axis generated by operating two 2-fold symmetry axes in an orthogonal system.

- a. Mirror
- b. Inversion
- c. 2-fold
- d. None of the above

**Options :**

- 8995147220. 1
- 8995147221. 2
- 8995147222. 3
- 8995147223. 4

**Question Number : 17 Question Id : 8995141816 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Which of the following terms is present in the d-spacing calculation for a hexagonal system in reciprocal space.

- a.  $\cos \gamma^*$
- b.  $\cos \alpha^*$
- c.  $\cos \beta^*$
- d. No  $\alpha^* \gamma^* \beta^*$

**Options :**

- 8995147224. 1
- 8995147225. 2
- 8995147226. 3
- 8995147227. 4

**Question Number : 18 Question Id : 8995141817 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

In a given unit cell with parameters  $a \neq b \neq c$  and  $\alpha \neq \beta \neq \gamma \neq 90^\circ$ , what is the resulting crystal system when  $a=b=c$  and  $\alpha=\beta=\gamma \neq 90^\circ$ .

- a. Cubic
- b. Trigonal
- c. Orthorhombic
- d. Hexagonal

**Options :**

- 8995147228. 1
- 8995147229. 2
- 8995147230. 3
- 8995147231. 4

**Question Number : 19 Question Id : 8995141818 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

The scattering power of an atom with respect to  $\sin\theta/\lambda$  is

- a. Constant
- b. Increases linearly
- c. Decreases linearly
- d. Decreases exponentially

**Options :**

- 8995147232. 1
- 8995147233. 2
- 8995147234. 3
- 8995147235. 4

**Question Number : 20 Question Id : 8995141819 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Where will an atom show minimum thermal parameter.

- a. At 10 K
- b. At 10 °C
- c. At room temperature
- d. At 0 °C

**Options :**

- 8995147236. 1
- 8995147237. 2
- 8995147238. 3
- 8995147239. 4

**Question Number : 21 Question Id : 8995141820 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

What do we call  $a^*$   $b^*$   $c^*$  and  $\alpha^*$  $\beta^*$  $\gamma^*$  in crystallography

- a. \* Axis and \* Angles
- b. Reciprocal lattice unit cell dimensions
- c.  $a^*=1-a$ ,  $b^*=1-b$ ,  $c^*=1-c$
- d.  $\alpha^*=1-\alpha$ ,  $\beta^*=1-\beta$ ,  $\gamma^*=1-\gamma$

**Options :**

- 8995147240. 1
- 8995147241. 2
- 8995147242. 3
- 8995147243. 4

**Question Number : 22 Question Id : 8995141821 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

What is the physical parameter used in the Patterson function.

- a. The square of the amplitude
- b. The amplitude
- c. The phase angle
- d. The Bragg angle

**Options :**

8995147244. 1

8995147245. 2

8995147246. 3

8995147247. 4

**Question Number : 23 Question Id : 8995141822 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

What will be the equivalent point generated after the operation of a 2-fold rotation parallel to b-axis on the given point  $x,y,z$ .

- a.  $-x,-y,z$
- b.  $x,-y,-z$
- c.  $x,-y,z$
- d.  $-x,y,-z$

**Options :**

8995147248. 1

8995147249. 2

8995147250. 3

8995147251. 4

**Question Number : 24 Question Id : 8995141823 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

What will be the equivalent point generated after the operation of a mirror plane perpendicular to b-axis on a given point  $x,y,z$

- a.  $-x,-y,z$
- b.  $x,-y,-z$
- c.  $-x,y,-z$
- d.  $x,-y,z$

**Options :**

- 8995147252. 1
- 8995147253. 2
- 8995147254. 3
- 8995147255. 4

**Question Number : 25 Question Id : 8995141824 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

A glide plan involves a

- a. Reflection
- b. Translation
- c. Reflection followed by translation
- d. Rotation followed by translation

**Options :**

- 8995147256. 1
- 8995147257. 2
- 8995147258. 3
- 8995147259. 4

**Question Number : 26 Question Id : 8995141825 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Find out the function which is minimized during the least squares refinement of a structure.

- a.  $\sum_{hkl} W_{hkl} (|F_o| - |F_c|)^2$
- b.  $xyz$
- c.  $\theta$
- d.  $\rho(xyz)$

**Options :**

- 8995147260. 1
- 8995147261. 2
- 8995147262. 3
- 8995147263. 4

**Question Number : 27 Question Id : 8995141826 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

Identify the intercepts of the miller indices 222.

- a.  $a/2, b/2, c/2$
- b. Half in a, twice in b, twice in c
- c. Twice the intercept in a, b, c
- d. Parallel to a, b, c

**Options :**

- 8995147264. 1
- 8995147265. 2
- 8995147266. 3
- 8995147267. 4

**Question Number : 28 Question Id : 8995141827 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

Identify the relationship between  $\theta$  and  $hkl$  in X-ray diffraction.

- a.  $\theta$  is proportional to  $hkl$
- b.  $\theta$  is inversely proportional to  $hkl$
- c.  $\theta$  is inversely proportional  $(hkl)^2$
- d.  $\theta$  is independent of  $hkl$

**Options :**

- 8995147268. 1
- 8995147269. 2
- 8995147270. 3
- 8995147271. 4

**Question Number : 29 Question Id : 8995141828 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

How do you explain the Miller indices 200.

- a. Intercept at 'a/2' parallel to 'b' and 'c'
- b. Twice at 'a' and perpendicular to 'b' and 'c'
- c. Doesn't cut at a, b, c,
- d. Perpendicular to 'a' and parallel to 'b' and 'c'

**Options :**

- 8995147272. 1
- 8995147273. 2
- 8995147274. 3
- 8995147275. 4

**Question Number : 30 Question Id : 8995141829 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**



The value of  $\theta$  in reciprocal space when  $\alpha = \beta = \gamma = 90^\circ$  the equation becomes,

- $\theta = \sin^{-1} \frac{\lambda}{2} \sqrt{(h^2 a^{*2} + k^2 b^{*2} + l^2 c^{*2} + 2hk a^* b^* \cos \gamma^* + 2hl a^* c^* \cos \beta^* + 2kl b^* c^* \cos \alpha^*)}$
- $\theta = \sin^{-1} \frac{\lambda}{2} \sqrt{(h^2 a^{*2} + k^2 b^{*2} + l^2 c^{*2})}$
- $\theta = \sin^{-1} \frac{\lambda}{2} \sqrt{(h^2 a^{*2} + k^2 b^{*2} + l^2 c^{*2} + 2hl a^* c^* \cos \beta^*)}$
- $\theta = \sin^{-1} \frac{\lambda}{2} \sqrt{(h^2 a^{*2} + k^2 b^{*2} + l^2 c^{*2} + 2hk a^* b^* \cos \gamma^*)}$

**Options :**

8995147276. 1
8995147277. 2
8995147278. 3
8995147279. 4

**Question Number : 31 Question Id : 8995141830 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

Find out the additional inversion symmetry generated for the space group  $C2/m$ .

- Inversion at  $a/4 + b/4$
- Inversion at  $000$
- Inversion at  $a/2 + b/2$
- Inversion at  $\frac{1}{2} \frac{1}{2} 0$

**Options :**

8995147280. 1
8995147281. 2
8995147282. 3
8995147283. 4

**Question Number : 32 Question Id : 8995141831 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

Which of the given set belongs to the eight unique inversion centers in P-1 space group

- a.  $000, \frac{1}{2} \frac{1}{2} \frac{1}{2}$
- b.  $000, 100$
- c.  $100, 001$
- d.  $010, 001$

**Options :**

8995147284. 1

8995147285. 2

8995147286. 3

8995147287. 4

**Question Number : 33 Question Id : 8995141832 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

What happens to the plane if one of the the Miller indeces is zero.

- a. The plane is parallel to that axis
- b. The plane is perpendicular to that axis
- c. The plane is inclined
- d. None of the above

**Options :**

8995147288. 1

8995147289. 2

8995147290. 3

8995147291. 4

**Question Number : 34 Question Id : 8995141833 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

What will happen when a Miller index is multiplied or divided by a constant.

- a. No effect on the orientation of the plane
- b. Will become parallel to the plane
- c. Will become perpendicular to the plane
- d. Will become zero

**Options :**

8995147292. 1

8995147293. 2

8995147294. 3

8995147295. 4

**Question Number : 35 Question Id : 8995141834 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

'a-glide' is perpendicular to

- a. b or c-axis
- b. a axis
- c. 100 plane
- d. 200 plane

**Options :**

8995147296. 1

8995147297. 2

8995147298. 3

8995147299. 4

**Question Number : 36 Question Id : 8995141835 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Identify the symmetry elements from Harker peak  $1/2\ 0\ w$

- a. 'a-glide' plane perpendicular to 'c'
- b. 2-fold axis parallel to 'c'
- c.  $2_1$ -screw parallel to 'c'
- d. 'b-glide' plane perpendicular to c

**Options :**

- 8995147300. 1
- 8995147301. 2
- 8995147302. 3
- 8995147303. 4

**Question Number : 37 Question Id : 8995141836 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

Identify the translation generated by a n-glide perpendicular to c-axis.

- a.  $(a+b)/2$
- b.  $(a+c)/2$
- c.  $(b+c)/2$
- d.  $a/4+b/4$

**Options :**

- 8995147304. 1
- 8995147305. 2
- 8995147306. 3
- 8995147307. 4

**Question Number : 38 Question Id : 8995141837 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

How are the amplitude and  $\theta$  related for a diffracted wave.

- a. Higher the  $\theta$  higher the amplitude
- b. Lower the  $\theta$  higher the amplitude
- c. Lower the  $\theta$  the lower the amplitude
- d. Depends on the cell dimensions

**Options :**

8995147308. 1

8995147309. 2

8995147310. 3

8995147311. 4

**Question Number : 39 Question Id : 8995141838 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Identify the point group belongs to the space group Cm.

- a. -2
- b. 2/m
- c. 2
- d. mmm

**Options :**

8995147312. 1

8995147313. 2

8995147314. 3

8995147315. 4

**Question Number : 40 Question Id : 8995141839 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Which one of the following statement is correct in the context of powder diffraction.

- Same hkl will have more than one  $\theta$
- More than one hkl might have same  $\theta$
- $\theta$  and hkl are not related
- Intensity independent on hkl

**Options :**

8995147316. 1

8995147317. 2

8995147318. 3

8995147319. 4

**Question Number : 41 Question Id : 8995141840 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is**

**Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Find out the amplitude of the wave 'f' from the given figure



- $f = OC$
- $f = \sqrt{(OB^2 + OC)^2}$
- $f = AB$
- $f = OC/OB$

**Options :**

8995147320. 1

8995147321. 2

8995147322. 3

8995147323. 4

**Question Number : 42 Question Id : 8995141841 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

Identify the systematic absent condition for a primitive lattice.

- a.  $hkl; h+k+l=2n+1$
- b.  $h0l; h+l=2n+1$
- c.  $0kl; k+l=2n+1$
- d. None of the above

**Options :**

8995147324. 1

8995147325. 2

8995147326. 3

8995147327. 4

**Question Number : 43 Question Id : 8995141842 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical Correct Marks : 2 Wrong Marks : 0**

What will be the resultant amplitude ' $f_r$ ' when  $j$  waves with different amplitudes and phases are superimposed.

- a.  $f_r = \sqrt{(\sum_j f_j \cos \delta_j)^2 + (\sum_j f_j \sin \delta_j)^2}$
- b.  $f_r = \tan^{-1} \sqrt{(\sum_j f_j \cos \delta_j) / (\sum_j f_j \sin \delta_j)}$
- c.  $f_r = \sqrt{(\sum_j f_j \cos \delta_j)^2} / \sqrt{(\sum_j f_j \sin \delta_j)^2}$
- d.  $f_r = \sum_j f_j \cos \delta_j^2 / \sum_j f_j \sin \delta_j^2$

**Options :**

8995147328. 1

8995147329. 2

8995147330. 3

8995147331. 4

**Question Number : 44 Question Id : 8995141843 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Patterson function is always

- a. Non-centro symmetric
- b. Depends upon the system
- c. Centro symmetric
- d. Depends upon the space group

**Options :**

8995147332. 1

8995147333. 2

8995147334. 3

8995147335. 4

**Question Number : 45 Question Id : 8995141844 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Where will be the mirror plane situated in 'a-glide' perpendicular to c-axis.

- a. ab plane
- b. ac plane
- c. bc plane
- d. none of the above

**Options :**

8995147336. 1

8995147337. 2

8995147338. 3

8995147339. 4



**Question Number : 46 Question Id : 8995141845 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

The equivalent points for the centrosymmetric space group P-1 are

- a.  $x,y,z; x,-y,z$
- b.  $x,y,z; -x,-y,-z$
- c.  $x,y,z; -x,y,z$
- d.  $x,y,z; x,y,-z$

**Options :**

- 8995147340. 1
- 8995147341. 2
- 8995147342. 3
- 8995147343. 4

**Question Number : 47 Question Id : 8995141846 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

Which of the following conditions is valid for an orthorhombic system.

- a.  $F(hkl)=F(h-k-l)$
- b.  $F(hkl) \neq F(-hkl)$
- c.  $F(hkl) \neq F(-h-k-l)$
- d.  $F(hkl) \neq F(-hk-l)$

**Options :**

- 8995147344. 1
- 8995147345. 2
- 8995147346. 3
- 8995147347. 4

**Question Number : 48 Question Id : 8995141847 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

In the equation for the electron density  $\rho(xyz)$  when expressed as a Fourier synthesis of the structure factor, the summation is over

- a.  $x y z$
- b. Scattering factor  $f_0$
- c. Scattering angle  $\theta$
- d.  $hkl$

**Options :**

- 8995147348. 1
- 8995147349. 2
- 8995147350. 3
- 8995147351. 4

**Question Number : 49 Question Id : 8995141848 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

The special systematically absent condition for a C centered lattice is

- a.  $h0l; h+l= 2n$
- b.  $h00; h=2n+1$
- c.  $00l; l=2n+1$
- d.  $0kl; k+l=2n+1$

**Options :**

- 8995147352. 1
- 8995147353. 2
- 8995147354. 3
- 8995147355. 4

**Question Number : 50 Question Id : 8995141849 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Single Line Question Option : No Option Orientation : Vertical**

**Correct Marks : 2 Wrong Marks : 0**

What happens to the plane if the Miller index is large.,

- a. The more nearly perpendicular the plane is to that axis
- b. The more nearly parallel the plane is to that axis
- c. The plane is nearly perpendicular to the diagonal
- d. The plane is inclined at an angle of  $45^\circ$

**Options :**

8995147356. 1

8995147357. 2

8995147358. 3

8995147359. 4