Paper Code No- CB06 Question Booklet No. 206163

SET C

ENTRANCE EXAMINATION-2018

B Sc- Hons Physics/Mathematics/Applied Mathematics /Chemistry/B Sc

ROLL NO. | B | 0 | 6 | 1 | 6 | 1 | 9 | 1 |

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Signature of Invigilator

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Time: 1 Hour 45 Minutes Total Marks: 100

Instructions to Candidates

1. Do not write your name or put any other mark of identification anywhere in the OMR Response Sheet. **IF ANY MARK OF IDENTIFICATIONS IS DISCOVERED ANYWHERE IN OMR RESPONSE SHEET, the OMR sheet will be cancelled, and will not be evaluated.**
2. This Question Booklet contains the cover page and a total of **100 Multiple Choice Questions of 1mark each.**
3. Space for rough work has been provided at the beginning and end. Available space on each page may also be used for rough work.
4. There is negative marking in Multiple Choice Questions. For each wrong answer, 0.25 marks will be deducted.
5. USE OF CALCULATOR IS NOT PERMITTED.
6. USE/POSSESSION OF ELECTRONIC GADGETS LIKE MOBILE PHONE, iPhone, iPad, pager ETC. is strictly **PROHIBITED**.
7. Candidate should check the serial order of questions at the beginning of the test. If any question is found missing in the serial order, it should be immediately brought to the notice of the Invigilator. No pages should be torn out from this question booklet.
8. Answers must be marked in the OMR response sheet which is provided separately. OMR Response sheet must be handed over to the invigilator before you leave the seat.
9. The OMR response sheet should not be folded or wrinkled. The folded or wrinkled OMR/response Sheet will not be evaluated.
10. Write your Roll Number in the appropriate space (above) and on the OMR Response Sheet. Any other details, if asked for, should be written only in the space provided.
11. There are four options to each question marked A, B, C and D. Select one of the most appropriate option and fill up the corresponding oval/circle in the OMR Response Sheet provided to you. The correct procedure for filling up the OMR Response Sheet is mentioned below.
12. **Use Black or Blue Ball Pen** only for filling the ovals/circles in OMR Response Sheet. Darken the selected oval/circle completely. If the correct answer is 'B', the corresponding oval/circle should be completely filled and darkened as shown below.

CORRECT METHOD
(A) ● (C) (D)

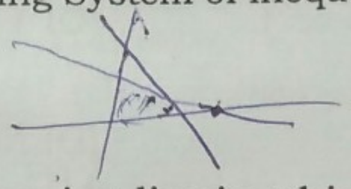
WRONG METHOD																			
(A)	⊗	(C)	(D)	(A)	✓	(C)	(D)	(A)	●	(C)	(D)	(A)	●	(C)	(D)	○	●	(C)	(D)	(A)	●	(C)	●

1. For any real number x and y, $\cos x = \cos y$ implies x equal to
   (A) $n\pi \pm y$ (B) $2n\pi \pm y$ (C) $n\pi + (-1)^n$ (D) $n\pi + y$

2. Express $(5-3i)^3$ in the form a+ib
   (A) -10-198i (B) -10-199i (C) -10-200i (D) -10

3. In how many ways can 10 examination papers should be managed so that the best and worst examination papers never appear together
   (A) 7 *9! (B) 8 *8! (C) 8 *9! (D) 9 *8!

4. Solve the following System of inequalities graphically



$$x + 2y \leq 8$$
$$2x + y \leq 8$$
$$x \geq 0\ y \geq 0$$

then shaded region lies in which quadrent?

(A) second quadrent (B) first quadrent (C) third quadrent (D) fourth quadrent

5. Find the Coefficient of x^6y^3 in the expansion of $(x+2y)^9$
   (A) 662 (B) 672 (C) 682 (D) 692

6. The remainder when 7^{103} is divided by 25 is
   (A) 16 (B) 18 (C) 9 (D) 0

7. If $f(x) = (x+1)^{\cot x}$ be continuous at $x = 0$, then $f(0)$ is equal to
   (A) 0 (B) $1/e$ (C) e (D) none of these

8. In the expansion of $\left(x - \frac{1}{3x^2}\right)^9$, the term independent of x is
   (A) T_3 (B) T_4 (C) T_5 (D) none of these

9. Three consecutive vertices of a parallelogram are (-2,-1),(1,0) and (4,3).Find the fourth vertex
   (A) (0,1) (B) (2,1) (C) (1,2) (D) none of these

10. If parabola $y^2 = px$ passes through the point (2,-3),then the length of latus rectum is
    (A) 4/3 (B) 7/2 (C) 9/2 (D) 2/9

11. A coin is tossed n times then the number of elements in its sample space are
    (A) 2^n (B) n^2 (C) n (D) none of these

12. The function $f(x) = \cot^{-1} x + x$ increases in the interval
    (A) $(1,\infty)$ (B) $(-1,\infty)$ (C) $(-\infty,\infty)$ (D) $(0,\infty)$

13. An urn contains 5 blue and an unknown no. x of red balls. Two balls are drawn at random. If the probability of both of them being blue is 5/14, then x is

(A) 4 (B) 3 (C) 2 (D) 5

14. The standard deviation of the following data: 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, is

(A) 4.75 (B) 5.50 (C) 5.13 (D) 5.74

15. The system of equations has no solution, if α is

$$\alpha x + y + z = \alpha - 1$$
$$x + \alpha y + z = \alpha - 1$$
$$x + y + \alpha z = \alpha - 1$$

(A) -2 (B) not -2 (C) either -2 or 1 (D) 1

16. Differentiation of a^x with respect to x, where a is a positive constant

(A) $x^a \log a$ (B) $a^x \log x$ (C) $a^x \log a$ (D) None of them

17. If the Rolle's theorem holds true for the function $y = x^2+2$, $a = -2$ and b=2 then there exist $c \in (-2,2)$ such that f'(c)=0, then the value of c is

(A) 0 (B) 1 (C) 2 (D) 3

18. The line y=x+1 is a tangent to the curve $y^2 = 4x$ at the point

(A) (1, 2) (B) (2,1) (C) (1,-2) (D) (-1,2)

19. Find the area lying above x-axis and included between the circle $x^2 + y^2 = 8x$ and inside of the parabola $y^2 = 4x$

(A) $\frac{7}{3}(8 + 3\pi)$ (B) $\frac{2}{10}(8 + 3\pi)$ (C) $\frac{5}{3}(8 + 3\pi)$ (D) $\frac{4}{3}(8 + 3\pi)$

20. Find the equation of the curve passing through the point (1,1) whose differential equation is

$$xdy = (2x^2 + 1)dx \; (x \neq 0)$$

(A) $y = x^3 + \log|x|$ (B) $y = x^2 + \log|x|$ (C) $y = x + \log|x^2|$ (D) $y = x^2 + \log|x^3|$

21. Find the angle between two vectors $\vec{a}$ and $\vec{b}$ with magnitudes 1 and 2 respectively and when $\vec{a}.\vec{b} = 1$

(A) $\frac{\pi}{3}$ (B) $\frac{2\pi}{3}$ (C) $\frac{\pi}{6}$ (D) $\frac{2\pi}{5}$

22. Solve the following linear programming problem graphically:

Minimize $Z = 3x + 9y$ subject to the constraints

$$x + 3y \leq 60$$
$$x + y \geq 10$$
$$x \leq y$$
$$x \geq 0, y \geq 0$$

(A) Minimum value is 60 at the point (5, 5) of the feasible region
(B) Minimum value is 50 at the point (5, 5) of the feasible region
(C) Minimum value is 60 at the point (4, 5) of the feasible region
(D) Minimum value is 50 at the point (4, 5) of the feasible region

23. Find the distance between the points P(6, 5, 9) and the plane determined by the points A (3, -1, 2), B (5, 2, 4), C (-1,-1, 6)

(A) $\frac{3\sqrt{34}}{17}$ (B) $\frac{4\sqrt{34}}{17}$ (C) $\frac{2\sqrt{39}}{15}$ (D) $\frac{4\sqrt{39}}{15}$

24. Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1+\sqrt{\tan x}}$

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{12}$ (D) $\frac{\pi}{48}$

25. $\tan^{-1}\sqrt{3} - \sec^{-1}(-2)$ is equal to

(A) π (B) $-\frac{\pi}{3}$ (C) $\frac{\pi}{3}$ (D) $\frac{2\pi}{3}$

26. $\sin\left(\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right)$ is equal to

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) 1

27. Solve $\frac{5-2x}{3} \leq \frac{x}{6} - 5$, then the answer is:

(A) $x \in [8, \infty]$ (B) $x \in [0, 8]$ (C) $x \in (8, \infty)$ (D) $x \in (-\infty, 8]$

28. Sum of the sequence 7, 77, 777, 7777, ... to n term is

(A) $\frac{7}{9}\left[\frac{10(10^n-1)}{9} - n\right]$ (B) $\frac{7}{9}\left[\frac{10(10^n-1)-n}{9}\right]$ (C) $\frac{7^n}{9}\left[\frac{10(10^n-1)}{9} - n\right]$ (D) $\frac{7}{9^n}\left[\frac{10(10^n-1)}{9} - n\right]$

29. If points A(1,0,-6), B(-3,p,q) and C(-5,9,6) are collinear then the values of p and q are

(A) p=5,q=3 (B) p=6,q=1 (C) p=3,q=2 (D) p=6,q=2

30. If $R = \{(3,3), (6,6), (9,9), (12,12), (6,12), (3,9), (3,12), (3,6)\}$ be a relation the set A={3,6,9,12}. the relation is

(A)reflexive and transitive only (B) reflexive only
(C)an equivalence relation (D) reflexive and symmetric only

31. Which of the following is not a gland?

(A) Stomach (B) Liver (C) Kidney (D) Pancreas

32. How much blood does an average adult have in the body?

(A) 3-4 Litre (B) 4-5 Litre (C) 5-6 Litre (D) 6-7 Litre

33. Which of the following toxic gases in the environment lowers the resistance to pneumonia in human beings?

(A) Sulphur di oxide (B) Nitrogen di oxide
(C) Carbon di oxide (D) Hydrogen chloride

34. Who was awarded the Nobel Prize for the discovery of neutrons?

(A) Rutherford (B) Chadwick (C) Bohr (D) Goldstein

35. Electron was first identified by:
(A) J. J. Thomson (B) Daniel Rutherford (C) J Kepler (D) Hames Chadwick

36. The time period of a pendulum on moon:
(A) Becomes zero (B) Increases (C) Remains the same (D) Decreases

37. The chemical used as a fixer in photography is:
(A) Borax (B) Sodium thio sulphate
(C) Sodium sulphate (D) Ammonium persulphate

38. Rectifiers are used to convert:
(A) Low voltage to high voltage (B) High voltage to low voltage
(C) DC to AC (D) AC to DC

39. BFJ, IMQ, PTX, ??:
(A) XBF (B) XAE (C) WAE (D) WBF

40. UV3, VU8, XS15, AP24, ??:
(A) DL35 (B) EL37 (C) DK37 (D) EL35

41. You go north, turn right, then right again and then go to the left. In which direction are you now?
(A) North (B) South (C) East (D) West

42. Dengue fever is caused by?
(A) Bacteria (B) Fungi (C) Virus (D) Protozoan

43. 1.Birth 2.Death 3.Funeral 4.Marriage 5.Education
What is the correct order?
(A) 4, 5, 3, 1, 2 (B) 2, 3, 4, 5, 1 (C) 1, 5, 4, 2, 3 (D) 1, 3, 4, 5, 2

44. As lightning accompanies thunder
(P) was mingled with
(Q) so in my character
(R) the mutterings of my wrath
(S) a flash of humour
What is the correct order?
(A) QSPR (B) PRSQ (C) QPRS (D) QRPS

45. It was true that
(P) the pet dog
(Q) would never sleep anywhere
(R) we once had
(S) except on the sofa
What is the correct order
(A)RPQS (B) SPQR (C) PRQS (D) PQSR

Direction (Q.46-50): Select appropriate option to fill in the blanks:

46. Everyone in this universe is accountable to God ---------- his actions.
(A) about (B) against (C) for (D) of

47. The opposition parties allege that prices of essential commodities are ---------- like a runaway ball on.
(A) soaring (B) reviving (C) flying (D) leaping

48. A son who is unable to look his father in the face is
(A) guilty (B) arrogant (C) timid (D) ashamed

49. Must we be subjected to your _____ complaints all day long?
(A) tiresome (B) fearsome (C) awesome (D) gleesome

50. I like listening to Wesley go on about politics and social issues; his opinions are _____ with my own beliefs.
(A) latent (B) explicit (C) consonant (D) ensconced

51. An aqueous solution of Na_2SO_4 is
(A) Neutral (B) Acidic (C) Basic (D) Colloida

52. Potash alum is —
(A) Simple Salt (B) Complex Salt (C) Double Salt (D) Acidic Salt

53. Which of the following is a solid acidic oxide?
(A) SO_2 (B) CaO (C) Na_2O_2 (D) P_2O_5

54. Which of the following is a false statement?
(A) NaCl Solution is neutral (B) $AlCl_3$ Solution is acidic
(C) CH_3COONa solution is alkaline (D) Na HCO_3 Solution is acidic

55. Which of the following is the strongest base?
(A) N_2H_4 (B) N_3H (C) NH_3 (D) PH_3

56. Which of the following bases is not present in RNA?
(A) Adenine (B) Thymine (C) Uracil (D) Cytosine

57. The most electronegative element among the following is :
(A) Fluorine (B) Bromin (C)Sodium (D)Xenon

58. How much N/5 HCl solution would be required to neutralize 2 g of $CaCO_3$?
(A) 100 ml (B) 200 ml (C) 50 ml (D) 90 ml

59. One mole of H_2SO_4 will exactly be neutralized by:
(A) One mole of NH_3 (B) One mole of Ba $(OH)_2$
(C) Two moles of Ca $(OH)_2$ (D) Two moles of $Sr(OH)_2$

60. For preparation of 250 ml. N/10 $NaHCO_3$ Solution, the amount of $NaHCO_3$ taken is:
(A) 1.15 g (B) 4.10 g (C) 2.1 g (D) None of these

61. Compound having formula $C_{12}H_{24}$ is:
(A) Alkane (B) Alkene (C) Alkyne (D) None of these

62. The compound $CH_3CH_2CH_2CH_2COOH$ is :
(A) Butanoic Acid (B) Propanoic Acid (C) Hexanoic Acid (D) Heptanoic Acid

63. An example of a chemical property is
(A) Density (B) Mass
(C) Solubility (D) Acidity

64. The gas evolved when methylamine reacts with nitrous acid is _____.
(A) N_2 (B) NH_3
(C) H_2 (D) C_2H_6

65. The compound having formula $CH_3CH{=}NOH$ is –
(A) Geometrical Isomers (B) Cis-trans isomers
(C) Optical Isomers (D) Isomers

66. Which of the following is ethanoyl chloride
(A) CH_3COCl (B) CH_3CH_2Cl (C) CH_3CH_2COCl (D) None

67. The I.U.P.A.C. name of Neo-Pentane is –
(A) 2-Methyl butane (B) 2, 2– dimethyl propane
(C) Ethyl propane (D) 2, 4– dimethyl butane

68. Acetaldehyde reacts with HCN to give–
(A) Acetaldehyde Oxime (B) Acetaldehyde Cyanohydrin
(C) Acetaldehyde Chlorohydrin (D) Acetone

69. Glucose on Oxidation gives: –
(A) Acid (B) Aldehyde (C) Ester (D) Ether

70. Which of the following compound Contains carbonyl group?
(A) Acetic Acid (B) Acetaldehyde (C) Formaldehyde (D) All of them

71. Which of the following is not an air pollutant?
(A) CO (B) SO_2 (C) NO (D) N_2

72. The gases which is not responsible for photochemical smog?
(A) Oxides of Nitrogen (B) Hydrocarbons
(C) Inert Gases (D) Carbon monoxide

73. K_2CrO_4 is used to identify–
(A) Cu^{2+} (B) Ba^{2+} (C) Ag^{+} (D) Ca^{2+}

74. Which of the following nitrates on strong heating leaves the metal as the residue?
(A) $AgNO_3$ (B) $Pb(NO_3)_2$ (C) $Cu(NO_3)_2$ (D) $Al(NO_3)_2$

75. Which among the following is most soluble in water?
(A) $Mg(OH)_2$ (B) $Sr(OH)_2$ (C) $Ca(OH)_2$ (D) $Ba(OH)_2$

76. A Young's double slit experiment uses a monochromatic source of light. The shape of interference fringes formed on the screen is
(A) Parabola (B) Straight line (C) Circle (D) Hyperbola

77. Two slits are made one millimeter apart and the screen is placed one metre away. The fringe separation when blue green light of wavelength 500 nm is used is
(A) 5×10^{-4} m (B) 2.5×10^{-3} m (C) 2×10^{-4} m (D) 10×10^{-4}m

78. In Young's double slit experiment the ratio of intensity of the maxima and minima in the interference experiment is 25 : 9.The ratio of widths of two slits is
(A) 18: 3 (B) 4: 1 (C) 8: 1 (D) 16 : 1

79. A screen is placed 50 cm from a single slit which is illuminated with light of wavelength 6000 Å. If the distance between the first and third minima in the diffraction pattern is 3.0 mm, the width of the slit is
(A) 1×10^{-4} m (B) 2×10^{-4} m (C) 0.5×10^{-4} m (D) 4×10^{-4} m

80. The input resistance of a transistor is 1000 Ω on charging its base currently by 10 μA, the collector current increases by 2 mA. If a load resistance of 5 kΩ is used in the circuit, the voltage gain of the amplifier is
(A) 100 (B) 500 (C) 1000 (D) 1500

81. In an *n-p-n* circuit transistor, the collector current is 10 mA. If 80% electron emitted reach the collector, then
(A) the emitter current will be 7.5 mA (B) the emitter current will be 12.5 mA
(C) the base current will be 3.5 mA (D) the base current will be 1.5 mA

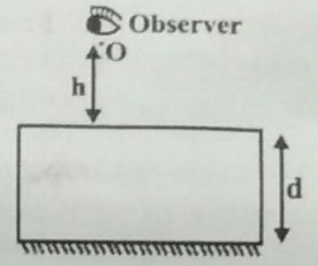
82. An air bubble in a glass sphere (μ = 1.5) is situated at a distance 3 cm from a convex surface of diameter 10 cm. At what distance from the surface will the bubble appear?
(A) 2.5 cm (B) – 2.5 cm (C) 5 cm (D) – 5 cm

83. A boy of height 1 m stands in front of a convex mirror. His distance from the mirror is equal to its focal length. The height of this image is
(A) 0.25 m (B) 0.33 m (C) 0.5 m (D) 0.67 m

84. A compound microscope consists of an objective lens with focal length 1.0 cm and eye piece of focal length 2.0 cm and a tube length 20 cm, the magnification will be
(A) 100 (B) 200 (C) 250 (D) 300

85. A convergent beam of light passes through a diverging lens of focal length 0.2m and comes to focus 0.3 m behind the lens. The position of the point at which the beam would coverage in the absence of the lens is
(A) 0.12 m (B) 0.6 m (C) 0.3 m (D) 0.15 m

86. A point luminous object (O) is at a distance h from front face of a glass slab of width d and of refractive index μ. On the back face of slab is a reflecting plane mirror. An observer sees the image of object in mirror [figure]. Distance of image from front face as seen by the observer will be



(A) $h+\frac{2d}{\mu}$ (B) 2h +2d (C) h + d (D) $h+\frac{d}{\mu}$

87. A plane mirror is placed along the x-axis facing negative y-axis. The mirror is fixed. A point object is moving with $3\hat{i}+4\hat{j}$ in front of the plane mirror. The relative velocity of image with respect to its object is

(A) $-8\hat{j}$ (B) $8\hat{j}$ (C) $3\hat{j}-4\hat{j}$ (D) $-6\hat{j}$

88. A jet plane is travelling west at the speed of 1600 kmh^{-1}. The voltage difference developed between the ends of the wings having a span of 20 m, (if the earth's magnetic field at the location has a magnitude of 5×10^{-4} T and the dip angle is 30°) is

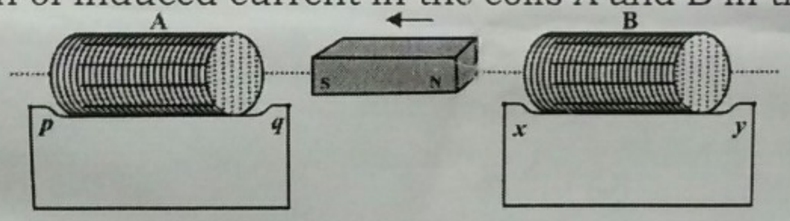
(A) 4.1 V (B) 2.2 V (C) 3.2 V (D) 3.8 V

89. *The co-efficient of mutual inductance of two coils depends on*

(A) medium between the coil (B) distance between the coils

(C) orientation of the two coils (D) all of these

90. *The direction of induced current in the coils A and B in the situation shown in the figure is*



(A) p to q in coil A and x to y in coil B (B) q to p in coil A and x to y in coil B

(C) p to q in coil A and y to x in coil B (D) q to p in coil A and y to x in coil B

91. Two solenoids of equal number of turns have their lengths and the radii in the same ratio 1 : 2. The ratio of their self inductances will be

(A) 1 : 2 (B) 2 : 1 (C) 1 : 1 (D) 1 : 4

92. A square of side x meters lies in the x-y plane in a region, where the magnetic field is given by $\vec{B}=B_0(3\hat{i}+4\hat{j}+5\hat{k})T$ where B_0 is constant. The magnitude of flux passing through the square is

(A) 5 B_0x^2 Wb (B) $3B_0x^2$ Wb (C) $2B_0x^2$ Wb (D) B_0x^2 Wb

93. *If the number of turns per unit length of a coil of solenoid is double, the self inductance of the solenoid will*

(A) remain unchanged (B) be halved (C) be doubled (D) become four time

94. In a pure capacitive circuit, if the frequency of a ac source is doubled, then its capacitive reactant will be
(A) remain same (B) doubled (C) halved (D) zero

95. At resonance frequency the impedance in series LCR circuit is
(A) maximum (B) minimum (C) zero (D) infinity

96. Streamline flow is more likely for liquids with
(A) high density and high viscosity (B) low density and low viscosity
(C) high density and low viscosity (D) low density and high viscosity

97. In a potentiometer a cell of emf 1.5V gives a balanced point at 32 cm length of the wire. If the cell is replaced by another cell the balance point shift to 65.0cm, then the emf of second cell is
(A) 3.05V (B) 2.05V (C) 4.05V (D) 6.05V

98. When a drop of water splits up into number of drops
(A) area increases (B) volume increases
(C) energy is absorbed (D) both (A) and (C)

99. A liquid will not wet the surface of a solid if its angle of contact is
(A) zero (B) 90° (C) 45° (D) greater than 90°

100. Which of the following instrument is used for measuring gauge pressure?
(A) Thermometer (B) Barometer (C) Manometer (D) Hydrometer

$\omega = \frac{2\pi}{f}$