

1. If $|P| > |Q|$, the angle between maximum resultant and minimum resultant is
[1 Marks]

- a. 0°
- b. 45°
- c. 90°
- d. 180°

2. Velocity of a body executing SHM leads the displacement by phase angle
[1 Marks]

- a. 0
- b. $\frac{\pi}{2}$
- c. π
- d. $\frac{\pi}{4}$

3. The volume strain along a three mutually perpendicular direction is v . It will be equivalent to linear strain
[1 Marks]

- a. $3/v$
- b. $v/3$
- c. $3v$
- d. V

4. For a gas if the ratio of specific heats at constant pressure and constant volume is γ , then the value of degree of freedom is

[1 Marks]

- a. $\frac{\gamma + 1}{\gamma - 1}$
- b. $\frac{\gamma - 1}{\gamma + 1}$
- c. $\frac{\gamma - 1}{2}$
- d. $\frac{2}{\gamma - 1}$

5. The amplitude of wave is represented by $= \frac{c}{a + b - c}$. Resonance will occur when

[1 Marks]

- a. $b = -\frac{c}{2}$
- b. $b = 0 \text{ \& } a = c$
- c. $b = -\frac{a}{2}$
- d. $a = c$

6. Which of the following does not support the wave nature of light

[1 Marks]

- a. Interference
- b. Diffraction
- c. Photoelectric effect
- d. Polarization

7. When the length of microscope tube is increased, its magnifying power

[1 Marks]

- a. Decreases
- b. Increases
- c. Do not change
- d. None of above

8. An inflated tyre of a bicycle bursts. Which of the following relation between pressure P and temperature T holds good if γ is the ratio of the specific heat capacities of air?

[1 Marks]

- a. $P\gamma^{-1}T\gamma = \text{constant}$
- b. $P\gamma T\gamma^{-1} = \text{constant}$
- c. $P\gamma T\gamma = \text{constant}$
- d. $P^{1-\gamma}T\gamma = \text{constant}$

9. A parallel plate capacitor has a capacitance of $50\mu F$ in air and $110\mu F$ when immersed in an oil. The dielectric constant of the oil is:

[1 Marks]

- a. 0.45
- b. 0.55
- c. 1.10
- d. 2.20

10. A hollow charged sphere does not produce an electric field at any

[1 Marks]

- a. Inner point
- b. Outer point
- c. Surface point
- d. None of above

11. A neutral point in the magnetic field is a point where

[1 Marks]

- a. Magnetic moment of the magnet is balanced by the magnetic field of earth
- b. Magnetic field due to the magnet is zero
- c. Magnetism is the strongest
- d. Earth's magnetic field is exactly neutralized by the field due to the magnet

12. Thomson's effect is the combination of which following effects?

[1 Marks]

- a. Seebeck effect and Peltier's effect
- b. Seebeck effect and Joule's effect
- c. Joule's effect and Peltier effect
- d. Ohm's effect and Peltier's effect

13. The induced emf produced when a magnet is inserted into a coil does not depend on the

[1 Marks]

- a. Number of turns in the coil
- b. Resistance of the coil
- c. Magnetic moment of the magnet
- d. Speed of approach of magnet

14. A photon and an electron have equal energy E . Then $\frac{\lambda_{\text{photon}}}{\lambda_{\text{electron}}}$ is proportional to

[1 Marks]

- a. $\sqrt{E}$
- b. $\frac{1}{\sqrt{E}}$
- c. $\frac{1}{E}$
- d. Does not depend on E

15. The neutron was discovered by

[1 Marks]

- a. Rutherford
- b. Chadwick
- c. Fermi
- d. Einstein

16. The band gap in germanium and silicon in eV respectively is

[1 Marks]

- a. 1.1, 0.7
- b. 1.1, 0
- c. 0, 1.1
- d. 0.7, 1.1

17. A chain of length L and mass M is kept on a rough horizontal table having coefficient of friction μ . The maximum length of chain that can hang outside without sliding is

[2 Marks]

- a. $\frac{\mu L}{\mu + 1}$
- b. $\frac{L}{\mu}$
- c. μL
- d. $\frac{L}{\mu + 1}$

18. A satellite revolves round planet of radius R in time T . Period of revolution around another planet of radius $3R$ is

[2 Marks]

- a. $3T$
- b. $3\sqrt{3} T$
- c. $\sqrt{T}$
- d. $9T$

19. 8 equal drops are falling through air with steady velocity of 5cm/s. If drops coalesce, new terminal velocity will be

[2 Marks]

- a. 10cm/s
- b. 5cm/s
- c. 20cm/s
- d. 40cm/s

20. 0.1 m^3 of water at 80°C is mixed with 0.3 m^3 of water at 60°C . The final temperature is

[2 Marks]

- a. 65°C
- b. 70°C
- c. 68°C
- d. 75°C

21. A sound absorber attenuates the sound level by 20dB. The intensity decreases by a factor of

[2 Marks]

- a. 1000
- b. 10000
- c. 100
- d. 10

22. The path difference between two interfering waves at a point on the screen is $1/8^{\text{th}}$ of a wavelength. The ratio of intensity at this point to that at the center of bright fringe is

[2 Marks]

- a. 0.853
- b. 1.17
- c. 0.99
- d. 1.01

23. A fish is at a depth of 30cm below the surface of water of refractive index $4/3$. The distance between the fish and its image is

[2 Marks]

- a. 22.5cm
- b. 7.5cm
- c. 18.3cm
- d. 4.5cm

24. A particle of mass m and charge q is released from rest in a uniform electric field of intensity E . The kinetic energy it attains after moving a distance S between the plates is

[2 Marks]

- a. qE
- b. qEm
- c. $qESm$
- d. qES

25. Two copper wires of same length l and cross-section areas A and $2A$ are connected to a battery. The ratio of drift velocities when the wires are in parallel is

[2 Marks]

- a. 1:2
- b. 4:1
- c. 3:1
- d. 1:1

26. A step up transformer operates on a 230V line and supplies a load of 2A. The ratio of primary and secondary windings is 1:25. The primary current is

[2 Marks]

- a. 8.8A
- b. 50A
- c. 12.5A
- d. 25A

27. An electron of mass m and charge e initially at rest gets accelerated by a constant electric field E . The rate of change of de-Broglie wavelength of this electron at time t is

[2 Marks]

- a. $-\frac{h}{eEt}$
- b. $\frac{h}{2eEt}$
- c. $\frac{h}{eE^2t}$
- d. $-\frac{h}{eEt^2}$

28. The activity of radioactive sample falls from 400/s to 200/s in 40 minutes. The half life of radioactive sample is

[2 Marks]

- a. 20min
- b. 30min
- c. 40min
- d. 50min

29. Which of the following is an adverb?

[1 Marks]

- a. Stand
- b. Smart
- c. Short
- d. Quickly

30. _____ he really a thief?

[1 Marks]

- a. Are
- b. Is or Was
- c. Were
- d. None of these

31. Hevery little when there are strangers present.

[1 Marks]

- a. Had always spoken
- b. Was always speaking
- c. Is always speaking
- d. Always speaks

32. If they _____ the train, they would have missed the beautiful scenery.

[1 Marks]

- a. Miss
- b. Had missed
- c. Will miss
- d. Have missed

33. The direct speech for "Nita ordered her servant to bring her a cup of tea" is:

[1 Marks]

- a. Nita told her servant, "Bring a cup of tea."
- b. Nita said, "Bring me a cup of tea."
- c. Nita said to her servant, "Bring me a cup of tea."
- d. Nita told her servant, "Bring her that cup of tea."

34. Convert the following compound sentence into a simple sentence: We must eat, or we cannot live.

[1 Marks]

- a. We must live to eat.
- b. We must eat to live.
- c. We can't live if we eat.
- d. We can't eat if we live.

35. My family _____ coming to the city tomorrow.

[1 Marks]

- a. is
- b. are
- c. be
- d. am

36. His speech was appropriate _____the occasion.

[1 Marks]

- a. Upon
- b. To
- c. About
- d. None of the above

37. Choose the correct statement:

[1 Marks]

- a. My aunt who lives in Mumbai is a doctor.
- b. My aunt, who lives in Mumbai, is a doctor.
- c. My aunt, who lives in Mumbai is a doctor.
- d. My aunt who lives in Mumbai, is a doctor.

38. What is the antonym for Foreign?

[1 Marks]

- a. Local
- b. Modern
- c. Popular
- d. Native

39. Which of the following contains the same vowel sound?

[1 Marks]

- a. Hook-brook-luck
- b. Cat-bat-mat
- c. Win-we-see
- d. Lead-leak-break

40. _____ are considered as Function words.

[1 Marks]

- a. Stressed
- b. Accented
- c. Non-stressed
- d. Content

41. One mole of a gas occupies a volume of 22.4 L. This is derived from

[1 Marks]

- a. Berzelius' hypothesis
- b. Gay-Lussacs' law
- c. Avogadro's law
- d. Dalton's law

42. Which of the following species has max. no. of unpaired electron?

[1 Marks]

- a. Cr^{+++}
- b. Fe^{+++}
- c. Ni
- d. Cr

43. pH of 10^{-8}M NaOH is

[1 Marks]

- a. 7.04
- b. 6
- c. 8
- d. 6.95

44. Which of these is called anomalous pair in Mendeleev's periodic table?

[1 Marks]

- a. N & O
- b. Li & Na
- c. Te & I
- d. Hg & Cu

45. An atom with atomic number 21 belongs to the category of

[1 Marks]

- a. s-block elements
- b. p-block elements
- c. d-block elements
- d. f-block elements

46. The catalyst used during manufacture of H_2SO_4 by contact process is

[1 Marks]

- a. Fe_2O_3
- b. Fe + Mo
- c. $\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$
- d. V_2O_5

47. Which of these is acidic hydride?

[1 Marks]

- a. N_2H_4
- b. NH_3
- c. NH_2NOH
- d. N_3H

48. Froth floatation process is used for the metallurgy of

[1 Marks]

- a. Chloride ores
- b. Amalgams
- c. Oxide ores
- d. Sulphide ores

49. The family to which methoxy methane belongs:

[1 Marks]

- a. hydrocarbon
- b. ketone
- c. ether
- d. ester

50. Chain isomers differ in

[1 Marks]

- a. empirical formula
- b. molecular formula
- c. molecular weight
- d. length of carbon atom

51. Which of the following is used as an antifreeze agent for making explosives?

[1 Marks]

- a. Ethanol
- b. Glycol
- c. Glycerol
- d. Phenol

52. When potassium dichromate reacts with reducing agent in the presence of H_2SO_4 , $\text{Cr}_2(\text{SO}_4)_3$ is obtained. The eq. wt. of potassium dichromate is:

[2 Marks]

- a. $M/2$
- b. $M/3$
- c. $M/5$
- d. $M/6$

53. The thickness of silver coat on a copper vessel of surface area $80 \text{ cm} \times 10 \text{ cm}$ applied by passing 0.2 A current for 3 hrs. (ρ of silver = 10.47 gm/cc)

[2 Marks]

- a. $1.88 \times 10^{-4} \text{ cm}$
- b. $1.88 \times 10^{-3} \text{ cm}$
- c. $2.88 \times 10^{-4} \text{ cm}$
- d. $2.88 \times 10^{-3} \text{ cm}$

54. 2.5 liters of 1 M NaOH solution are mixed with another 3 liters of 0.5 M NaOH solution. Then the molarity of the resulting solution is

[2 Marks]

- a. 1.08M
- b. 1.0M
- c. 0.73M
- d. 0.50

55. The pH of a solution required to precipitate $\text{Zn}(\text{OH})_2$ from a solution containing 0.05 M Zn^{++} ion is: K_{sp} for $\text{Zn}(\text{OH})_2 = 1.29 \times 10^{-9}$

[2 Marks]

- a. 9.2
- b. 10.2
- c. 11.2
- d. 8.2

56. When concentrated H_2SO_4 is added to dry KNO_3 , brown fumes evolve. These fumes are :

[2 Marks]

- a. SO_2
- b. SO_3
- c. NO_2
- d. NO

57. Fire extinguishers contain H_2SO_4 and

[2 Marks]

- a. NaHCO_3 and Na_2CO_3
- b. NaHCO_3
- c. Na_2CO_3
- d. CaCO_3

58. Which of the followings can distinguish ethane & ethyne?

[2 Marks]

- a. Tollen's reagent
- b. Baeyer's reagent
- c. Bromine solution
- d. All

59. $\frac{100}{10!} = \frac{1}{8!} + \frac{x}{9!}$. Find x.

[1 Marks]

- a. 1
- b. 2
- c. 3
- d. 4s

60. $\sqrt{x+8} + \sqrt{x+3} = \sqrt{12x+13}$ is called
[1 Marks]

- a. reciprocal eq
- b. exponential eq
- c. radical eq
- d. none of these

61. If A and B are non singular matrices then $(AB)^{-1} =$
[1 Marks]

- a. A^{-1}
- b. B^{-1}
- c. $A^{-1}B^{-1}$
- d. $B^{-1}A^{-1}$

62. When a selection of objects is made without paying regard to the order of selection, it is called
[1 Marks]

- a. sequence
- b. series
- c. combination
- d. permutation

63. $\sum_{k=1}^n k^2 =$
[1 Marks]

- a. $\frac{n(n+1)}{2}$
- b. $\frac{n^2(n+1)^2}{4}$
- c. $\frac{n(n+1)(2n+1)}{6}$
- d. none of these

64. Area under the circle $x^2 + y^2 = 16$ is

[1 Marks]

- a. π sq units(
- b. 13π sq units(
- c. 16π sq units(
- d. 4π sq units

65. The area of the circle $x^2 + y^2 = 16$ exterior to the parabola $y^2 = 6x$ is

[1 Marks]

- a. $\frac{4}{3}(4\pi - \sqrt{3})$
- b. $\frac{1}{3}(4\pi + \sqrt{3})$
- c. $\frac{2}{3}(8\pi - \sqrt{3})$
- d. $\frac{4}{3}(8\pi + \sqrt{3})$

66. The nature of the function $f(x) = -\frac{x}{2} + \sin x$ in the interval $-\pi/3 < x < \pi/3$ is

[1 Marks]

- a. increasing
- b. decreasing
- c. neither decreasing nor increasing
- d. increasing and decreasing

67. $\frac{d}{dx}(ax + b)^n = na(ax + b)^{n-1}$ is valid only when n must be:

[1 Marks]

- a. real number
- b. rational number
- c. Imaginary number
- d. Irrational number

68. $\lim_{x \rightarrow \pi} \frac{\sin(\pi - x)}{\pi - x}$ is
[1 Marks]

- a. 1
- b. 0
- c. ∞
- d. nonexistent

69. The Parametric form of the circle $x^2 + y^2 - 2x - 4y - 4 = 0$ is
[1 Marks]

- a. $(1 - 3\cos\theta, 2 - 3\sin\theta)$
- b. $(1 + 3\cos\theta, 2 + 3\sin\theta)$
- c. $(2\cos\theta, 2\sin\theta + 1)$
- d. $(2 + 3\cos\theta, 3 + 2\sin\theta)$

70. The length of the latus rectum of the parabola $y^2 + 8x - 2y + 17 = 0$ is
[1 Marks]

- a. 2
- b. 4
- c. 8
- d. 16

71. The angle between the pair of straight lines $2x^2 + 7xy + 3y^2 = 0$ is
[1 Marks]

- a. 60
- b. 135
- c. 75
- d. 45 or 135

72. What is the locus of a moving point equidistant from the straight lines $x + y = 0$ and $x - y = 0$?

[1 Marks]

- a. $xy = 0$ (
- b. $xy = \text{constant}$ (
- c. $x = 0$ (
- d. $y = 0$

73. Find the distance of the point $(3, -2, 1)$ from the plane $2x - y + 2z + 3 = 0$

[1 Marks]

- a. $17/3$ (
- b. $19/3$ (
- c. $13/3$ (
- d. $15/3$

74. Let $f(x) = 5x + 1$, $x \in R$ then value of $f^{-1}(6)$ is,

[1 Marks]

- a. 31
- b. 1
- c. 6
- d. $1/6$

75. Range of $\cot x$ is

[1 Marks]

- a. $[-1, 1]$
- b. R
- c. negative real no.
- d. $R - \{x \mid -1 < x < 1\}$

76. If A and B are two mutually exclusive events, then

[1 Marks]

- a. $PA < P(B^c)$
- b. $P(A) > P(B^c)$
- c. $P(A) < P(B)$
- d. None of these

77. If $\vec{a}$ and $\vec{b}$ are unit vectors such that $\vec{a} + \vec{b} = 1$, then the value of $\vec{a} \cdot \vec{b} =$

[1 Marks]

- a. 1
- b. $\sqrt{2}$
- c. 3
- d. $\sqrt{3}$

78. Lowest value of variance can be

[1 Marks]

- a. 1
- b. -1
- c. 3
- d. 0

79. $\omega^{28} + \omega^{38} =$

[2 Marks]

- a. 0
- b. 1
- c. ω
- d. -1

80. If $A = \begin{bmatrix} 0 & 1 & 3 \\ 0 & 2 & 4 \\ 0 & 3 & 5 \end{bmatrix}$ then $|A| =$

[2 Marks]

- a. 0
- b. 1
- c. 10
- d. -1

81. $n(n-1)(n-2) \dots (n-r+1) =$

[2 Marks]

- a. $n!r!$
- b. $\frac{n!}{r!}$
- c. $\frac{n!}{(n-r)!}$
- d. $\frac{(n-2)!}{n!}$

82. AM between $1-x+x^2$ and $1+x+x^2$ is

[2 Marks]

- a. $1+x^2$
- b. $1-x^2$
- c. $1+x$
- d. $1-x$

83. $\int x^x (1 + \log x) dx$ is equals to

[2 Marks]

- a. $x^x + c$
- b. $x^{-x} + c$
- c. $x \log x + x$
- d. $\log x + x$

84. If $f(x) = \sin x$ then $f'(\cos^{-1}3x) =$

[2 Marks]

a. $\cos x$

b. $\frac{-3}{\sqrt{1-9x^2}}$

c. $\frac{3}{\sqrt{1-9x^2}}$

d. $3x$

85. $\lim_{x \rightarrow -\infty} \frac{-5}{\sqrt{x}} =$

[2 Marks]

a. 0

b. $-\infty$

c. $+\infty$

d. Not exists

86. If $[x]$ is the greatest integer not greater than x , then $\lim_{x \rightarrow 2} [x]$ is

[2 Marks]

a. 0

b. 1

c. 2

d. none of these

87. The equation of the circle is $x^2+y^2-4x-2y+3=0$. Then the equation of the tangent at (1,2) is

[2 Marks]

a. $x+y-3=0$

b. $x+2y-5=0$

c. $x-y+1=0$

d. $3x-2y-7=0$

88. The vertex of the parabola $x^2+8x+12y+4=0$ is

[2 Marks]

- a. $(-4,1)$
- b. $(4,-1)$
- c. $(-4,-1)$
- d. $(4, 1)$

89. If the sum of distances of a point from two perpendiculars lines in a plane is 1, then the locus of a point is:

[2 Marks]

- a. Circle
- b. Straight Line
- c. Parabola
- d. Square

90. If a line lie in a octant OXYZ and it makes equal angles with the axes, then

[2 Marks]

- a. $l=m=n=\frac{1}{\sqrt{3}}$
- b. $l=m=n=\pm\frac{1}{\sqrt{3}}$
- c. $l=m=n=\frac{1}{3}$
- d. $l=m=n=\frac{1}{\sqrt{2}}$

91. If sets A and B are defined as $A = \{ (x, y) : y = e^x, x \in R \}$ $B = \{ (x, y) : y = x, x \in R \}$ then

[2 Marks]

- a. $B \subset A$
- b. $A \subset B$
- c. $A \cap B = \phi$
- d. $A \cup B = A$

92. Domain of $3\sin x$ is

[2 Marks]

- a. $[-3, 3]$
- b. $\mathbb{R}$
- c. positive real no.
- d. none of these

93. If $\vec{a} = \vec{i} + 2\vec{j} + 3\vec{k}$, $\vec{b} = 2\vec{i} + 4\vec{j} + 6\vec{k}$ and $\vec{c} = 3\vec{i} - \vec{j} + \vec{k}$, then the value of $\vec{a} \cdot \vec{b} \times \vec{c}$ is

[2 Marks]

- a. 28
- b. 26
- c. 0
- d. 24

94. Williamson ether synthesis is an example of..... reaction.

[2 Marks]

- a. SN^1
- b. E_1
- c. SN^2
- d. E_2

95. Paris green, a common pesticide contain

[2 Marks]

- a. basic copper acetate
- b. arsenous oxide
- c. acetic acid
- d. all of above

96. When benzene diazonium chloride is heated with the Cu and HCl, chlorobenzene is formed. The reaction is :

[1 Marks]

- a. Sandmeyer reaction
- b. Sandmeyer Gatterman reaction
- c. raschig's reaction
- d. all of these

97.

Read the following passage and answer the four question that follow:

A comet is a small, icy and dusty celestial body that orbits the Sun. It consists of a nucleus, which is the solid center of the comet, and a coma, which is the cloud of gas and dust surrounding the nucleus. When a comet passes close to the Sun, the Sun's heat expands the coma and creates a bright, glowing halo called a coma. Comets are often called "dirty snowballs" because they are composed of water, methane, and other volatiles. They are believed to be remnants of the early solar system and may provide insight into the formation and evolution of planets.

Q. What is a comet?

[2 Marks]

- a. A small, icy and dusty celestial body that orbits the Sun
- b. A large, rocky and dusty celestial body that orbits the Sun
- c. A small, icy and rocky celestial body that orbits the Sun
- d. A large, rocky and gaseous celestial body that orbits the Sun

98. What does a comet consist of?

[2 Marks]

- a. A nucleus and a coma
- b. A nucleus and a halo
- c. A coma and a halo
- d. A nucleus and a tail

99. What is the coma?

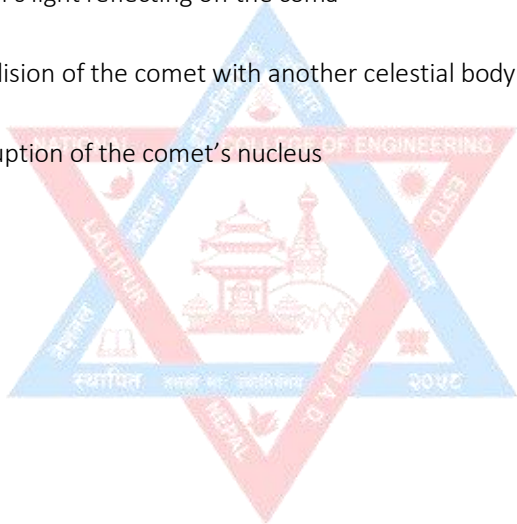
[2 Marks]

- a. The solid center of the comet
- b. The cloud of gas and dust surrounding the nucleus
- c. The bright, glowing halo around the comet
- d. The tail of the comet

100. What causes the bright, glowing halo around the comet?

[2 Marks]

- a. The Sun's heat expanding the coma
- b. The Sun's light reflecting off the coma
- c. The collision of the comet with another celestial body
- d. The eruption of the comet's nucleus



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