JAMIA MALAYALI HALQA

Paper Code No- AB06/1 Question Booklet No 206321

ENTRANCE EXAMINATION-2016

B.Sc- Hons Physics/ Mathematics/ Chemistry/ B.Sc with Instrumentation/ B.Sc

SET A

ROLL NO. | | | | | | | | | |

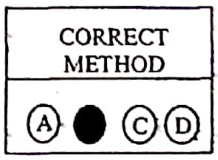
.....

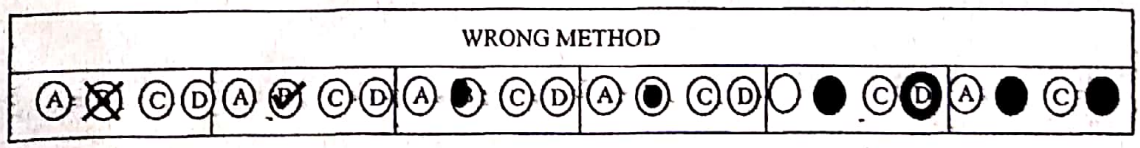
Signature of Invigilator

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 Answer Sheet. **IF ANY MARK OF IDENTIFICATIONS IS DISCOVERED ANYWHERE IN OMR ANSWER SHEET, the OMR sheet will be cancelled, and will not be evaluated.**
2. This Question Booklet contains this cover page and a total of **100 Multiple Choice Questions of 1mark.** Space for rough work has been provided at the beginning and end. Available space on each page may also be used for rough work.
3. Each correct answer carries one mark.
4. There is negative marking for 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 not permitted.
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 answer sheet which is provided separately. OMR answer sheet must be handed over to the invigilator before you leave the seat.
9. The OMR answer sheet should not be folded or wrinkled. The folded or wrinkled OMR/Answer Sheet will not be evaluated.
10. Write your Roll Number in the appropriate space (above) and on the OMR Answer Sheet. Any other details, if asked for, should be written only in the space provided.
11. There are four alternative answers to each question marked A, B, C and D. Select one of the answers you consider most appropriate and fill up the corresponding oval/circle in the OMR Answer Sheet provided to you. The correct procedure for filling up the OMR Answer Sheet is mentioned below.
12. Use Black or Blue Ball Pen only for filling the ovals/circles in OMR Answer Sheet while answering the Questions. For your Choice of answers darken the correct oval/circle completely. If the correct answer is 'B', the corresponding oval/circle should be completely fill and darkened as shown below.





SECTION CHEMISTRY

1. How many position isomers can be obtained by the mono substitution of toluene with chlorine?

(A) Four (B) Three
(C) Two (D) Five

2. Which of the following is temporary effect?

(A) Hyperconjugation (B) Resonance
(C) Electomeric (D) Inductive

3. Aromaticity of benzene is due to

(i) It possesses planar structure
(ii) It obeys Huckel's rule
(iii) It is cyclic
(iv) Delocalized π electrons

(A) (i) , (ii) and (iv) (B) (ii), (iii) and (iv)
(C) (i),(ii) and (iii) (D) All

4. The distinction between primary, secondary and tertiary alcohols can be made by

(i) Lucas reagent (ii) Victor Meyer test
(iii) Iodoform test

(A) (i) (B) (ii)
(C) (i) and (ii) (D) (i), (ii) and (iii)

5. The volume of hydrogen gas obtained at STP in litre when one gram of Al completely reacted with excess of aquos NaOH [Al=27]

(A) 1.24 (B) 1.66
(C) 2.49 (D) .83

6. Which is not standard state of element?

(A) Graphite (B) Oxygen gas
(C) Monoclinic sulphur (D) White-phosphorous

7. Which of the following is not an ore of Aluminium

(A) Cryolite (B) Feldspar
(C) Mica (D) Siderite

8. The ratio of radius of hydrogen atom of its second excited state to its ground state is

(A) 4:1 (B) 9:1
(C) 2:1 (D) 3:1

9. For the same speed which of the following gaseous molecule will have larger wave associate with it

(A) Hydrogen (B) Oxygen
(C) Nitrogen (D) Carbon dioxide

10. Which forms complex compound?

(A) Addition of ammonia in hard water
(B) Addition of EDTA in hard water
(C) Addition of copper sulphate in hard water
(D) Addition of potash alum in hard water.

11. The vapor density of the mixture of NO_2 and N_2O_4 is 40. The mass percentage of NO_2 in 100 gram of the mixture is

(A) 80 (B) 15
(C) 20 (D) 85

12. The hybridization of Al in Al_2Cl_6 is

(A) sp (B) sp^2
(C) sp^3 (D) sp^3d

13. Peroxide effect is observed for which of the following when added to propane

(A) HCl (B) HBr
(C) HI (D) All

14. False statement about diamond is

(A) It is an allotrope of carbon
(B) It has tetrahedral shape
(C) It has highest thermal conductivity
(D) It is hardest substance

15. Maximum covalence of nitrogen is

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

16. In periodic table anomalous behaviour of elements is generally observed in

(A) First period (B) Second period
(C) Third period (D) Fourth period

17. Pairs of elements having lowest ionization energy and highest Electron affinity

(A) Rb and F (B) Cs and F
(C) Rb and Cl (D) Cs and Cl

18. Which of the following orbital has highest angular momentum

(A) 5d (B) 6s
(C) 4f (D) 7p

19. A 2 litre closed container contains 2 gram hydrogen, 16 gram oxygen and 14 gram nitrogen at 27°C temperature. Assuming they are non-reacting, the pressure exerted in atmosphere by hydrogen is [R=0.082 lit-atm/mol/k]

(A) 24.6 (B) 12.3
(C) 6.15 (D) 3.075

20. Iodoform test is not given by

(A) Ethanol (B) Acetic acid
(C) Acetaldehyde (D) Acetone

21. Glycosidic linkage is found in
(A) Lactose (B) Glucose
(C) Fructose (D) D-xylose

22. For which of the following order of reaction the rate constant is equal to rate of reaction
(A) 0 (B) 1
(C) 2 (D) 3

23. The heat of combustion of carbon is 393.5 kj/mol. The calorific value of carbon is
(A) 393.5 kj (B) 4722 kj
(C) 32.80 kj (D) Can't be determined.

24. How much electricity in faraday (F) is passed to obtain one mole of Al from one mole of Al_2O_3 during electrolysis.
(A) 2 (B) 3
(C) 12 (D) 6

25. Which of the following is not a state function?
(A) Pressure (B) Volume
(C) Temperature (D) Heat

SECTION (MATHS)

26. If $\left(\frac{1-i}{1+i}\right)^{100} = \alpha + i\beta$, then

(A) $\alpha = 2, \beta = -1$ (B) $\alpha = 1, \beta = 0$
(C) $\alpha = 0, \beta = 1$ (D) $\alpha = -1, \beta = 2$

27. The angle between the lines $2x^2 - 7xy + 3y^2 = 0$ is

(A) 60^0 (B) 45^0
(C) $\tan^{-1}(7/6)$ (D) 30^0

28. Area of the quadrilateral formed by the lines $|x| + |y| = 1$ is

(A) 4 (B) 2
(C) 8 (D) none of these

29. The probability that a person will hit a target in shooting practice is 0.3. If he shoots 10 times, the probability that he hits the target is

(A) 1 (B) $1-(0.7)^{10}$
(C) $(0.7)^{10}$ (D) $(0.3)^{10}$

30. The value of $\lim_{x\to\infty} \frac{\sin x}{x}$ is

(A) 1 (B) 0
(C) -1 (D) none of these

31. If $G(x) = -\sqrt{25 - x^2}$, then $\lim_{x\to 1} \frac{G(x) - G(1)}{x - 1}$ has the value

(A) $\frac{1}{\sqrt{24}}$ (B) $\frac{1}{5}$
(C) $-\sqrt{24}$ (D) none of these

32. 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

33. 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

34. The system of linear equations $x + y + z = 2$, $2x + y - z = 3$, $3x + 2y + kz = 4$ has a unique solution if

(A) $k \neq 0$ (B) $-1 < k < 1$
(C) $-2 < k < 2$ (D) $k = 0$

35. If

$$f(x) = \begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & (x+1)x \\ 3x(x-1) & 2(x-1)(x-2) & (x+1)x(x-1) \end{vmatrix},$$

Then $f(100)$ is equal to
(A) 0 (B) 1
(C) 100 (D) $k = 0$

36. If the circles $x^2 + y^2 = 9$ and $x^2 + y^2 + 8y + c = 0$ touch each other, then c is equal to

(A) 15 (B) -15
(C) 16 (D) -16

37. The function $f(x) = \cot^{-1} x + x$ increases in the interval

(A) $(1, \infty)$ (B) $(-1, \infty)$
(C) $(-\infty, \infty)$ (D) $(0, \infty)$

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(A) $(1, \infty)$ (B) $(-1, \infty)$
(C) $(-\infty, \infty)$ (D) $(0, \infty)$

38. The maximum value of $\left(\frac{1}{x}\right)^x$ is

(A) e (B) e^a
(C) $e^{1/a}$ (D) $\left(\frac{1}{a}\right)^{1/a}$

39. The value of a so that the sum of the squares of the roots of the equation $x^2 - (a-2)x - a + 1 = 0$ assumes the least value, is

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

40. If $\int e^{\tan^{-1}x}\left(\frac{1+x+x^2}{1+x^2}\right)dx$ is equal to

(A) $xe^{\tan^{-1}x} + C$ (B) $x^2e^{\tan^{-1}x} + C$
(C) $\frac{1}{x}e^{\tan^{-1}x} + C$ (D) none of these

41. The value of $\int_{-1}^{1} x|x|dx$ is

(A) 2 (B) 1
(C) 0 (D) none of these

42. The points of extremism of
$\varphi(x) = \int_1^x e^{-\frac{t^2}{2}}(1-t^2)dt$ are

(A) $x = 1, -1$ (B) $x = -1, 2$
(C) $x = 2, 1$ (D) $x = -2, 1$

43. The area bounded by the curve $y = 2x - x^2$ and the straight line $y = -x$ is given by

(A) 9/2 (B) 43/6
(C) 35/6 (D) none of these

44. The degree of the differential equation

$\left(\frac{d^3y}{dx^3}\right)^{2/3} + 4 - 3\frac{d^2y}{dx^2} + 5\frac{dy}{dx} = 0$ is

(A) 1 (B) 2
(C) 3 (D) none of these

45. The general solution of the differential equation $(1+y^2)dx + (1+x^2)dy = 0$ is

(A) $x - y = C(1-xy)$ (B) $x - y = C(1+xy)$
(C) $x + y = C(1-xy)$ (D) $x + y = C(1+xy)$

46. The maximum value of xy subject to $x + y = 8$ is

(A) 8 (B) 16
(C) 20 (D) 24

47. The perimeter of a ΔABC is 6 times the arithmetic mean of the sines of its angles. If the side a is 1, then the angle A is

(A) $\pi/6$ (B) $\pi/3$
(C) $\pi/2$ (D) $2\pi/3$

48. Number of solutions of the equation $\tan x + \sec x = 2\cos x$, lying in the interval $[0, 2\pi]$ is

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

49. The number of ways in which one can post 5 letters in 7 letter boxes is

(A) 35 (B) ${}^7P_5$
(C) 7^5 (D) 5^7

50. The number of zeros at the end of 70! is

(A) 16 (B) 5
(C) 7 (D) 70

SECTION (PHYSICS)

51. The dimensions of $\frac{1}{2}\varepsilon_0 E^2$, where ε_0 is permittivity of free space and E is the electric field, are:

(A) MLT^{-1}
(B) ML^2T^{-2}
(C) $ML^{-1}T^{-2}$
(D) ML^2T^{-1}

52. If the gravitational field strength at a height h above the Earth of radius R is same as at a depth of R/2, then h has value

(A) R (B) R/2
(C) $(\sqrt{2}-1)$ R (D) $\sqrt{2}$R

53. If R be the radius of Earth then the height of the geostationary satellite orbit from Earth's surface is approximately

(A) R (B) 2R
(C) 5R D) 10R

54. A simple pendu... time period T. I... to 2^0 then the n...
(A) T

54. A simple pendulum of angle of swing 1^0 has time period T. If the angle of swing is increased to 2^0 then the new time period will be
(A) T
(B) 2T
(C) T/2
(D) T/4

55. Rainbow is formed due to following physical principles
(A) There is total internal reflection of light in water droplets
(B) There is angle of minimum deviation of light on refraction in water droplets
(C) Both of the above
(D) None of the above

56. Lunar eclipse will take place when
(A) The Sun is between the Moon and the Earth
(B) The Earth is between the Sun and the Moon
(C) The Moon is between the Sun and the Earth
(D) The Sun, the Moon and the Earth form an equilateral triangle in space

57. Tritium has a half life of 12.5 years. What fraction of a sample of pure tritium will remain undecided after 100 years
(A) 1/8
(B) 1/256
(C) 1/128
(D) 1/512

58. Energy released on burning fossil fuel has its origin in
(A) Geothermal energy
(B) solar energy
(C) Fission energy
(D) volcanic eruptions

59. A parallel plate capacitor having area A and separation between plates d has capacitance C. If the area of plates and separation between plates is changed to 2A and d/2 respectively, then the new capacitance is
(A) C/4
(B) C/2
(C) 2C
(D) 4C

60. If X is a planet in the night sky then
(A) Relative position of X will keep on changing with respect to other objects in the sky
(B) Relative position of X will remain same with respect to other objects in the sky
(C) X will be seen moving in a circular orbit in the sky
(D) X will be seen moving in an elliptical orbit in the sky

61. A rectangular object is sliding down an inclined plane at an increasing speed. If F is the frictional force on the object then
(A) F is increasing with time
(B) F is decreasing with time
(C) F is constant with time
(D) More information is needed for a definite conclusion

62. Insulators are bad conductors of electricity because in an insulator
(A) No electric field can be established
(B) No potential can be established
(C) There are no freely moving charge carriers
(D) There are no freely moving atoms

63. One solid and one hollow balls of same mass and diameter are rolled down simultaneously from same height on an inclined plane, then
(A) Hollow ball will reach first
(B) Solid ball will reach first
(C) Both balls will reach simultaneously
(D) More data is required for any conclusive statement

64. Lamps A and B are marked 100V, 100W and 100V, 50W respectively. If a potential difference of 200V is applied across a series combination of the two lamps then which lamp will burn brighter
(A) Both the lamps
(B) lamp A
(C) Lamp B
(D) none of the lamps

65. In an inelastic collision which quantity is not conserved
(A) Total energy
(B) kinetic energy
(C) Angular momentum
(D) linear momentum

66. Moderating material is used with nuclear fuel in nuclear power reactor as it

(A) Slows down neutrons to make them more effective for fission
(B) Slows down neutrons to make them less effective for fission
(C) Speeds up neutrons to make them more effective for fission
(D) Speeds up neutrons to make them less effective for fission

67. Poise is a unit of

(A) Pressure
(B) conductivity
(C) Surface tension
(D) viscosity

68. Consider a permanent electric dipole in an external uniform electric field. The dipole will experience

(A) Zero force and a non-zero torque
(B) zero force and a zero or non-zero torque
(C) Non-zero force and a zero torque
(D) non-zero force and a non-zero torque

69. An object is placed at 10 cm in front of a concave mirror of radius of curvature 15 cm, then the image formed is

(A) Magnified, real and inverted
(B) magnified, virtual and erect
(C) reduced, real and inverted
(D) reduced, virtual and erect

70. Height of ionosphere from surface of Earth is approximately

(A) 80-300 km
(B) 50-100 km
(C) 200-400 km
(D) 300-600 km

71. In a solar cell, optimum band gap of active semiconductor used, for maximum efficiency is

(A) 3.0 eV
(B) 1.1 eV
(C) 2.0 eV
(D) 1.5 eV

72. Thermo-emf V of a thermocouple has the temperature dependence given by $V=\alpha T+\beta T^2$, where T is the temperature difference between the two junctions and α and β are constants. Cold junction is at a temperature of 300K. If the neutral temperature of the thermocouple is 500K, then the inversion temperature is

(A) 400K
(B) 500K
(C) 600K
(D) 700K

73. A long straight wire of radius R carries a steady current I uniformly distributed across the cross section of the wire. Magnetic field at the center of the wire is

(A) Zero
(B) $2\mu_0 I/\pi R$
(C) $\mu_0 I/\pi R$
(D) $\mu_0 I/2\pi R$

74. A series LCR resonant circuit contains $R=5\Omega$, L=8mH and C=2nF. Quality factor Q of the circuit is

(A) 10^4
(B) 400
(C) 10^{-4}
(D) 2.5×10^{-3}

75. If Young's double slit experiment is performed using white light, then on the screen

(A) No fringes will be observed
(B) Large number of coloured fringes will be observed
(C) Few colored fringes will be observed
(D) There will be a white central fringe and few colored fringes around it

SECTION
(GENERAL AWARENESS/REASONING/ GENERAL ENGLISH)

76. If + means X,- means +,X means/ and / means-, then 10+5X10/2-5 has a value of

(A) 35
(B) 45
(C) 30
(D) None of the above

77. Arrange the
and choose
(A) Ron

77. Arrange the following words in alphabetical order and choose the one that comes at the last.
    (A) Romance
    (B) Rejoice
    (C) Reveal
    (D) Retain

78. From the given alternative words, select the one which cannot be formed using the letters of the given word.

    INFATUATION
    (A) Future
    (B) INFANT
    (C) ACTION
    (D) AUCTION

79. In a certain code POETRY is written as QONDSQX &OVER is written as PNUDQ. How MORE is be written in that code language?
    (A) LNNQD
    (B) NNNQD
    (C) NLNQD
    (D) NLPQD

Q80 AND 81
Select the letter/ word that could replace

80. Carbon: Diamond: :Corundum:?
    (A) Garnet
    (B) Ruby
    (C) Pukhraj
    (D) Pearl

81. BOQD: ERTG::ANPC:?
    (a) DSQF
    (b) FSHU
    (c) SHFU
    (d) DSQF

82. Find out the number that does not belong to the group of numbers for lack of common property.
    (A) 8
    (B) 42
    (C) 49
    (D) 35

83. Find out the set of number amongst the four sets of numbers given in the alternatives which is the most likely to the set given in the question:

    Given set (4, 25, 81)
    (A) (4, 36 ,79)
    (B) (9 ,48 ,81)
    (C) (16 ,64 ,100)
    (D) (9 ,49 ,143)

84. Yavanika (curtain) was introduced in Indian theatre by which of the following:
    (A) Shakas
    (B) Parthians
    (C) Greeks
    (D) Kushans

85. The kuka movement started in mid-nineteenth century in:
    (A) Western Punjab
    (B) Maharashtra
    (C) Bengal
    (D) Madhya pradesh

86. Who said 'swaraj is my birth right and I'll have it'?
    (A) Mahatma Gandhi
    (B) Bipin Chandra Pal
    (C) Gopal Krishna Gokhle
    (D) Bal Gangadhar Tilak

87. Process by which plants prepare their food is
    (A) Carbohydrolysis
    (B) Metabolic synthesis
    (C) Photosynthesis
    (D) Photosyntization

88. Study of bone is called
    (A) Orology
    (B) Oesteology
    (C) Seromology
    (D) Geology

89. A plant cell differ from animal in having
    (A) Chloroplast
    (B) Cell wall
    (C) Cell membrane
    (D) Nucleus

90. The book 'Midnight's Children has been written by:
    (A) Arundhati Roy
    (B) Tasleema Nasreen
    (C) SalmanRushdie
    (D) Kiran Desai

91. Ctrl, shift and Alt are called....keys.
    (A) Function
    (B) Modifier
    (C) Alphanumeric
    (D) Adjustment

92. Hydrogen was discovered by:
    (A) Cavendish
    (B) Lavosier
    (C) Rutherford
    (D) Scheele

93. Obscene
    (A) Objectionable
    (B) Indecent
    (C) Displeasing
    (D) Condemnable

94. Sumptuous
    (A) Lavish
    (B) Fancy
    (C) Meager
    (D) Irritable

95. Wary
    (A) Cautions
    (B) Accurate
    (C) Quick
    (D) Practical

96. Profound
    (A) Profuse
    (B) Boundless
    (C) Deep
    (D) Fathomless

97. Wanton
    (A) Sportive
    (B) Ardent
    (C) Fragile
    (D) Discreet

98. Grave
    (A) Noble
    (B) Inconsequential
    (C) Solemn
    (D) Senile

99. Parsimonious
    (A) Scrimp
    (B) Lavish
    (C) Polite
    (D) Meticulous

100. Reprimand
    (A) Reward
    (B) Appreciate
    (C) Encourage
    (D) Praise

Paper Code No- B06

Question Booklet No. 206421

ENTRANCE EXAMINATION-2017

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

SET A

ROLL NO.

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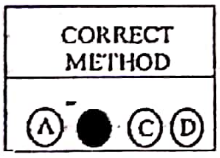
Signature of Invigilator

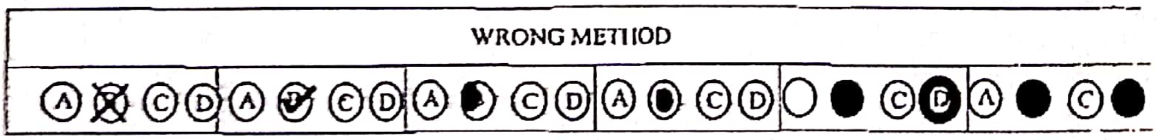
Time: 1 Hour 45 Minutes

Total Marks: 100

Instructions to Candidates

1. Do not write your name or put any other mark of identification anywhere in the OMR Answer Sheet. IF ANY MARK OF IDENTIFICATIONS IS DISCOVERED ANYWHERE IN OMR ANSWER SHEET, the OMR sheet will be cancelled, and will not be evaluated.
2. This Question Booklet contains this cover page and a total of 100 Multiple Choice Questions of 1mark. Space for rough work has been provided at the beginning and end. Available space on each page may also be used for rough work.
3. Each correct answer carries one mark.
4. There is negative marking for 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 not permitted.
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 answer sheet which is provided separately. OMR answer sheet must be handed over to the invigilator before you leave the seat.
9. The OMR answer sheet should not be folded or wrinkled. The folded or wrinkled OMR/Answer Sheet will not be evaluated.
10. Write your Roll Number in the appropriate space (above) and on the OMR Answer Sheet. Any other details, if asked for, should be written only in the space provided.
11. There are four alternative answers to each question marked A, B, C and D. Select one of the answers you consider most appropriate and fill up the corresponding oval/circle in the OMR Answer Sheet provided to you. The correct procedure for filling up the OMR Answer Sheet is mentioned below.
12. Use Black or Blue Ball Pen only for filling the ovals/circles in OMR Answer Sheet while answering the Questions. For your Choice of answers darken the correct oval/circle completely. If the correct answer is 'B', the corresponding oval/circle should be completely fill and darkened as shown below.





SECTION (CHEMISTRY)

1. Which of the following is not a characteristic of a crystalline solid?
   (A) Isotropic nature.
   (B) Definite and characteristic heat of fusion.
   (C) A regular periodically repeated pattern of arrangement of constituent particles in the entire crystal.
   (D) A true solid

2. Which of the following are peroxoacids of sulphur?
   (A) H_2SO_5 and $H_2S_2O_8$
   (B) H_2SO_5 and $H_2S_2O_7$
   (C) $H_2S_2O_7$ and $H_2S_2O_8$
   (D) $H_2S_2O_6$ and $H_2S_2O_7$

3. Silicon doped with electron-rich impurity forms:
   (A) *p*-type semiconductor
   (B) *n*-type semiconductor
   (C) intrinsic semiconductor
   (D) Insulator

4. What is the coordination number in a square close packed structure in two dimensions?
   (A) 2
   (B) 3
   (C) 4
   (D) 6

5. A ferromagnetic substance becomes a permanent magnet when it is placed in a magnetic field because .
   (A) all the domains get oriented in the direction of magnetic field.
   (B) all the domains get oriented in the direction opposite to the direction of magnetic field.
   (C) domains get oriented randomly.
   (D) domains are not affected by magnetic field.

6. Which of the following are examples of globular proteins?
   (A) All the above
   (B) Keratin
   (C) Myosin
   (D) Insulin

7. Benzophenone can be obtained by:
   (A) Benzoyl chloride + Phenyl magnesium chloride
   (B) Benzene + Carbon monoxide + $ZnCl_2$
   (C) Benzoyl chloride + Benzene + $AlCl_3$
   (D) None of the above

8. What is the correct order of reactivity of alcohols in the following reaction?
   $R—OH + HCl \rightarrow R—Cl + H_2O$
   (A) $1° > 2° > 3°$
   (B) $1° < 2° > 3°$
   (C) $3° > 2° > 1°$
   (D) $3° > 1° > 2°$

9. Maximum amount of a solid solute that can be dissolved in a specified amount of a given liquid solvent is independent of :
   (A) Pressure
   (B) Temperature
   (C) Nature of solute
   (D) Nature of solvent

10. In comparison to a 0.01 M solution of glucose, the depression in freezing point of a 0.01 M $MgCl_2$ solution is:
    (A) About three times
    (B) about twice
    (C) about six times
    (D) about 10 times

11. The values of Van't Hoff factors for KCl, NaCl and K_2SO_4, respectively, are
    (A) 2, 2 and 3
    (B) 2, 2 and 2
    (C) 1, 1 and 2
    (D) None of the above

12. K_H value for Ar(g), CO_2(g), HCHO (g) and CH_4(g) are 40.39, 1.67, 1.83×10^{-5} and 0.413 respectively. Arrange these gases in the order of their increasing solubility.
    (A) $HCHO < CH_4 < CO_2 < Ar$
    (B) $HCHO < CO_2 < CH_4 < Ar$
    (C) $Ar < CO_2 < CH_4 < HCHO$
    (D) $Ar < CH_4 < CO_2 < HCHO$

13. Which of the following electrolytes will have maximum coagulating value for AgI/Ag+ sol?
    (A) Na_2S
    (B) Na_3PO_4
    (C) Na_2SO_4
    (D) NaCl

14. 4L of 0.02 M aqueous solution of NaCl was diluted by adding one litre of water. The molality of the resultant solution is
    (A) 0.004
    (B) 0.008
    (C) 0.012
    (D) 0.016

15. The quantity of charge required to obtain one mole of aluminium from Al_2O_3 is_____.
(A) 1F
(B) 6F
(C) 2F
(D) 3F

16. Which of the following statement is not correct about an inert electrode in a cell?
(A) It does not participate in the cell reaction.
(B) It provides surface either for oxidation or for reduction reaction.
(C) It provides surface for conduction of electrons.
(D) It provides surface for redox reaction.

17. A first order reaction is 50% completed in 1.26×10^{14} s. How much time would it take for 100% completion?
(A) Infinite
(B) 1.26×10^{15} s
(C) 2.52×10^{14} s
(D) None of the above

18. Activation energy of a chemical reaction can be determined by _____.
(A) determining the rate constants at two temperatures.
(B) determining the rate constant at standard temperature.
(C) determining probability of collision.
(D) All the above.

19. Which one of the following is not applicable to the phenomenon of adsorption?
(A) $\Delta G < 0$
(B) $\Delta H > 0$
(C) $\Delta S < 0$
(D) $\Delta H < 0$

20. In the extraction of copper from its sulphide ore, the metal is formed by the reduction of Cu_2O with
(A) FeS
(B) CO
(C) Cu_2S
(D) SO_2

21. In the extraction of aluminium by Hall-Heroult process, purified Al_2O_3 is mixed with CaF_2 to:
(A) lower the melting point of Al_2O_3 and increase the conductivity of molten mixture.
(B) reduce Al^{3+} into Al(s).
(C) acts as catalyst
(D) All the above

22. In qualitative analysis when H_2S is passed through an aqueous solution of salt acidified with dil. HCl, a black precipitate is obtained. On boiling th precipitate with dil. HNO_3, it forms a solution of blue colour. Addition of excess of aqueous solution of ammonia to this solution gives:
(A) deep blue solution of $[Cu(NH_3)_4]^{2+}$
(B) deep blue precipitate of $Cu(OH)_2$
(C) deep blue solution of $Cu(NO_3)_2$
(D) deep blue solution of $Cu(OH)_2.Cu(NO_3)_2$

23. Which of the following is correct for P_4 molecule of white phosphorus?
(A) It has 6 lone pairs of electrons.
(B) It has six P–P single bonds.
(C) It has three P–P single bonds.
(D) None of the above

24. Which of the following is not tetrahedral in shape?
(A) NH_4^+
(B) $SiCl_4$
(C) SF_4
(D) SO_4

25. The magnetic nature of elements depends on the presence of unpaired electrons. Identify the configuration of transition element, which shows highest magnetic moment.
(A) $3d^5$
(B) $3d^3$
(C) $3d^8$
(D) $3d^2$

26. $KMnO_4$ acts as an oxidising agent in alkaline medium. When alkaline $KMnO_4$ is treated with KI, iodide ion is oxidised to ___.
(A) I_2
(B) IO^-
(C) IO^{3-}
(D) IO_4

27. Transition elements form binary compounds with halogens. Which of the following elements will form MF_3 type compounds?
(A) Cr
(B) Zn
(C) Cu
(D) Ni

28. Which of the following is most acidic?
(A) Benzyl alcohol
(B) Cyclohexanol
(C) Phenol
(D) *m*-Chlorophenol

29. Hoffmann Bromamide Degradation reaction is shown bywhich of the following compounds:
(A) $ArNH_2$
(B) $ArNO_2$
(C) $ArCONH_2$
(D) $ArCH_2NH_2$

30. IUPAC name of *m*-cresol is:
(A) 3-butyl phenol
(B) 3-chlorophenol
(C) 3-methoxyphenol
(D) 3-methylphenol

SECTION (MATHEMATICS)

31. If the algebraic sum of the perpendicular distances from the points (2, 0), (0, 2) and (1, 1) to a variable straight line be zero, then the line passes through the point
(A) $(-1, 1)$
(B) $(1, 1)$
(C) $(1, -1)$
(D) $(-1, -1)$

32. The equation $x^2 + y^2 - 6x + 8y + 25 = 0$ represents
(A) a point $(3, -4)$
(B) a pair of straight lines $x = 3,\ y = -4$
(C) a circle of non-zero radius
(D) none of these

33. If A, B are two $n \times n$ non-singular matrices, then
(A) AB is non-singular
(B) AB is singular
(C) $(AB)^{-1} = A^{-1}B^{-1}$
(D) $(AB)^{-1}$ does not exist

34. If A is an involutary matrix given by $A = \begin{bmatrix} 0 & 1 & -1 \\ 4 & -3 & 4 \\ 3 & -3 & 4 \end{bmatrix}$, then the inverse of $\frac{1}{2}A$ will be
(A) $2A$
(B) $\frac{1}{2}A^{-1}$
(C) $\frac{1}{2}A$
(D) A^2

35. Let $A = [a_{ij}]_{m \times n}$ be a matrix such that $a_{ij} = 1$ for all i, j. Then,
(A) $rank(A) > 1$
(B) $rank(A) = 1$
(C) $rank(A) = m$
(D) $rank(A) = n$

36. If $A = \begin{bmatrix} 1/a & 1 & bc \\ 1/b & 1 & ca \\ 1/c & 1 & ab \end{bmatrix}$, then determinant of A is:
(A) 0
(B) abc
(C) $\frac{1}{abc}$
(D) none of these

37. Let $A = \{(x, y): y = e^x,\ x \in R\}$ and $B = \{(x, y): y = e^{-x},\ x \in R\}$, then
(A) $A \cap B = \emptyset$
(B) $A \cap B \neq \emptyset$
(C) $A \cup B = R^2$
(D) none of these

38. The function $f: [0, 3] \to [1, 29]$, defined by $f(x) = 2x^3 - 15x^2 + 36x + 1$, is
(A) one-one and onto
(B) onto but not one-one
(C) one-one but not onto
(D) neither one-one nor onto

39. If a, b, c are in H.P., then $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ will be in
(A) A.P.
(B) G.P.
(C) H.P.
(D) none of these

40. A gentleman has six friends to invite. In how many ways can he send invitation cards to them, if he has three servants to carry the cards?
(A) 6^3
(B) 3^6
(C) 18
(D) 9

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(C) 18
(D) 9

41. In the binomial expansion of $(a-b)^n, n \geq 5$, the sum of the 5^{th} and 6^{th} terms is zero. Then a/b equals
(A) $\frac{n-5}{6}$
(B) $\frac{n-4}{5}$
(C) $\frac{5}{n-4}$
(D) $\frac{6}{n-5}$

42. $\int \frac{1}{\sqrt{x^2+2}} d(x^2+1)$ is equal to
(A) $2\sqrt{x^2+2}+C$
(B) $\sqrt{x^2+2}+C$
(C) $\frac{1}{(x^2+2)^{3/2}}+C$
(D) none of these

43. The value of $\int_{-\pi}^{\pi} \sin x \, f(\cos x) dx$ is
(A) π
(B) 2π
(C) $2f(1)$
(D) none of these

44. The area bounded by the eurve $y = x|x|$, x-axis and the ordinates $x = 1, x = -1$ is given by
(A) 0
(B) 1/3
(C) 2/3
(D) 1

45. The value of $cos1^\circ \; cos2^\circ \; cos3^\circ$..... $cos179^\circ$ is
(A) $\frac{1}{\sqrt{2}}$
(B) 0
(C) 1
(D) none of these

46. If $\cot\frac{A}{2} = \frac{b+c}{a}$, then the ΔABC is
(A) isosceles
(B) equilateral
(C) right angled
(D) none of these

47. If $sin^{-1}x + sin^{-1}(1-x) = cos^{-1}x$, then x equals
(A) $1, -1$
(B) $1, 0$
(C) $0, \frac{1}{2}$
(D) none of these

48. The solution of the equation $\frac{dy}{dx} = \frac{x+y}{x-y}$, is
(A) $C(x^2+y^2)^{1/2} + e^{tan^{-1}\left(\frac{y}{x}\right)} = 0$
(B) $C(x^2+y^2)^{1/2} = e^{tan^{-1}\left(\frac{y}{x}\right)}$
(C) $C(x^2-y^2)^{1/2} = e^{tan^{-1}\left(\frac{y}{x}\right)}$
(D) none of these

49. The order of the differential equation $\frac{d^2y}{dx^2} = \sqrt{1+\left(\frac{dy}{dx}\right)^3}$, is
(A) 2
(B) 1
(C) 3
(D) 4

50. If $\sin x$ is an integrating factor of the differential equation $\frac{dy}{dx} + Py = Q$, then P can be
(A) $\log \sin x$
(B) $\cot x$
(C) $\sin x$
(D) $\log \cos x$

51. If $\vec{a}, \vec{b}, \vec{c}$ are the position vectors of the vertices of an equilateral triangle whose orthocentre is at the origin, then
(A) $\vec{a}+\vec{b}+\vec{c} = \vec{0}$
(B) $|\vec{a}|^2 = |\vec{b}|^2 + |\vec{c}|^2$
(C) $\vec{a}+\vec{b} = \vec{c}$
(D) none of these

52. If $|\vec{a}| = 3, |\vec{b}| = 5$ and $|\vec{c}| = 4$ and $\vec{a}+\vec{b}+\vec{c} = \vec{0}$, then the value of $(\vec{a}.\vec{b} + \vec{b}.\vec{c})$ is equal to
(A) 0
(B) -25
(C) 25
(D) none of these

53. Let $\vec{a} = \hat{i}+\hat{j}+\hat{k}$, $\vec{c} = \hat{j}-\hat{k}$. If $\vec{b}$ is a vector satisfying $\vec{a}\times\vec{b} = \vec{c}$ and $\vec{a}.\vec{b} = 3$, then $\vec{b}$ is
(A) $\frac{1}{3}(5\hat{i}+2\hat{j}+2\hat{k})$
(B) $\frac{1}{3}(5\hat{i}-2\hat{j}-2\hat{k})$
(C) $3\hat{i}-\hat{j}-\hat{k}$
(D) none of these

54. If two
and
is

54. If two lines of regressions are $3x+2y = 19$ and $9x+3y = 46$, the correlation coefficient is
(A) $1/2\sqrt{3}$
(B) $-1/2\sqrt{3}$
(C) 0.52
(D) -0.52

55. If $\rho(x, y) = 0$, then two lines of regressions are
(A) parallel
(B) perpendicular
(C) coincident
(D) none of these

56. The value of $\lim_{x\to 0} \frac{x^2 \sin(\frac{1}{x})}{\sin x}$, is
(A) 1
(B) 0
(C) ½
(D) none of these

57. The function $f(x) = sin^{-1}(\sin x)$, is
(A) continuous but not differentiable at $x = \pi$
(B) continuous and differentiable at $x = 0$
(C) discontinuous at $x = -\pi$
(D) none of these

58. If $x^y = e^{x-y}$, then $\frac{dy}{dx}$ is equal to
(A) $(1 + \log x)^{-1}$
(B) $(1 + \log x)^{-2}$
(C) $\log x.(1 + \log x)^{-2}$
(D) none of these

59. The equation of the tangent to the curve $y = x + \frac{4}{x^2}$, that is parallel to the x-axis is
(A) $y = 2$
(B) $y = 3$
(C) $y = 0$
(D) $y = 1$

60. The value of c in the Rolle's theorem when $f(x) = 2x^3 - 5x^2 - 4x + 3$, $x \in [\frac{1}{2}, 3]$ is
(A) 2
(B) -1/3
(C) -2
(D) 2/3

SECTION (PHYSICS)

61. The following when added as an impurity to silicon produces n-type semiconductor
(A) P (B) Al
(C) B (D) Mg

62. An electric charge in uniform motion produces
(A) only electric field
(B) only magnetic field
(C) both electric and magnetic fields
(D) none of the above

63. X-rays are emitted when
(A) high energy electrons hit a substance of low molecular weight
(B) high energy electrons hit a substance of high molecular weight
(C) low energy electrons hit a substance of low molecular weight
(D) low energy electrons hit a substance of high molecular weight

64. The mean Kinetic Energy E per unit volume and pressure P of gas are related as
(A) P=2/3 E
(B) P=5/3 E
(C) P=3/2 E
(D) P=1/2 E

65. A monatomic ideal gas, initially at temperature T_1, is enclosed in a cylinder fitted with a frictionless piston. The gas is allowed to expand adiabatically to a temperature T_2 by releasing the piston suddenly. If L_1 and L_2 be the lengths of the gas column before and after expansion respectively then T_1/T_2 is given by:
(A) $(L_1/L_2)^{2/3}$
(B) (L_1/L_2)
(C) (L_2/L_1)
(D) $(L_2/L_1)^{2/3}$

66. A parallel plate capacitor having a separation between the plates d, plate area A and material with dielectric constant K has capacitance C_o. Now one –third of the material is replaced by another material with dielectric constant 2K, so that effective there are two capacitors one with area 1/3 A, dielectric constant 2K and another with area 2/3A and dielectric constant K. If the

capacitance of this new capacitor is C then C/C_0 is
(A) 1
(B) 4/3
(C) 2/3
(D) 1/3

67. If two soap bubbles of different radii are in communication with each other
(A) the size of the bubbles remains the same
(B) air flows from the large bubble till the size are equal
(C) air flows from the smaller bubble into the larger bubble
(D) none of these.

68. The r.m.s. velocity of the molecules of a gas at 15^0C is 1.8 X 10^3 m/s. What will be the r.m.s. velocity at 119 ^{0}C
(A) 7.2 x 10^3 m/s
(B) 1.1 x 10^3 m/s
(C) 2.1 x 10^3 m/s
(D) none of these

69. The law of equipartition of energy was postulated by
(A) Maxwell
(B) Boltzman
(C) Stefan
(D) Weins

70. Suppose a plane mirror is approaching you at the speed of 10 cm/sec and you can see your image in it. At what speed will your image approach you?
(A) 20 cm/sec
(B) 5 cm/sec
(C) 10 cm/sec
(D) 100 cm/sec

71. The plane face of a plano-convex lens is silvered. If μ be the refractive index and R, the radius of curvature, then the system will behave like a concave mirror of radius of curvature
(A) μR
(B) $R/(\mu - 1)$
(C) R^2/μ
(D) $(\mu + 1)/(\mu - 1)R$

72. The dimensions of $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$ are the same as that of
(A) Velocity
(B) Time
(C) Capacitance
(D) Distance

73. Two springs A and B have force constants K_1 and K_2 respectively. The ratio of work done on A to that done on B in increasing their lengths by the same amount is:
(A) $\frac{K_1}{K_2}$
(B) $\sqrt{\frac{K_1}{K_2}}$
(C) $\frac{K_2}{K_1}$
(D) $\sqrt{\frac{K_2}{K_1}}$

74. If the linear momentum is increased by 50%, the kinetic energy will increase by
(A) 50%
(B) 100%
(C) 125%
(D) 25%

75. If the gymnast sitting on a rotating stool, with his arms outstretched, suddenly lowers his arms
(A) the angular velocity decreases
(B) his moment of inertia decreases
(C) the angular velocity will remain constant
(D) the angular momentum increases

76. The escape velocity from the earth is 11 km/sec. The escape velocity from a planet having twice the radius and the same density as earth is
(A) 22 km/sec
(B) 11 km/sec
(C) 55 km/sec
(D) 15.5 km/sec

77. A transverse wave is described by the equation $y = y_0 \sin 2\pi (ft - x/\lambda)$. The maximum particle velocity is equal to four times the wave velocity if
(A) $\lambda = \pi y_0/4$
(B) $\lambda = \pi y_0/2$
(C) $\lambda = \pi y_0$
(D) $\lambda = 2\pi y_0$

78. The susceptibility of a dielectric depends on
(A) intensity of the applied field
(B) the dielectric polarization
(C) the ratio of dielectric polarization and the intensity of the applied field
(D) the ratio of the intensity of the applied field and dielectric polarization

79. The properties of light can be explained by
(A) wave theory
(B) particle theory
(C) both wave and particle theories
(D) none of the above

80. Which phenomenon causes polarisation of light
(A) reflection
(B) double reflection
(C) double refraction
(D) refraction

81. The ratio of phase velocity and the velocity of light is
(A) unity
(B) less than unity
(C) more than unity
(D) none

82. The equation of wave travelling in a string can be written as $y=3\cos\pi(100t-x)$. Its wavelength is
(A) 100 cm
(B) 20 cm
(C) 5 cm
(D) none of the above

83. At what temperature and pressure, the velocity of sound in air is double its value at 0°C ?
(A) 1092°C
(B) 819°C
(C) 546°C
(D) 273°C

84. The path difference between two wavefronts emitted by coherent sources of wavelengths 5460 A^0 is 2.1μ. The phase difference between the wavefronts at the points is
(A) 7.692 rad
(B) 7.692π rad
(C) $\frac{7.692}{\pi}$ rad
(D) $\frac{7.692}{3\pi}$ rad

85. Two coils are placed close to each other. The mutual inductance of the pair of coils depends upon:
(A) The rate at which the current is changing in two coils
(B) Relative position and orientation of the two coils
(C) The material of the wire of the coils
(D) The current in the two coils

86. Total e.m.f. produced in thermo-couple does not depend upon
(A) Peltier coefficient of hot junction
(B) Peltier coefficient of cold junction
(C) Thomson coefficient of the conductors
(D) The duration for which current is passed

87. Two identical metal plates show photo electric effect by a light of wavelength λ_A falls on a plate A and λ_B on plate B ($\lambda_A = 2\lambda_B$). The maximum kinetic energy is
(A) $2K_A = K_B$
(B) $K_A < K_B/2$
(C) $K_A = 2K_B$
(D) $K_A = K_B/2$

88. A substance which emits light of certain colour at a given temperature can also absorb the same colour at that temperature. This is statement of
(A) Snell's law
(B) Fresnal's law
(C) Kirchhoff's law
(D) Newton's law

89. The wavelength of the first Balmer series is $6563A^0$. The Rydberg constant for hydrogen is about
(A) 1.09×10^7 per m
(B) 1.09×10^8 per m
(C) 1.09×10^9 per m
(D) 1.09×10^5 per m

90. A *p-n junction* has a depletion layer of the order of
(A) 10^{-10} m
(B) 10^{-12} m
(C) 10^{-6} m
(D) 10^{-4} m

SECTION
(GENERAL AWARENESS/REASONING/ GENERAL ENGLISH)

91. The graphs of the two linear equations $ax + by = c$ and $bx - ay = c$, where a, b and c are all not equal to zero,
(A) are parallel
(B) intersect at one point
(C) intersect at two points
(D) perpendicular

92. Jamia Millia Islamia was initially established at Aligarh in the year?
(A) 1920
(B) 1940
(C) 1990
(D) 1970

93. The average of first 50 natural numbers?
(A) 25.30
(B) 25.50
(C) 25.00
(D) 12.25

94. A steady minds triumphs _____ difficulties.
(A) with
(B) at
(C) in
(D) over

95. Which of the following is most nearly the same in meaning of the word "Allocate"?
(A) Allow
(B) Assign
(C) withhold
(D) nominate

96. In which medium, the speed of light is maximum?
(A) solid
(B) liquid
(C) gas
(D) vacuum

97. Dr. C V Raman received nobel prize in which year?
(A) 1911
(B) 1920
(C) 1930
(D) 1940

98. The nuclear particles which are assumed to hold the nucleons together are
(A) electrons
(B) positrons
(C) neutrons
(D) mesons

99. The number of moles of solute present in 1 kg of a solvent is called its
(A) molality
(B) molarity
(C) normality
(D) formality

100. The most electronegative element among the following is
(A) sodium
(B) bromine
(C) fluorine
(D) oxygen