FIITJEE Big Bang Edge Test - 2022

for students presently in **Class 10 (going to 11) (Paper 2)**

Time: 3 Hours (2:00 pm – 5:00 pm)   **CODE: 1011-2**   *Maximum Marks: 234*

Instructions:

Caution: Class, Paper, Code as given above MUST be correctly marked on the answer OMR sheet before attempting the paper. Wrong Class, Paper or Code will give wrong results.

1. **You are advised to devote 60 Minutes on Section-I, 60 Minutes on Section-II and 60 Minutes on Section-III.**

2. **This Question paper consists of 3 sections. Marking scheme is given in table below:**

Section	Subject		Question no.	Marking Scheme for each question	
				Correct answer	Wrong answer
SECTION – I	PHYSICS	(PART-A)	1 to 10	**+3**	**–1**
	CHEMISTRY	(PART-B)	11 to 20	**+3**	**–1**
	MATHEMATICS	(PART-C)	21 to 30	**+3**	**–1**
SECTION – II	PHYSICS	(PART-A)	31 to 36	**+3**	**–1**
	CHEMISTRY	(PART-B)	37 to 42	**+3**	**–1**
	MATHEMATICS	(PART-C)	43 to 48	**+3**	**–1**
	PHYSICS	(PART-D)	49 to 50	**+3**	**0**
	CHEMISTRY	(PART-E)	51 to 52	**+3**	**0**
	MATHEMATICS	(PART-F)	53 to 54	**+3**	**0**
SECTION – III	PHYSICS	(PART-A)	55 to 59	**+3**	**0**
	CHEMISTRY	(PART-B)	60 to 64	**+3**	**0**
	MATHEMATICS	(PART-C)	65 to 69	**+3**	**0**
	PHYSICS	(PART-D)	70 to 72	**+3**	**0**
	CHEMISTRY	(PART-E)	73 to 75	**+3**	**0**
	MATHEMATICS	(PART-F)	76 to 78	**+3**	**0**

3. Answers have to be marked on the OMR sheet. The Question Paper contains blank spaces for your rough work. No additional sheets will be provided for rough work.

4. Blank papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.

5. **Before attempting paper writes your OMR Answer Sheet No., Registration Number, Name** and **Test Centre** in the space provided below.

6. **See method of marking of bubbles at the back of cover page for question no. 49 to 54 and 70 to 78.**

Note: *Please check this Question Paper contains all **78** questions in serial order. If not so, exchange for the correct Question Paper.*

OMR Answer Sheet No. : _____

Registration Number : _____

Name of the Candidate : _____

Test Centre : _____

For questions **49 to 54 and 70 to 78**

Numerical based questions single digit answer 0 to 9

Example 1:

If answer is 6.

Correct method:

⓪ ① ② ③ ④ ⑤ ● ⑦ ⑧ ⑨

Example 2:

If answer is 2.

Correct method:

⓪ ① ● ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

Recommended Time: 60 Minutes for Section – I

Section – I

PHYSICS – (PART – A)
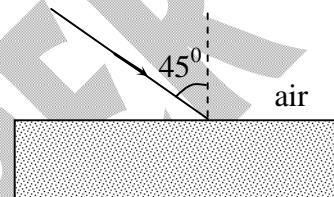
*This part contains **10 Multiple Choice Questions** number **1 to 10**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

1. Colour of the sky is blue due to
   (A) Scattering of light
   (B) Total internal reflection
   (C) Total emission
   (D) None of these

2. A man runs towards a mirror at a speed 15 *m/s.* The speed of the image relative to the man is
   (A) 15 ms^{-1}
   (B) 30 ms^{-1}
   (C) 35 ms^{-1}
   (D) 20 ms^{-1}

3. Focal length of an equiconvex lens is 20 cm. If we cut it once perpendicular to principle axis, and then along principle axis. Then focal length of each part will be
   (A) 20 cm
   (B) 10 cm
   (C) 40 cm
   (D) 5 cm

4. The minimum distance between an object and its real image formed by a convex lens is
   (A) 1.5 f
   (B) 2 f
   (C) 2.5 f
   (D) 4 f

5. A virtual image three times the size of the object is obtained with a concave mirror of radius of curvature $36cm$. The distance of the object from the mirror is
   (A) $5cm$
   (B) $12cm$
   (C) $10cm$
   (D) $20cm$

6. In a converging lens of focal length f and the distance between real object and its real image is 4f. If the object moves x_1 distance towards lens its image moves x_2 distance away from the lens and when object moves y_1 distance away from the lens its image moves y_2 distance towards the lens, then choose the correct option

   (A) $x_1 > x_2$ and $y_1 > y_2$
   (B) $x_1 < x_2$ and $y_1 < y_2$
   (C) $x_1 < x_2$ and $y_1 > y_2$
   (D) $x_1 > x_2$ and $y_2 > y_1$
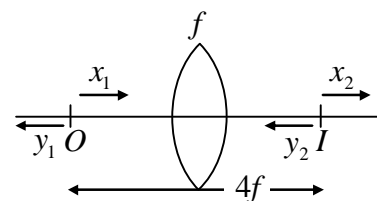
Space for Rough Work

7. The refractive index of a certain glass is 1.5 for light whose wavelength in vacuum is 6000 Å. The wavelength of this light when it passes through glass is
(A) 4000 Å
(B) 6000 Å
(C) 9000 Å
(D) 15000 Å

8. A convex lens *A* of focal length 20 cm and a concave lens *B* of focal length 5 cm are kept along the same axis with a distance *d* between them. If a parallel beam of light falling on *A* leaves *B* as a parallel beam, then the distance *d* in cm will be
(A) 25
(B) 15
(C) 30
(D) 50

9. A ray of light enters into a transparent liquid from air as shown in the figure. The refractive index of the liquid varies with depth *x* from the topmost surface as $\mu = \sqrt{2} - \dfrac{1}{\sqrt{2}} x$ where *x* in meters.

The depth of the liquid medium is sufficiently large. The maximum depth reached by the ray inside the liquid is

(A) $\sqrt{2}$ m
(B) $\dfrac{1}{\sqrt{2}}$ m
(C) 0.5 m
(D) 1 m

10. When the power of eye lens increases, the defect of vision is produced. The defect is known as
(A) Shortsightedness
(B) Longsightedness
(C) Colourblindness
(D) None of these

Space for Rough Work

CHEMISTRY – (PART – B)

*This part contains **10 Multiple Choice Questions** number **11 to 20**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

11. Which of the following hydroxides is most basic-
    (A) $Be(OH)_2$ (B) $Ba(OH)_2$
    (C) $Ca(OH)_2$ (D) $Mg(OH)_2$

12. White silver chloride in sunlight turns to-
    (A) grey   (B) yellow
    (C) remain white   (D) red

13. Which of the following is a basic salt-
    (A) $CuSO_4$ (B) Na_2CO_3
    (C) $ZnSO_4$ (D) NH_4NO_3

14. An element reacts with oxygen to give a compound with a high melting point. This compound is also soluble in water.
    The element is likely to be-
    (A) Calcium   (B) Carbon
    (C) Silicon   (D) Iron

15. Take about 1.0 g $CaCO_3$ in a test tube. Heat it over a flame, when a colourless gas comes out.
    The reaction is called a
    (A) Decomposition reaction   (B) displacement reaction
    (C) Double decomposition reaction   (D) Double displacement reaction.

16. Plaster of paris is obtained-
    (A) by adding water to calcium sulphate
    (B) by adding sulphuric acid to calcium hydroxide
    (C) by heating gypsum to a very high temperature
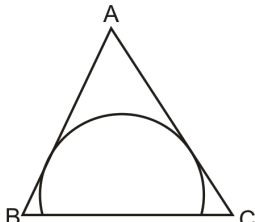   (D) by heating gypsum to 373K.

Space for Rough Work

17. Which of the following solutions has the same pH value as 100 mL of 0.05 M sulphuric acid diluted to 1L at the same temperature?
(A) 10^{-2} M sodium hydroxide solution
(B) 10^{-2} M calcium hydroxide solution
(C) 0.06 M hydrochloric acid solution
(D) 0.01 M nitric acid solution.

18. Which among the following metal form passive layer with steam?
(A) Cu
(B) Al
(C) Zn
(D) Ca

19. The pH of the solution of which of the following salts is greater than 7?
(A) CH_3COONa
(B) NH_4Cl
(C) K_2SO_4
(D) $Mg(NO_3)_2$

20. In the equation, $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$ NaOH is acting as-
(A) an oxidising agent
(B) a base
(C) a nitrating agent
(D) a dehydrating agent

Space for Rough Work

MATHEMATICS – (PART – C)

*This part contains **10 Multiple Choice Questions** number **21 to 30**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

21. Minimum value of $x^2 - 2x + 3$ is
    (A) 1   (B) 2   (C) 3   (D) 4

22. If $\sin x = \dfrac{1}{2}$, then Cosx can be?

    (A) $\dfrac{1}{2}$ (B) $\dfrac{1}{\sqrt{2}}$ (C) $-\dfrac{1}{\sqrt{2}}$ (D) $-\dfrac{\sqrt{3}}{2}$

23. Length of longest diagonal of a regular hexagon of side length 3 cm is?
    (A) 4 cm   (B) 5 cm   (C) 7 cm   (D) 6 cm

24. If coordinates of midpoints of sides of triangle are (0, 2), (3, 6), (7, 3). Find area of triangle ?
    (A) 11 unit^2 (B) 12 unit^2 (C) 12.5 unit^2 (D) 13 unit^2

25. In $\triangle ABC$, points P and Q are on sides AB and AC such that PQ||BC. If PQ divides $\triangle ABC$ in two equal areas, then find AP:PB ?
    (A) $\sqrt{2}+1$ (B) $\sqrt{2}-1$ (C) $\sqrt{2}:1$ (D) $3-2\sqrt{2}$

26. In adjoining figure, ABC is an equilateral triangle having side length $14\sqrt{3}$ cm.
    A semicircle is draw having diameter on BC and touching sides AB and AC. Find radius of semi-circle ?

    (A) 10 cm   (B) 11 cm   (C) 12 cm   (D) 10.5 cm

Space for Rough Work

27. In $\triangle$ABC, point D is on AC such that $\angle$ABC = $\angle$BDC, if BC = 9, BD = 8, BA = 12 find AD ?
(A) 7 (B) 6 (C) 6.5 (D) 7.5

28. If α, β, r, s are roots of $x^4 - x^3 + x^2 + x + 3 = 0$, Find value of $(1+\alpha)(1+\beta)(1+r)(1+s)$?
(A) 4 (B) 5 (C) 6 (D) 8

29. Find ratio in which line joining of points A(–7, –1) and B(8, 2) is divided by x + y = 2 ?
(A) 5 : 4 (B) 4 : 3 (C) 3 : 2 (D) 6 : 5

30. A ray of light emerging from point A(3, 2), strikes on x-axis at P(α, 0) and reflected ray passes through point B(8, 4). Find α ?
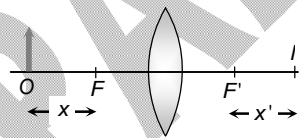(A) $\dfrac{14}{3}$ (B) 7 (C) 5 (D) 6

Space for Rough Work

Recommended Time: 60 Minutes for Section – II

Section – II

PHYSICS – (PART – A)

This part contains 6 Multiple Choice Questions number 31 to 36. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct.

31. A person uses a lens of power + 3D to normalise vision. Near point of hypermetropic eye is
(A) 1 *m*   (B) 1.66 *m*
(C) 2 *m*   (D) 0.66 *m*

32. An object 1 cm tall is placed in front of a mirror at a distance of 4 cm. In order to produce an upright image of 3cm height one needs a
(A) convex mirror of radius of curvature 12 cm   (B) concave mirror of radius of curvature 12 cm
(C) concave mirror of radius of curvature 4 cm   (D) plane mirror of height 12 cm

33. An object is placed at a point distant *x* from the focus of a convex lens having focal length f and its image is formed at *I* as shown in the figure. The distances *x*, *x'* satisfy the relation

(A) $\dfrac{x + x'}{2} = f$

(B) $f = xx'$

(C) $x + x' \le 2f$

(D) $x + x' \ge 2f$

34. The radius of curvature for a convex lens is 40 *cm*, for each surface. Its refractive index is 1.5. The focal length will be
(A) 40 *cm*   (B) 20 *cm*
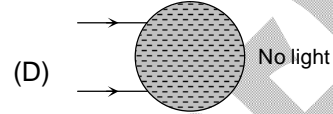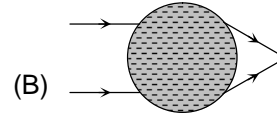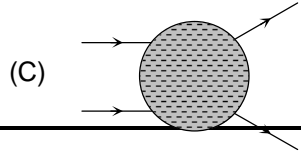(C) 80 *cm*   (D) 30 *cm*
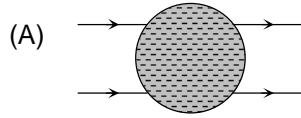
Space for Rough Work

35. A plane mirror makes an angle of $30°$ with horizontal. If a vertical ray strikes the mirror, find the angle between mirror and reflected ray
    (A) 30°   (B) 45°
    (C) 60°   (D) 90°

36. A water drop in air refractes the light ray as

(A)

(B)

(C)

(D) No light

Space for Rough Work

CHEMISTRY – (PART – B)

This part contains **6 Multiple Choice Questions** number **37 to 42**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

37. The salt whose aqueous solution will have no effect on either red litmus or blue litmus is
    (A) Potassium sulphate
    (B) Sodium carbonates
    (C) Ammonium sulphate
    (D) Sodium acetate

38. When P reacts with caustic soda, the products are PH_3 and NaH_2PO_2. This reaction is an example of-
    (A) oxidation
    (B) reduction
    (C) oxidation and reduction (redox)
    (D) neutralization

39. pH of 0.1 M KOH will be
    (A) 12
    (B) 1
    (C) 13
    (D) 0.1

40. In the following equation
    $$\mathbf{a}Zn + \mathbf{b}H_2SO_4 \longrightarrow \mathbf{c}ZnSO_4 + \mathbf{d}H_2$$
   a, b, c, d can have the values
    (A) 1, 2, 2, 1
    (B) 1, 1, 1, 1
    (C) 1, 1, 1, 2
    (D) 2, 1, 1, 2

41. Which of the following non-metal is lustrous?
    (A) Sulphur
    (B) Oxygen
    (C) Nitrogen
    (D) Iodine

42. Iron is galvanized when it is dipped in
    (A) Molten Zinc
    (B) Molten Copper
    (C) Molten Carbon
    (D) Molten Gold

Space for Rough Work

MATHEMATICS – (PART – C)

*This part contains **6 Multiple Choice Questions** number **43 to 48**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

43. The value of the expression $\cos 1^\circ \cos 2^\circ \dots \cos 180^\circ$ is equal to :
    (A) 1 (B) 2 (C) 0 (D) None of these

44. Let N be the least positive integer such that whenever a non-zero digit c is written after the last digit of N, the resulting number is divisibly by c. Then the sum of the digits of N is
    (A) 9 (B) 18 (C) 27 (D) 36

45. In a forest, a certain number of apes equal to the square of one-eighth of the total number of their group are playing and having great fun. The rest of them are twelve in number and are on an adjoining hill. The echo of their shrieks from the hills frightens them. They come and join the apes in the forest and play with enthusiasm. What is the total number of apes in the forest.
    (A) 16 (B) 48 (C) both (A) and (B) (D) 64

46. $\cot x - \tan x =$
    (A) $\cot 2x$ (B) $2\cot^2 x$ (C) $2\cot 2x$ (D) $\cot^2 2x$

47. In $\triangle ABC$, DE $\parallel$ BC and the area of the DBCE $= 45\ cm^2$. If AD: DB = 1: 3 then find the area of $\triangle ADE$
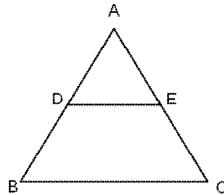
    (A) $2\ cm^2$ (B) $3\ cm^2$ (C) $4\ cm^2$ (D) $6\ cm^2$

48. In given figure, AD is angle bisector of angle A find the value of AB :
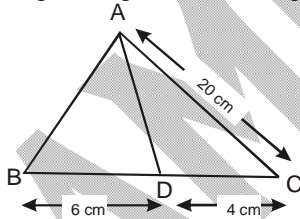
    (A) 24cm (B) 25cm (C) 40 cm (D) 30 cm

Space for Rough Work

PHYSICS – (PART – D)

This part contains 2 Numerical Based Questions number 49 to 50. Each question has Single Digit Answer 0 to 9.

49. A farsighted person whose near point is 100 cm wants to read a book at a distance 25 cm. Find the power of lens needed.

50. A myopic person uses specs of power –0.5 D. What is the distance (in metre) of the far point of his eye?

Space for Rough Work

CHEMISTRY – (PART – E)

*This part contains **2 Numerical Based Questions** number **51 to 52**. Each question has **Single Digit Answer 0 to 9**.*

51.   What is the oxidation state of 'S' in $H_2S_2O_8$?

52.   Calculate the resultant pOH of a solution when 20 ml of 0.1 N NaOH is mixed with 20 ml of 0.05 M $Ca(OH)_2$ at $25^{o}C$.

Space for Rough Work

MATHEMATICS – (PART – F)

This part contains **2 Numerical Based Questions** number **53 to 54**. Each question has **Single Digit Answer 0 to 9**.

53. Number of points having integer coordinates inside $\triangle ABC$ such that A(0, 0) B(41, 0) C(0, 41) is k. Find $\dfrac{k}{156}$?

54. Find number of natural number solutions for a + b + c + d + e = 20 such that a < b< c < d < e ?
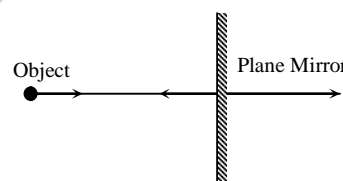
Space for Rough Work

Recommended Time: 60 Minutes for Section – III

Section – III

PHYSICS – (PART – A)

This part contains 5 Multiple Choice Questions number 55 to 59. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct.

55. A converging lens is used to form an image on a screen. When upper half of the lens is covered by an opaque screen
    (A) Half the image will disappear
    (B) Complete image will be formed of same intensity
    (C) Half image will be formed of same intensity
    (D) Complete image will be formed of decreased intensity

56. The angle of minimum deviation measured with a prism is 30° and the angle of prism is 60°. The refractive index of prism material is
    (A) $\sqrt{2}$ (B) 2
    (C) 3/2   (D) 4/3

57. In the diagram shown, the object is performing SHM according to the equation $y = 2A\sin(\omega t)$ and the plane mirror is performing SHM according to the equation $Y = -A\sin\left(\omega t - \dfrac{\pi}{3}\right)$. The diagram shows the state of the object and the mirror at time $t = 0$ sec. The minimum time from $t = 0$ sec after which the velocity of the image becomes equal to zero?

    (A) $\dfrac{\pi}{3\omega}$ (B) $\dfrac{3\pi}{\omega}$

    (C) $\dfrac{\pi}{6\omega}$ (D) $\dfrac{2\pi}{3\omega}$

58. A man runs towards a mirror at a speed 15 *m/s.* The speed of the image relative to the man is
    (A) 15 ms^{-1} (B) 30 ms^{-1}
    (C) 35 ms^{-1} (D) 20 ms^{-1}

59. A lens behaves as a converging lens in air and a diverging lens in water (μ_{water} = 1.33). The refractive index of the material is
    (A) Equal to unity   (B) Equal to 1.33
    (C) Between unity and 1.33   (D) Greater than 1.33

Space for Rough Work

CHEMISTRY – (PART – B)

*This part contains **5 Multiple Choice Questions** number **60 to 64**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

60. Which of the following pairs will give displacement reactions?
    (A) $ZnSO_4$ solution and copper metal
    (B) $MgCl_2$ solution and Aluminium metal
    (C) $FeSO_4$ solution and silver metal
    (D) $AgNO_3$ solution and copper metal.

61. Aluminium does not oxidise readily in air because-
    (A) it is high in the electrochemical series
    (B) it is low in the electrochemical series
    (C) the metal does not combine with oxygen
    (D) the metal is coverted with a layer of oxide which does not rub off.

62. Sodium hydroxide turns phenolphthalein solution
    (A) pink
    (B) yellow
    (C) colourless
    (D) orange

63. Which one of the following statements is correct about universal indicators?
    (A) It is a mixture of HCl and NaOH
    (B) It is a mixture of many indicators
    (C) It is a solution of phenolphthalein in alcohol
    (D) It is a solution of phenolphthalein in water

64. Which of the following reactions represents thermite welding process involved in the repairing of broken railway tracks?
    (A) $Al + Fe_2O_3 \rightarrow Al_2O_3 + Fe$
    (B) $Al_2O_3 + Cr \rightarrow Cr_2O_3 + Al$
    (C) $Al_2O_3 + Fe \rightarrow Fe_2O_3 + Al$
    (D) $C + Fe_2O_3 \rightarrow CO + Fe$

Space for Rough Work

MATHEMATICS – (PART – C)

*This part contains **5 Multiple Choice Questions** number **65 to 69**. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.*

65. The number of all two-digit natural numbers n such that n is equal to sum of square of digit in its ten's place and cube of digit in unit place is ?
    (A) 0   (B) 1   (C) 2   (D) more than 2

66. If $x^{2013} + \dfrac{1}{x^{2013}} = 2$, Find $x^{2022} + \dfrac{1}{x^{2022}}$?
    (A) 0   (B) 1   (C) 2   (D) 4

67. The number of solutions in positive integers of 2x + 3y = 763 is
    (A) 125   (B) 126   (C) 127   (D) 128

68. If $\sec\theta + \tan\theta = k$ then find $\cos\theta$:
    (A) $\dfrac{k^2+1}{2k}$ (B) $\dfrac{2k}{k^2+1}$ (C) $\dfrac{k}{k^2+1}$ (D) $\dfrac{k}{k^2-1}$

69. The remainder when $\dfrac{1!+2!+3!+...+99!}{15}$
    (A) 1   (B) 2   (C) 3   (D) 0

Space for Rough Work

PHYSICS – (PART – D)

This part contains **3 Numerical Based Questions** number **70 to 72**. Each question has **Single Digit Answer 0 to 9**.

70.   Two rays are incident on a spherical concave mirror of radius R = 5cm parallel to its optical axis at distances h_1 = 3 cm and h_2 = 4cm. Determine the approximate value Δx , where Δx is the distance between the points at which these rays intersect the optical axis after being reflected from the mirror.

71.   A rectangular tank of depth 8 meter is full of water ($\mu = 4/3$), the bottom is seen at the depth (in meter)

72.   A man cannot see closer than 1m from the eyes clearly. What is the power of the corrective lens used?

Space for Rough Work

CHEMISTRY – (PART – E)

*This part contains **3 Numerical Based Questions** number **73 to 75**. Each question has **Single Digit Answer 0 to 9**.*

73. Calculate the pH of a solution of a 0.05 M diabasic acid assuming 100% ionization.

74. How many acids in the following are present in either fruit or vegetable.
    Oxalic acid, Malic acid, nitric acid, tartaric acid, sulphuric acid, hydrochloric acid

75. Properties belong to metals :
    Ductility, Conductivity, Brittle, Low B.P. & M.P., Lustre, Non-Sonorous, Dense, Electropositive.

Space for Rough Work

MATHEMATICS – (PART – F)

This part contains 3 Numerical Based Questions number 76 to 78. Each question has Single Digit Answer 0 to 9.

76. Find remainder when 3^{128} is divided by 13 ?

77. If α, β, r are roots of $x^3 - 3x + 1 = 0$, find value of $(\alpha + \beta)^3 + (\beta + r)^3 + (r + \alpha)^3$?

78. If $\sin \theta_1 + \sin \theta_2 + \sin \theta_3 = 3$ then
$\cos\theta_1 + \cos\theta_2 + \cos\theta_3$ is :

Space for Rough Work

FIITJEE Big Bang Edge Test - 2022
for students presently in Class 10 (going to 11) (Paper 2)
SAMPLE PAPER ANSWER KEY

1.	**A**	2.	**B**	3.	**C**	4.	**D**
5.	**B**	6.	**C**	7.	**A**	8.	**B**
9.	**D**	10.	**A**	11.	**B**	12.	**A**
13.	**B**	14.	**A**	15.	**A**	16.	**D**
17.	**D**	18.	**B**	19.	**A**	20.	**B**
21	**B**	22.	**D**	23.	**D**	24.	**C**
25.	**A**	26.	**D**	27.	**D**	28.	**B**
29.	**A**	30.	**A**	31.	**A**	32.	**B**
33.	**D**	34.	**A**	35.	**C**	36.	**B**
37.	**A**	38.	**C**	39.	**C**	40.	**B**
41.	**D**	42.	**B**	43.	**C**	44.	**A**
45.	**A**	46.	**C**	47.	**B**	48.	**D**
49.	**3**	50.	**2**	51.	**6**	52.	**1**
53.	**5**	54.	**7**	55.	**D**	56.	**A**
57.	**D**	58.	**B**	59.	**C**	60.	**D**
61.	**D**	62.	**A**	63.	**B**	64.	**A**
65.	**C**	66.	**C**	67.	**C**	68.	**B**
69.	**C**	70.	**1**	71.	**6**	72.	**3**
73.	**1**	74.	**3**	75.	**5**	76.	**9**
77.	**3**	78.	**0**				