Atomic Energy Central School No 4

Rawatbhata

CLASS 11 - PHYSICS

MULTIPLE CHOICE EXAMINATION JANUARY 2019-20

Time Allowed: 1 hour **Maximum Marks: 40**

Section A

1. According to Hooke's law **[1]**

   a) For small deformations the stress and strain are proportional to each other

   b) For small deformations the stress is proportional to square of strain

   c) For small deformations the stress and strain are inversely proportional to each other

   d) For large deformations the stress and strain are proportional to each other

2. A specimen of oil having an initial volume of 600 cm^3 is subjected to a pressure increase of 3.6 $\times$ 10^6Pa and the volume is found to decrease by 0.45 cm^3 what is the bulk modulus of the material? **[1]**

   a) 4.4 $\times$ 10^9 Pa

   b) 5.0 $\times$ 10^9 Pa

   c) 4.8 $\times$ 10^9 Pa

   d) 4.6 $\times$ 10^9 Pa

3. How much should the pressure on a litre of water be changed to compress it by 0.10 percent? Bulk modulus of water 2.2 GPa **[1]**

   a) 2.4 $\times$ 10^6 N/ m^2

   b) 2.2 $\times$ 10^6 N/ m^2

   c) 2.6 $\times$ 10^6 N/ m^2

   d) 2.0 $\times$ 10^6 N/ m^2

4. A specimen of oil having an initial volume of 600 cm^3 is subjected to a pressure increase of 3.6 $\times$ 10^6 Pa and the volume is found to decrease by 0.45 cm3 what is the compressibility of the material? **[1]**

   a) 2.3 $\times$ 10^{-10} Pa^{-1}

   b) 2.1 $\times$ 10^{-10} Pa^{-1}

   c) 1.7 $\times$ 10^{-10} Pa^{-1}

   d) 1.9 $\times$ 10^{-10} Pa^{-1}

5. Four identical hollow cylindrical columns of mild steel support a big structure of mass 50,000 kg. The inner and outer radii of each column are 30 and 60 cm respectively. Assuming the load distribution to be uniform, calculate the compression strain of each column. . Take Young's modulus of steel as 20 $\times$ 10^{10} Pa **[1]**

   a) 2.95 $\times$ 10^{-6}

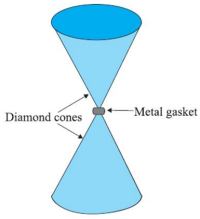
   b) 3.1 $\times$ 10^{-6}

   c) 3.0 $\times$ 10^{-6}

   d) 2.18 $\times$ 10^{-6}

6. Anvils made of single crystals of diamond, with the shape as shown in Figure, are used to investigate behaviour of materials under very high pressures. Flat faces at the narrow end of the anvil have a diameter of 0.50 mm, and the wide ends are subjected to a compression force **[1]**

of 50,000 N. What is the pressure at the tip of the anvil?



a) 2.1×10^{11} Pa

b) 2.5×10^{11} Pa

c) 2.9×10^{11} Pa

d) 3.2×10^{11} Pa

7. The importance of the elastic behavior of materials is **[1]**

a) that it gives methods for understanding materials

b) that it is useful in building sling shots

c) that it is useful in making springs

d) that it enables a safe and sound design of bridges, buildings, machinery parts.

8. What is the density of water at a depth where pressure is 80.0 atm, given that its density at the surface is 1.03×10^3 kg m^{-3}? **[1]**

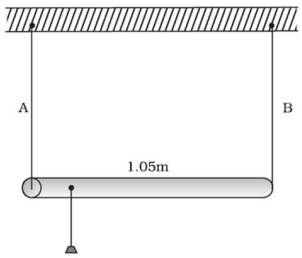
a) 1.054×10^3 kg/ m^3

b) 1.074×10^3 kg/ m^3

c) 1.094×10^3 kg/ m^3

d) 1.034×10^3 kg/ m^3

9. A rod of length 1.05 m having negligible mass is supported at its ends by two wires of steel (wire A) and aluminum (wire B) of equal lengths as shown in Figure. The cross-sectional areas of wires A and B are 1.0 mm^2 and 2.0 mm^2, respectively. At what point along the rod should a mass m be suspended in order to produce equal stresses? Take Young's modulus of steel as 200 GPa, for aluminum 70 GPa **[1]**



a) 0.8 m from steel wire

b) 0.7 m from steel wire

c) 0.6 m from steel wire

d) 0.9 m from steel wire

10. When a solid is deformed, **[1]**

a) only the atoms or molecules of the surface move from their equilibrium position

b) only the atoms or molecules at some points move from their equilibrium position

c) the atoms or molecules do not move from their equilibrium position

d) all the atoms or molecules are displaced from their equilibrium positions causing a change in inter atomic (or intermolecular) distances.

11. Water rises to a height of 16.3 cm in a capillary of height 18 cm above the water level. If the **[1]**

tube is suddenly cut at a height of 12 cm

a) the height of the water in the capillary will be 10.3 cm

b) water will stay at a height of 12 cm in the capillary tube

c) water will come as a fountain from the capillary tube

d) water will flow down the sides of the capillary tube

12. According to Pascal's law for transmission of fluid pressure external pressure applied on any part of a fluid contained in a vessel is _____ in all directions **[1]**

a) transmitted and increased

b) transmitted undiminished and equally

c) not transmitted

d) transmitted and decreased

13. in laminar flow **[1]**

a) adjacent layers of fluid move in circle crossing each other each other and the flow is steady

b) adjacent layers of fluid do not slide smoothly past each other and the flow is unsteady

c) adjacent layers of fluid slide smoothly past each other and the flow is steady

d) adjacent layers of fluid slide smoothly past each other and the flow is unsteady

14. A parrot is in a wire case, which is hanging from a spring balance. Initially the parrot sits in the cage and in the second instant the parrot flies inside the cage, the reading of the balance will be **[1]**

a) Lesser when the parrot flies in the cage

b) None of these

c) Greater when the parrot flies in the cage

d) Remain unchanged

15. Two match sticks are laid side by side on the surface of water. When a drop of light oil on the end of a third match stick is touched to the surface film between the two floating sticks, the two match sticks **[1]**

a) will move apart rapidly

b) will remain as they are

c) will come closer

d) will be joined

16. At large flow velocities the flow of a fluid becomes **[1]**

a) viscous

b) turbulent

c) compressible

d) laminar

17. Two bodies are in equilibrium when suspended in water from the arms of a balance. The mass of one body is 36 gm and its density is 9 gm/cc. If the mass of the other is 48 gm, its density in gm/cm^3 is **[1]**

a) 3.0

b) 4/3

c) 3/2

d) 5

18. A liquid drop of radius R is broken up into N small droplets. The work done is proportional to(**[1]**

take $N^{\frac{1}{3}}$ >> 1)

a) $N^{\frac{1}{3}}$ b) N

c) $N^{-2/3}$ d) $N^{-0.5}$

19. If a block of iron of unknown mass of size 5 cm $\times$ 5 cm $\times$ 5 cm was completely submerged in water, what is the mass of block. (density of water = 1 gm/ cm^3) **[1]**

a) 90 gm b) 80 gm

c) 125 gm d) 100 gm

20. The basic property of a fluid that makes it different from solids **[1]**

a) it can be compressed b) it does not expands very little on heating

c) it has a large density d) is that it can flow

21. If a pipe carrying incompressible liquid has an area A_1 and velocity V_1 at one point A_2 and V_2 at another point, the equation of continuity gives the relation **[1]**

a) $A_1 = A_2V_2$ b) $A_1V_1 = A_2V_2$

c) $A_1V_1 = A_2V_2$ d) $A_1V_1 = 2A_2V_2$

22. When the adhesive force in the case of liquid and glass is greater than the cohesive forces between the liquid molecules, the shape of the meniscus of liquid in a capillary tube is? **[1]**

a) Plane b) Circular

c) Convex d) Concave

23. Two tubes of the same material but of different radii are dipped in a liquid. The height to which a liquid rises in one tube is 2.2cm and in the other is 6.6 cm. The ratio of their radii is **[1]**

a) 1:3 b) 1:9

c) 9:1 d) 3:1

24. A capillary tube remains dipped in a water container, so that loss in weight of the capillary tube is **[1]**

a) half of the buoyant force b) less than the upward buoyant force

c) equal to the upward buoyant force d) more than the upward buoyant force

25. Three liquids of densities d, 2d and 3 d are mixed in equal volumes. Then the density of mixture is **[1]**

a) d b) 2d

c) 3d d) 5d

26. Three liquids of densities d, 2d and 3d are mixed in equals proportions of weights. The relative density of the mixture is **[1]**

a) 23/18d b) 11/7d

c) 13/9d d) 18/11d

27. What fraction of the volume of solid piece of metal of sp gr 7.2 floats above the surface of a **[1]**

container of mercury of sp. gr. 13.6?

a) 0.78 b) 0.47

c) 0.53 d) 0.75

28. It is easier to spray water to which soap is added, because **[1]**

a) Addition of soap to water increases surface tension of water

b) Addition of soap to water decreases surface tension of water

c) Addition of soap to water makes surface tension of water zero

d) Addition of soap to water increases its density

29. A tank with a square base of area 2.0 m^2 is divided into two compartments by a vertical partition in the middle. There is a small hinged door of face area 20 cm^2 at the bottom of the partition. Water is filled in one compartment and an acid, of relative density 1.7, in the other, both to a height of 4m. If g = 10 ms^{-2} the force necessary to keep the door closed is **[1]**

a) 80.88 N b) 20.92 N

c) 40.52 N d) 54.88 N

30. In a hydraulic lift the force applied on the smaller cylinder of area A_1 is F_1. If the area of the larger cylinder is A_2 the maximum weight that can be lifted is **[1]**

a) F_1 b) $\frac{A_1}{A_2}F_1$

c) $F_1 A_2$ d) $\frac{A_2}{A_1}F_1$

31. The unit of surface tension in S.I units is given by **[1]**

a) dynes per cm b) dynes per cm^2

c) Newtons per $meter^2$ d) Newtons per meter

32. The height of mercury column in a simple barometer is h. As tube is inclined to the vertical at an angle $\propto$ the length of the mercury column along the length of the tube is l, then **[1]**

a) l = h/cos$\propto$ b) l = h sin$\propto$

c) l = h cos$\propto$ d) l = h

33. An air bubble of radius r is formed inside a tank of water at depth h. The atmospheric pressure is equal to a water column of height H. the pressure inside the bubble is **[1]**

a) $\rho g(h+H)+\frac{T}{r}$ b) $\rho g(h+H)+\frac{8T}{r}$

c) $\rho g(h+H)+\frac{4T}{r}$ d) $\rho g(h+H)+\frac{2T}{r}$

34. A soap bubble has radius r and the surface tension of the soap film is T. The energy needed to double the diameter of the bubble without change of temperature is **[1]**

a) $8\pi r^2 T$ b) $4\pi r^2 T$

c) $12\pi\ r^2 T$ d) $14\pi r^2 T$

35. According to Pascal's Law the **[1]**

a) pressure in a fluid at rest is the same at all points if they are at the same

b) pressure in a fluid at rest is the same at all points if they are at different

height

heights

c) pressure in a fluid increases with temperature

d) pressure in a fluid decreases with temperature

36. The stream line in a flow is **[1]**

a) a curve whose perpendicular at any point is in the direction of the fluid velocity at that point

b) a curve which shows all points of equal pressure

c) a curve whose tangent at any point is in the direction of the fluid velocity at that point

d) a curve which shows all points of equal velocity

37. A raft of wood of density 600kg/ m^3 and mass 120 kg floats in water. How much weight can be put on the raft to make it just sink? **[1]**

a) 200kg

b) 40kg

c) 80kg

d) 120kg

38. Pressure applied to an enclosed fluid is **[1]**

a) Increased and applied to every part of the fluid

b) Diminished and transmitted to the wall of the container

c) Increased in proportion to the mass of the fluid and then transmitted

d) Transmitted unchanged to every portion of the fluid and walls of the containing vessel

39. A wooden cube just floats inside water when a 200gm mass is placed on it. When the mass is removed, the cube is 2 cm above the water level. The size of the cube is **[1]**

a) 15 cm

b) 5 cm

c) 20 cm

d) 10 cm

40. Density is defined as **[1]**

a) volume of 1 kg of the material

b) mass per unit volume

c) volume per unit mass

d) volume of 10 kg of the material

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CLASS 11 - CHEMISTRY

MULTIPLE CHOICE EXAMINATION JANUARY 2020

Time Allowed: 1 hour **Maximum Marks: 40**

Section A

41. Heating a pulverised mixture of limestone and clay in a rotary kiln is used in the manufacture of: **[1]**

    a) Slaked lime
    b) Lime
    c) Plaster of Paris
    d) Portland cement

42. Choose the correct order of increase in ionic size of alkaline earth metals in the options given below **[1]**

    a) $Mg^{2+} > Ca^{2+} > Sr^{2+} > Ba^{2+} < Be^{2+}$
    b) $Ca^{2+} > Sr^{2+} > Ba^{2+} < Be^{2+} < Mg^{2+}$
    c) $Be^{2+} > Mg^{2+} > Ca^{2+} > Sr^{2+} > Ba^{2+}$
    d) $Sr^{2+} > Ba^{2+} < Be^{2+} < Mg^{2+} < Sr^{2+}$

43. Metal carbonates decompose on heating to give metal oxide and carbondioxide. Which of the metal carbonates is most stable thermally? **[1]**

    a) $Sr\ CO_3$
    b) $Ca\ CO_3$
    c) $BaCO_3$
    d) $Mg\ CO_3$

44. Which of the following statements is true about $Ca(OH)_2$? **[1]**

    a) It is used in the preparation of bleaching powder
    b) It is a light blue solid
    c) It is used in the manufacture of cement.
    d) It does not possess disinfectant property.

45. Amphoteric hydroxides react with both alkalies and acids. Which of the following Group 2 metal hydroxides is soluble in sodium hydroxide? **[1]**

    a) $Ca(OH)_2$
    b) $Ba(OH)_2$
    c) $Mg(OH)_2$
    d) $Be(OH)_2$

46. The solubility of metal halides depends on their nature, lattice enthalpy and hydration enthalpy of the individual ions. Amongst fluorides of alkali metals,the lowest solubility of LiF in water is due to **[1]**

    a) Low ionisation enthalpy of lithium atom
    b) High lattice enthalpy
    c) High hydration enthalpy for lithium ion.
    d) Ionic nature of lithium fluoride

47. Several sodium compounds find use in industries. Which of the following compounds is/ are **[1]**

used for textile industry?

a) Na_2SO_4 b) $NaHCO_3$

c) Na_2CO_3 d) NaCl

48. Which of the following are the correct reasons for anomalous behaviour of lithium? **[1]**

a) Exceptionally low ionisation enthalpy b) Low degree of hydration

c) Exceptionally small size of its atom d) Its low polarising power

49. Alkaline earth metals have large size of the atoms. Therefore, they shows **[1]**

a) low electopositivity b) low ionization enthalpies

c) low hydration enthalpies d) low nuclear charge

50. Cement is an industrially important compound of **[1]**

a) Potassium b) Calcium

c) Magnesium d) Sodium

51. Magnesium do not impart any colour to the flame because **[1]**

a) The electrons in magnesium are too strongly bound to get excited b) Low absorption of light energy

c) The electrons in magnesium are too loosly bound to get excited d) Low thermal conductivities

52. Which of the following is not a peroxide? **[1]**

a) Na_2O_2 b) CrO_5

c) BaO_2 d) KO_2

53. Alkali metals react with water vigorously to form hydroxides and dihydrogen.Which of the following alkali metals reacts with water least vigorously? **[1]**

a) Na b) K

c) Cs d) Li

54. Which of the following is used in photo-electric cells? **[1]**

a) K b) Na

c) Cs d) Li

55. Lithium shows a diagonal relationship with **[1]**

a) silicon b) magnesium

c) nitrogen d) sodium

56. Which of the alkali metal is having least melting point? **[1]**

a) Cs b) Na

c) Rb d) K

57. The diagonal relationship exists between **[1]**

a) Lithium and magnesium

b) Beryllium and magnesium

c) Lithium and beryllium

d) Lithium and aluminium

58. The oxide of which of the following metals is amphoteric? **[1]**

a) Ca

b) Mg

c) Ba

d) Be

59. Why does the solubility of alkaline earth metal carbonates and sulphates in water decrease down the group? **[1]**

a) hydration enthalpy decreases down the group

b) size of anions being much shorterer compared to cations

c) coordination numbesr more than four

d) lattice enthalpy decreases down the group

60. When Zeolite, which is hydrated sodium aluminium silicate is treated with hard water, the sodium ions are exchanged with which of the following ion(s)? **[1]**

a) Mg^{2+} ions

b) H^{+} ions

c) SO_4^{2-} ions

d) O^{2-} ions

61. Elements of which of the following group(s) of periodic table do not form hydrides. **[1]**

a) Groups 7, 8, 9

b) Groups 15, 16, 17

c) Group 14

d) Group 13

62. Water undergoes self ionization to a small extent to give **[1]**

a) H_3O^+ and OH^-

b) OH^+ and H^-

c) OH^+ and OH^-

d) H^+ and OH^-

63. Consider the reactions **[1]**

(A) $H_2O_2 + 2HI \rightarrow I_2 + 2H_2O$

(B) $HOCl + H_2O_2 \rightarrow H_3O + Cl + O_2$

Which of the following statements is correct about H_2O_2 with reference to these reactions?

Hydrogen perioxide is

a) a reducing agent in both (A) and (B)

b) a reducing agent in (A) and oxidising agent in (B)

c) an oxidising agent in (A) and reducing agent in (B)

d) an oxidising agent in both (A) and (B)

64. Which of the following equations depict the oxidising nature of H_2O_2? **[1]**

a) $2MnO4^- + 6\,H^+ + 5H_2O_2 \rightarrow 2Mn^{2+}$

b) $2I^- + 2H^+ + H_2O_2 \rightarrow I_2 + 2H_2O$

c) $2Fe3^+ + 2H^+ + H_2O_2 \rightarrow 2Fe^{2+} + 2H_2O$

d) $KIO_4 + H_2O_2 \rightarrow KIO_3 + H_2O + O_2$

65. Which of the following statement(s) is/are correct in the case of heavy water? **[1]**

a) Heavy water is more effective as solvent than ordinary water.

b) Heavy water is used as a moderator in nuclear reactor.

c) Heavy water has lower boiling point than ordinary water.

d) Heavy water is more unassociated than ordinary water.

66. Temporary hardness It can be removed in boiling by precipitating **[1]**

a) $Mg(HCO_3)_2.CaCO_3$

b) $Ca(HCO_3)_2.Mg(OH)_2$

c) $CaCO_3.Mg(OH)_2$

d) $Mg(HCO_3)_2Ca(HCO_3)_2$

67. Hydrogenation of vegetable oil using nickel as catalyst gives edible fats. Choose the appropriate one given below. **[1]**

a) vanaspati

b) Cheese

c) sunflower oil

d) Rice bran oil

68. H_2O_2behaves as a bleaching agent because: **[1]**

a) it breaks the chemical bonds of the chromophores

b) acts as a strong reducing agent in basic media

c) it absorbs the visible light

d) acts as a strong reducing agent in acidic media

69. Dihydrogen can be prepared on commercial scale by different methods. In its preparation by the action of steam on hydrocarbons, a mixture of CO and H_2 gas is formed. It is known as _____. **[1]**

a) Producer gas

b) Starter gas

c) Industrial gas

d) Water gas

70. Pure de-mineralised water is obtained by passing water through an anion exchange as a second process after passing it through a cation exchange. This makes the water **[1]**

a) basic

b) acidic

c) remain unchanged

d) neutral

71. Hydrogen peroxide is used as: **[1]**

a) all of these

b) a bleaching agent

c) a reducing agent

d) an oxidizing agent

72. Hydrogen peroxide is obtained by the electrolysis of _____. **[1]**

a) water

b) fused sodium peroxide

c) hydrochloric acid

d) sulphuric acid

73. On treatment of hard water with zeolite, sodium ions get exchanged with **[1]**

a) Na^+ ions

b) Ca^{2+} ions

c) H^+ ions

d) OH^-

74. Which of the following statements are not true for hydrogen? **[1]**

a) It has one electron in the outermost shell.

b) It can lose an electron to form a cation which can freely exist

c) It forms a large number of ionic

d) It exists as diatomic molecule.

compounds by losing two electrons.

75. Which of the following hydrides is electron-precise hydride? **[1]**

a) B_2H_6 b) H_2O

c) NH_3 d) CH_4

76. Zeolite is **[1]**

a) Hydrated ferric oxide b) Hydrated sodium aluminium silicate

c) Sodium hexametaphosphate d) Sodium tetraborate

77. In winter season ice formed on the surface of a lake **[1]**

a) provides thermal insulation b) disturbs the ecological balance

c) kills the aquatic life in the lake d) lowers the temperature of the surrounding atmosphere

78. Reaction of carbon monoxide gas of syngas mixture with steam in the presence of catalyst is called **[1]**

a) Coal gasification reaction b) Redox Reactions

c) Hydrolysis Reaction d) Water-gas shift reaction

79. Hydrogen is obtained as a by-product in the **[1]**

a) Manufacturing of caustic soda b) Electrolysis of water

c) Bosch process d) Lane process

80. Metal hydrides are ionic, covalent or molecular in nature. Among LiH, NaH, KH, RbH, CsH, the correct order of increasing ionic character is **[1]**

a) LiH > NaH > CsH > KH>RbH b) NaH > CsH > RbH > LiH > KH

c) LiH < NaH < KH < RbH < CsH d) RbH > CsH > NaH > KH > LiH

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CLASS 11 - MATHEMATICS

Multiple Choice Questions Examination January (2019-20)

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 40**

General Instructions:

Note: Darken the most appropriate circle on the OMR Sheet against each question .

Section A

81. In an ellipse the distance between its foci is 6 and its minor axis is 8 ; the eccentricity of the ellipse is **[1]**

a) $\frac{1}{\sqrt{52}}$ b) $\frac{1}{2}$

c) $\frac{3}{5}$ d) $\frac{3}{5}$

82. The parabolas $x^2 = 4y$ and $y^2 = 4x$ intersect **[1]**

a) on the line x + y = 0 b) on the line y = x

c) none of these d) in a unique point

83. The equation of the directrix of the parabola $x^2 = -4\ a\ y$ is **[1]**

a) y – a = 0 b) x – a = 0

c) x + a = 0 d) y + a = 0

84. The equation $x^2 + 3y^2 - 9x + 2y + 1 = 0$ represents **[1]**

a) a parabola b) a circle

c) a hyperbola d) an ellipse

85. The length of latus rectum of an ellipse is one-third of its major axis. Its eccentricity would be **[1]**

a) $\frac{2}{3}$ b) $\sqrt{\frac{2}{3}}$

c) $\frac{1}{\sqrt{3}}$ d) $\frac{1}{\sqrt{2}}$

86. The eccentricity of the conic $9x^2 - 16y^2 = 144$ is **[1]**

a) $\frac{5}{4}$ b) $\frac{4}{5}$

c) $\frac{4}{3}$ d) $\sqrt{7}$

87. The radius of the circle 3 x (x – 2) + 3 y (y + 1) = 4 is **[1]**

a) 3 b) $\sqrt{\frac{15}{4}}$

c) $\sqrt{\frac{31}{12}}$ d) 2

88. The ellipse = $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, b^2 = a^2$ is a **[1]**

a) a hyperbola b) none of these.

c) horizontal ellipse

d) vertical ellipse

89. The centre of a circle passing through the points (0, 0), (1, 0) and touching the circle $x^2 + y^2 = 9$ is **[1]**

a) $\left(\frac{1}{2}, -\sqrt{2}\right)$

b) $\left(\frac{1}{2}, \frac{1}{2}\right)$

c) $\left(\frac{1}{2}, -\sqrt{2}\right)$

d) $\left(\frac{1}{2}, \frac{3}{2}\right)$

90. The eccentricity 'e' of a parabola is **[1]**

a) Zero

b) More than 1

c) Equal to 1

d) Less than 1

91. The equations x = a cos θ , y = b sin θ, $0 \leq \theta < 2\pi$, a $\neq$ b, represent **[1]**

a) a parabola

b) an ellipse

c) a hyperbola

d) a circle

92. The vertex of the parabola $y^2 = 4\ a$ (x + a) is **[1]**

a) (a, 0)

b) (- a, 0)

c) (0, 0)

d) (0, a)

93. The eccentricity of the hyperbola $x^2 - y^2 = 9$ is **[1]**

a) less than 1

b) none of these

c) $\sqrt{2}$

d) 1

94. If the length of the major axis of an ellipse is three times the length of its minor axis, its eccentricity is **[1]**

a) $\frac{1}{\sqrt{2}}$

b) $\frac{2\sqrt{2}}{3}$

c) $\frac{1}{3}$

d) $\frac{1}{\sqrt{3}}$

95. The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9}$ =1 and having its centre at (0, 3) is **[1]**

a) $\frac{7}{2}$

b) $\sqrt{12}$

c) 3

d) 4

96. The equation $\vec{r} = \lambda\hat{i} represents$ **[1]**

a) the Z axis

b) the Y axis

c) the YOZ plane

d) the X axis

97. The equations of y axis are **[1]**

a) y = 0 , z = 0

b) x = 0 , z = 0

c) x = 0 , y = 0 , z = 0

d) x = 0 , y = 0

98. The points (1 , 1 , 0) , (0 , 1 , 1) , (1 , 0 , 1) , and (2/3 , 2/3 , 2/3) are **[1]**

a) none of these

b) coplanar

c) non coplanar

d) the vertices of a parallelogram

99. The plane XOZ divides the join of (1 , -1 , 5) and (2 , 3 ,4) in the ratio k : 1 , then the value of k **[1]**

is

a) 3 b) 1/ 3

c) - 3 d) - 1/ 3

100. The ratio in which the line joining (2 , 4 , 5) (3 , 5 , - 4) is divided by the YZ – plane is **[1]**

a) it is 4 : - 3 b) it is 3 : 2

c) it is 2 : 3 d) it is - 2 : 3

101. The area of the triangle whose vertices are (1 , 2 , 3) , (2 , 5 , - 1) , (- 1 , 1 , 2) is (sq. units) **[1]**

a) 145 b) 165

c) 150 d) $\frac{\sqrt{155}}{2}$

102. The points A (0 , 2 , 0) , B ($\sqrt{3}$, 1 , 0) , and C($\frac{1}{\sqrt{3}}, 1, \frac{2\sqrt{2}}{\sqrt{3}}$) are the vertices of **[1]**

a) a scalene triangle b) none of these

c) an equilateral triangle d) an isosceles triangle

103. The plane x + y = 0 is **[1]**

a) none of these b) passes through z – axis

c) parallel to z – axis d) perpendicular to z – axis

104. The points P (0 , 0, 0) , Q (2 , 0 , 0) , R (1 , $\sqrt{3}$, 0) and S (1 , $\frac{1}{\sqrt{3}}, \frac{2\sqrt{2}}{\sqrt{3}}$) lie **[1]**

a) none of these b) in XOY plane

c) in a line d) in a plane at right angles to Z – axis

105. The equation of any plane parallel to y – axis **[1]**

a) none of these b) y = d

c) ax + cz = 0 , $a^2 + c^2 \neq 0$ d) ax + cz + d = 0 , $a^2 + c^2 \neq 0$

106. If $\sin x = \frac{t}{\sqrt{1+t^2}}, then \frac{dx}{dt}$ is equal to **[1]**

a) $\frac{1}{\sqrt{1-t^2}}$ b) $\frac{1}{1+t^2}$

c) $\cos x + t^2$ d) $\frac{1}{\left(1+t^2\right)^{3/2}}$

107. $\frac{d}{dx}\left(\tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)\right)$ is equal to **[1]**

a) $\frac{1}{1+x^2}$ b) $\frac{-1}{\sqrt{1-x^2}}$

c) $1 + x^2$ d) $\frac{1}{\sqrt{1-x^2}}$

108. If f (x) = $\sqrt{1-x^2}, x \in (0,1), then f'(x)$ is equal to **[1]**

a) $\sqrt{1-x^2}$ b) $\sqrt{x^2-1}$

c) $\frac{1}{\sqrt{1-x^2}}$ d) $\frac{-x}{\sqrt{1-x^2}}$

109. $\underset{x \to 1}{Lt}\ (\cos[x])$ **[1]**

a) 0

b) is equal to cos 1

c) does not exist

d) is equal to 1

110. $\frac{d}{dx}(\sin^{-1}(1-x))$ is equal to **[1]**

a) $\frac{-1}{\sqrt{2x-x^2}}$

b) $\frac{1}{\sqrt{x^2-2x}}$

c) $\frac{1-x}{(2x-x^2)^{\frac{3}{2}}}$

d) $\frac{1}{\sqrt{2x-x^2}}$

111. $\underset{h\to 0}{Lt}\ \frac{\sin\sqrt{x+h}-\sin\sqrt{x}}{h}$ is equal to **[1]**

a) $\frac{1}{2\sin\sqrt{x}}$

b) $\frac{\cos\sqrt{x}}{2\sqrt{x}}$

c) $\frac{\cos\sqrt{x}}{2\sqrt{x}}$

d) $\sin\sqrt{x}$

112. If $y=\sqrt{\log x+\sqrt{\log x+\sqrt{\log x+\ldots to\ \infty}}}$ then $\frac{dy}{dx}$ is equal to **[1]**

a) $\frac{y}{2x-1}$

b) $\frac{1}{x(2y-1)}$

c) $\frac{x}{2y-1}$

d) $\frac{\log x}{2y-1)}$

113. If $y=\sin^{-1}$ x and z = $\cos^{-1}\sqrt{1-x^2}$, then $\frac{dy}{dz}=$ **[1]**

a) - 1

b) $\tan^{-1}\frac{x}{\sqrt{1-x^2}}$

c) 1

d) 0

114. $\frac{d}{dx}\left\{\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)\right\}$ is equal to **[1]**

a) $\frac{1}{1+x^2}$

b) $\sec^2 3x$

c) $\frac{3}{1+x^2}$

d) $\frac{3}{1+9x^2}$

115. $\underset{x\to 3}{Lt}\ \frac{\sqrt{x^2+10}-\sqrt{19}}{x-3}$ is equal to **[1]**

a) 1

b) $\frac{6}{\sqrt{19}}$

c) $\frac{3}{\sqrt{19}}$

d) 0

116. $\underset{x\to\frac{\pi}{4}}{Lt}\ \frac{\sec x-\sqrt{2}}{x-\frac{\pi}{4}}$ is equal to **[1]**

a) -1

b) 0

c) $\sqrt{2}$

d) $\sqrt{3}$

117. $\underset{x\to\frac{\pi}{3}}{Lt}\ \frac{\sec x-2}{x-\frac{\pi}{3}}$ is equal to **[1]**

a) 2

b) $2+\sqrt{3}$

c) $\sqrt{3}$

d) $2\sqrt{3}$

118. $\underset{x\to 0}{Lt}\ \frac{\sin x^n}{(\sin x)^m}, n>m>0$, is equal to **[1]**

a) $\frac{m}{n}$

b) 0

c) 1

d) $\frac{n}{m}$

119. $\underset{x\to\infty}{Lt}\left(\sqrt{x^2+1}-x\right)$ is equal to **[1]**

a) 0 b) 2

c) -1 d) $\frac{1}{2}$

120. $\underset{x\to 0}{Lt}\left(\frac{\tan x-x}{x}\right)\sin\left(\frac{1}{x}\right)$ is equal to **[1]**

a) 1 b) a real number other than 0 and 1

c) -1 d) 0

Solution

Class 11 - Physics

MULTIPLE CHOICE EXAMINATION JANUARY 2019-20

Section A

1. **(a)** For small deformations the stress and strain are proportional to each other
Explanation: By definition of Hooke's law
within elastic limit, the stress developed is directly proportional to the strain produced in a body.
$stress \propto strain$

2. **(c)** 4.8×10^9 Pa
Explanation:
$bulk\ modulus\ is\ defined\ as\ B = -\frac{P}{\Delta V/V}$
$here\ P\ is\ volume\ stress\ which\ is\ equal\ to\ presssure$
$given\ P = 3.6 \times 10^6\ pa \qquad \Delta V = -0.45\ cm^3 \quad V = 600\ cm^3$
$B = -\frac{3.6 \times 10^6}{-0.45/600}$
$B = 4.8 \times 10^9\ pa$

3. **(b)** 2.2×10^6 N/ m^2
Explanation:
$bulk\ modulus\ B = \frac{\frac{\Delta P}{\Delta V}}{V}$
$given\ V = \ 1\ lit \quad bulk\ modulus\ B = 2.2\ Gpa = 2.2 \times 10^9\ pa$
$\Delta V = 0.10\%$
$\Delta P = B \times \frac{\Delta V}{V}$
$\Delta P = 2.2 \times 10^9 \times \frac{0.10}{100 \times 1} = 2.2 \times 10^6\ N/m^2$

4. **(b)** 2.1×10^{-10} Pa^{-1}
Explanation:
$compressibility(K)\ is\ defined\ as\ reciprocal\ of\ bulk\ modulus$
$bulk\ modulus\ is\ defined\ as\ B = -\frac{P}{\Delta V/V}$
$here\ P\ is\ volume\ stress\ which\ is\ equal\ to\ presssure$
$given\ P = 3.6 \times 10^6\ pa \qquad \Delta V = -0.45\ cm^3 \quad V = 600\ cm^3$
$B = -\frac{3.6 \times 10^6}{-0.45/600}$
$B = 4.8 \times 10^9\ pa$
$K = \frac{1}{B} = \frac{1}{4.8 \times 10^9}$
$K = 2.1 \times 10^{-10}\ pa^{-1}$

5. **(d)** 2.18×10^{-6}

Explanation:

$young\ modulus\ y = 2.0 \times 10^{11}\ N/m^2$

$also\ y = \frac{stress}{strain}$

$strain = \frac{stress}{y} = \frac{F}{A \times y}$

$if\ we\ assume\ uniform\ distribution\ of\ weight\ then\ weight\ on\ one\ cylinder\ (m) = \frac{50000}{4} = 12500\ kg$

$restoring\ force\ F = mg = 12500\ g$

$area\ of\ each\ cylinder\ A = \pi(\mathrm{r_2} - \mathrm{r_1})^2$

$\mathrm{A} = 3.14 \times (60 - 30)^2 \times 10^{-4} = 0.28\ \mathrm{m^2}$

$\text{strain} = \frac{12500 \times 9.8}{0.28 \times 20 \times 10^{10}}$

$\text{strain} = 2.18 \times 10^{-6}$

6. **(b)** 2.5×10^{11} Pa

Explanation: Given compression force F = 50000 N

Radius will be r = $\frac{diameter}{2}$ = $\frac{0.50}{2}$ = 0.25 mm = 0.25 $\times$ 10^{-3} m

Area at which compression is applied A = πr^2 = 3.14 $\times$ $(0.25 \times 10^{-3})^2$ = 0.2 $\times$ 10^{-6} m^2

Pressure at the tip P = $\frac{Force}{area}$ = $\frac{50000}{0.2 \times 10^{-6}}$

P = 2.5 $\times$ 10^{11} pa

7. **(d)** that it enables a safe and sound design of bridges, buildings, machinery parts.

Explanation: More the elastic a material is , more it has the property to regain its original position which is required in construction works.

8. **(d)** 1.034×10^3 kg/ $\mathrm{m^3}$

Explanation: Let the given depth be h.

Pressure at the given depth, p = 80.0 atm = 80 × 1.01 × 10^5 Pa

Density of water at the surface, ρ_1 = 1.03 × 10^3kg m^{-3}

Let ρ_2 be the density of water at the depth h.

Let V_1 be the volume of water of mass m at the surface.

Let V_2 be the volume of water of mass m at the depth h.

Let ΔV be the change in volume.

$\Delta V = V_1 - V_2 = m\left[\frac{1}{\rho_1} - \frac{1}{\rho_2}\right]$

$volumetric\ strain = \frac{\Delta V}{V_1} = m\left[\frac{1}{\rho_1} - \frac{1}{\rho_2}\right] \times \frac{\rho_1}{m}$

$\frac{\Delta V}{V_1} = 1 - \frac{\rho_1}{\rho_2} \quad \rightarrow (1)$

$bulk\ modulus\ B = \frac{P}{\frac{\Delta V}{V_1}}$

$\frac{\Delta V}{V_1} = \frac{P}{B}\ \ but\ compressibility\ \frac{1}{B}\ of\ water\ is\ 45.8 \times 10^{-11}\ pa^{-1}$

$\frac{\Delta V}{V_1} = 80 \times 1.013 \times 10^5 \times 45.8 \times 10^{-11} = 3.71 \times 10^{-3} \quad \rightarrow (2)$

$from\ equation\ 1\ and\ 2$

$1 - \frac{\rho_1}{\rho_2} = 3.71 \times 10^{-3}$

$\rho_2 = \frac{1.03 \times 10^3}{1 - (3.71 \times 10^{-3})}$

$\rho_2 = 1.034 \times 10^3\ kg/m^3$

9. **(b)** 0.7 m from steel wire
Explanation: let L be the length of each of the wires A and B. Also given cross sectional area of wire A_{steel}=1mm^2 cross sectional area of B_{al}=2mm^2
young modulus for steel y_{steel}=200 Gpa=2 $\times$ 10^{11} N/m^2
young modulus of aluminium y_{al}=70Gpa=7 $\times$ 10^{10} N/m^2
Let after placing the mass m weight on lower ends of wire be F_1 and F_2 then stress on wires A and B will be $\frac{F_1}{A_{steel}}$ and $\frac{F_2}{A_{al}}$
Now given condition is stress should be equal thus
$\frac{F_1}{A_{\text{steel}}} = \frac{F_2}{A_{al}} \Rightarrow \frac{F_1}{F_2} = \frac{A_{steel}}{A_{al}} \rightarrow (1)$
if mass m is placed at a distance x and y from two wires then
$F_1x = F_2y$
$\frac{F_1}{F_2} = \frac{y}{x} \rightarrow (2)$
From equation 1 and 2
$\frac{y}{x} = \frac{A_{\text{steel}}}{A_{al}} \Rightarrow x = \frac{A_{al}}{A_{\text{steel}}}y \quad \rightarrow (3)$
also given x + y = 1.05 (total length of rod)
y = 1.05 - x $\rightarrow$ (4)
thus from 3 and 4
$x = \frac{A_{al}}{A_{steel}}(1.05 - x) \quad \Rightarrow \quad xA_{steel} = A_{al}1.05 - A_{al}x$
$x\left(A_{\text{steel}} + A_{al}\right) = A_{al} \times 1.05 \quad \Rightarrow \quad x = \frac{2\times10^{-6}\times\times1.05}{(2+1)\times10^{-6}}$
x = 0.7 m
Thus mass should be placed 0.7m from steel wire.

10. **(d)** all the atoms or molecules are displaced from their equilibrium positions causing a change in inter atomic (or intermolecular) distances.
Explanation: External force permanently distubed the equilibrium position of the interatomic (or intermolecular) forces between the particles of solid bodies.

11. **(d)** water will flow down the sides of the capillary tube
Explanation: The height of a liquid in a capillary is given by
$h = \frac{2S\cos\theta}{r\rho g}$
But if the capillary tube is of a length less than h the liquid does not overflow or came out if it is cut suddenly. The angle made by the liquid surface with the tube changes in such a way that force due to surface of tube on surface of liquid $F = 2\pi\, rS\, \cos\, \theta$ equals the weight of the liquid raised.

12. **(b)** transmitted undiminished and equally
Explanation: Pascal's principle is defined as a change in pressure at any point in an enclosed fluid at rest is transmitted undiminished to all points in the fluid.
This principle is stated mathematically as:
$\Delta P = \rho g(\Delta h)$
ΔP is the hydrostatic pressure (given in pascals in the SI system), or the difference in pressure at two points within a fluid column, due to the weight of the fluid.

13. **(c)** adjacent layers of fluid slide smoothly past each other and the flow is steady
Explanation: laminar flow (or streamline flow) occurs when a fluid flows in parallel layers, with no disruption between the layers. At low velocities, the fluid tends to flow without lateral mixing, and adjacent layers slide past one another like playing cards.

14. **(a)** Lesser when the parrot flies in the cage
Explanation: For the bird to stay in the air, the wings must push down on the air under them. If the cage is air tight, the air exerts an equal force on the floor of the cage. The net force down on the scale will remain constant. If the cage is not air tight (i.e; the wire cage), the air will move down and horizontal. The force down will be less than the weight of the bird.

15. **(a)** will move apart rapidly
Explanation: They will move apart rapidly because surface tension of oil is lesser than that of water.

16. **(b)** turbulent
Explanation: When any liquid is flowing more than the velocity of it's critical velocity then flow becomes turbulent.

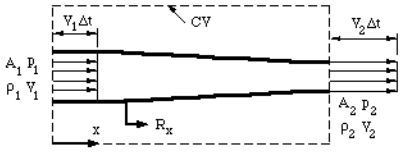
17. **(a)** 3.0
Explanation: $W_1 = W_2$
$m_1 g - v_1 \rho \omega g = m_2 g - v_2 \rho \omega g$
$36 - 4 * 1 = 48 - V_2 * 1$
$V_2 = 48 - 32 = 16 m^3$
$\rho = m_2 / v_2 = 48/16 = 3 g/cm^3$

18. **(a)** $N^{\frac{1}{3}}$
Explanation: When a droplet of radius R is broken into N small droplets total volume will remain constant. Let radius of small droplets be r. Then
$\frac{4}{3}\pi\ R^3 = N\ \frac{4}{3}\pi\ r^3$
$r = \frac{R}{N^{\frac{1}{3}}}$
$work\ done\ will\ be\ equal\ to\ the\ change\ in$
$surface\ energy\ thus$
$W = S_f - S_i = N4\pi\ r^2 T\ - 4\pi\ R^2 T$
$W = N4\pi \left(\frac{R}{N^{\frac{1}{3}}} \right)^2 T - \ 4\pi R^2 T$
$W = 4\pi R^2 T \left(N^{\frac{1}{3}}\ - 1 \right)$
$if\ N^{\frac{1}{3}}\ is\ very\ large\ thus\ it\ becomes$
$W = 4\pi R^2 T N^{\frac{1}{3}}$
$thus$
$W\ \alpha\ N^{\frac{1}{3}}$

19. **(c)** 125 gm
Explanation:
When it is submerged completely its weight will be balanced by the buoyant force which is equal to the mass of water displaced. Thus let mass of block be m then at equilibrium
$mg = V\rho g$
$m = 5\ \times\ 5\ \times 5\ \times 1$
$m = 125\ gm$

20. **(d)** is that it can flow
Explanation: fluids can flow due to unbalanced forces between the atoms of fluids.

21. **(b)** $A_1 V_1 = A_2 V_2$
Explanation: When a fluid is in motion, it must move in such a way that mass is conserved. Consider the steady flow of fluid through a duct (that is, the inlet and outlet flows do not vary with time). The inflow and outflow are one-dimensional, so that the velocity V and density ρ are constant over the area A.



Now we apply the principle of mass conservation. Since there is no flow through the side walls of the duct, what mass comes in over A_1 goes out of A_2, (the flow is steady so that there is no mass accumulation).
Over a short time interval Δt
Volume flow in over A_1 = $A_1V_1\triangle$t

Volume flow out over A_2 = $A_2V_2\triangle$t

Therefore
mass in over A = $\rho A_1V_1\triangle$t

mass out over A = $\rho A_2V_2\triangle$t

So:ρ A_1V_1 = $\rho A_2V_2\triangle$t

As volume is same so this equation can be written as
$A_1V_1 = A_2V_2$
This is a statement of the principle of mass conservation for a steady, one-dimensional flow, with one inlet and one outlet. This equation is called the continuity equation for steady one-dimensional flow.

22. **(d)** Concave
Explanation: Formation of meniscus depends on cohesive and adhesive forces in a liquid. For water, adhesive forces are stronger than the cohesive forces, therefore, water in a container stick to the wall of container and owing to the capillary action rises a little bit and form concave meniscus.

When liquid water is confined in a tube, its surface (meniscus) has a concave shape because water wets the surface and creeps up the side.

23. **(d)** 3:1
Explanation: Using the relation for height of liquid in a capillary tube
$h = \frac{2S\cos\theta}{r\rho g}$
$thus\ if\ all\ other\ parameter\ are\ fixed$
$h\ \alpha\ \frac{1}{r}$
$\Rightarrow \frac{h_1}{h_2} = \frac{r_2}{r_1}\ \ given\ h_1 = 2.2\ and\ h_2 = 6.6$
$\frac{2.2}{6.6} = \frac{r_2}{r_1}$
$\frac{r_1}{r_2} = 3:1$

24. **(c)** equal to the upward buoyant force
Explanation: This is archimedes principle when an object submerged in a liquid its weight is equal to the Buoyant force.

25. **(b)** 2d
Explanation: Density of mixture is given by
$\rho_{mix} = \frac{total\ mass}{total\ volume} = \frac{m_1+m_2+m_3}{v_1+v_2+v_3}$
$as\ v_1 = v_2 = v_3$
$\rho_{mix} = \frac{\rho_1 v\ +\rho_2 v+\rho_3 v}{v+v+v}$
$\Rightarrow \frac{dv+2dv+3dv}{3v}$
$\rho_{mix} = 2d$

26. **(d)** 18/11d

Explanation: Density of mixture of liquids is given by

$\rho_{mix} = \frac{total\ mass}{total\ volume} = \frac{m_1+m_2+m_3}{\frac{m_1}{\rho_1}+\frac{m_2}{\rho_2}+\frac{m_3}{\rho_3}}$

$\rho_{mix} = \frac{\frac{x}{3}+\frac{x}{3}+\frac{x}{3}}{\frac{x}{3d}+\frac{x}{6d}+\frac{x}{9d}}$

$\rho_{mix} = \frac{18d}{11}$

27. **(b)** 0.47

Explanation: V = Volume of metal

V' = Volume of mercury displaced

Weight of body = Weight of mercury displaced

= $7.2 \times 9810 \times V = 13.6 \times 9810 \times V'$

=> $\frac{V'}{V} = 0.53$

Fraction of volume above mercury = 1-0.53 = 0.47

28. **(b)** Addition of soap to water decreases surface tension of water

Explanation: Addition of soap decreases the surface tension of water , as we know the energy of spraying is directly proportional to the surface tension .

29. **(d)** 54.88 N

Explanation: Water compartment,

$P = h\rho g$

$= 4 \times 1.0 \times 10^3 \times 9.8$

$= 39.2 \times 10^3 Pa$

Acid Compartment,

$P' = h\rho' g$

$= 4 \times 1.7 \times 10^3 \times 9.8$

$= 66.64 \times 10^3 Pa$

Now,

$P' - P = 66.64 \times 10^3 - 39.2 \times 10^3$

$P' - P = 27.44 \times 10^3\ Pa$

$A = 20\ cm^2 = 20 \times 10^{-4} m^2$

Force using pressure,

$Pressure = \frac{Force}{Area}$

$Force = pressure \times area$

$F = 27.44 \times 10^3 \times 20 \times 10^{-4}$

$F = 54.88\ N$

30. **(d)** $\frac{A_2}{A_1} F_1$

Explanation: According to Pascal's Law,

Pressure applied to any point inside the liquid is trnasmiteed equally in all direction so,

Pressure applied on the smaller cylinder is equal to the pressure on the other cylinder,which is given by

$\frac{F_1}{A_1} = \frac{F_2}{A_2}$

So,

Maximum force on the other side is ,

F2 = $\frac{A_2}{A_1} \times F_1$

31. **(d)** Newtons per meter

Explanation: surface tension is measured in force per unit length. The S.I unit is newton per meter but the

CGS unit dyne per centimeter is also used.

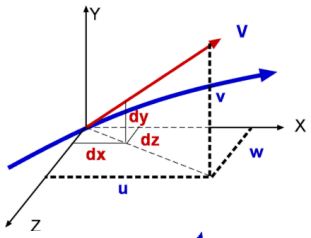
32. **(c)** l = h cos∝
Explanation: This will form a right angled triangle with base l and hypertonius h and angle between base and hypertonius is
α
$thus \ \ \cos\ \alpha = \frac{l}{h}$
$l = h\ \cos\alpha$

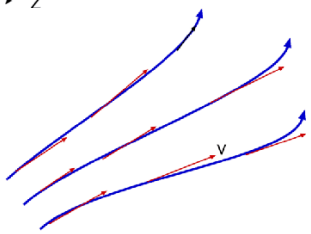
33. **(d)** $\rho g\left(h + H\right) + \frac{2T}{r}$
Explanation: Excess pressure in a air bubble is given by
$P_2 - P_1 = \frac{2T}{r}$
$T \rightarrow surface\ tension \ \ r \rightarrow radius\ of\ bubble$
$if\ the\ bubble\ is\ at\ a\ depth\ h\ inside\ then$
$P_1 = P_{atm} + h\rho g$
$given\ P_{atm} = H\rho g$
$P_1 = \rho g\left(H + h\right)$
$thus$
$P_2 \ = \ \ \ \rho g\left(h + H\right) + \frac{2T}{r}$

34. **(c)** $12\pi\ r^2T$
Explanation:
Surface energy is given by
S = surface area(A) × surface tension(T)
initial surface energy
$S_1 = 4\pi r^2T$
now if diameter is doubled radius will also be doubled thus surface energy will be
$S_2 = 4\pi(2r)^2T$
$S_2 = 16\pi r^2T$
thus excess energy required is
$\Delta s = S_2 - S_1$
$\Delta S = 16\pi r^2T - 4\pi r^2T$
$\Delta S = 12\pi r^2T$

35. **(a)** pressure in a fluid at rest is the same at all points if they are at the same height
Explanation: According to Pascal's Law,
$P\text{-}P_0$ = hdg
from above
Change in pressure is directly proportional to depth from the free surface.
At the same horizonatal line all point are at the same depth and have same value of acceleration due to gravity and denity of water as well.

36. **(c)** a curve whose tangent at any point is in the direction of the fluid velocity at that point
Explanation: Streamlines, streaklines and pathlines are field lines in a fluid flow. They differ only when the flow changes with time, that is when the flow is not steady. Considering a velocity vector field in three-dimensional space in the framework of continuum mechanics, we have that:
Streamlines are a family of curves that are instantaneously tangent to the velocity vector of the flow. These show the direction in which a massless fluid element will travel at any point in time
A streamline is one that drawn is tangential to the velocity vector at every point in the flow at a given instant and forms a powerful tool in understanding flows. This definition leads to the equation for streamlines.$\frac{du}{u} = \frac{dv}{v} = \frac{dw}{w}$
where u, v, and w are the velocity components in x, y and z directions respectively as sketched.





37. **(c)** 80kg
Explanation: Given mass of raft M=120 k.g.
density of raft=600 k.g./m^3
thus volume of raft V =
$V = \frac{Mass}{density} = \frac{120}{600} = 0.2m^3$
when raft just sin k inside after placing extra mass m. thus weight of
(raft + extra mass m)
will be equal to buoyant force. so
(M + m)g = $V\rho g$
$120 + m = 0.2 \times 1000$
m = 80 kg.

38. **(d)** Transmitted unchanged to every portion of the fluid and walls of the containing vessel
Explanation: According to Pascal's law (or the principle of transmission offluid-pressure) is a principle in fluid mechanics that states that apressure change occurring anywhere in a confined incompressiblefluid is transmitted throughout the fluid such that the same change occurs everywhere.

39. **(d)** 10 cm
Explanation: Let the side of the cube be x, density of water be ρ, mass of cube be m, acceleration due to gravity be g.
When the weight is on the block,
Using Archimedes' Principle ,
Weight of the block + Weight of the mass = Bouyant force (B_1)
Since Bouyant force is equal to volume of liquid displaced by body thus
$B_1 = \rho g x^3$
$thus \quad (m + 200)g = \rho g x^3$
$m = \rho x^3 - 200 \quad \rightarrow (1)$
$when\ mass\ is\ removed\ the\ wooden\ cube\ is\ 2cm\ outside$
$thus\ volume\ of\ cube\ inside = volume\ of\ water\ displaced = (x-2)x^2$
$again\ balance\ the\ buoyant\ force\ B_2 = \rho g(x-2)x^2$
$\rho g(x-2)x^2 = mg$
$\Rightarrow \rho(x-2)x^2 = m$
$substitute\ for\ m$
$\rho(x-2)x^2 = \rho x^3 - 200$
$\Rightarrow 2\rho x^2 = 200$
$take\ \rho = \ 1\ gram/cm^3$
$\Rightarrow x = 10\ cm$

40. **(b)** mass per unit volume
Explanation: Density is defined as the compactness of substance.
Mathematically,
Density(D)= $\frac{Mass(M)}{Volume(V)}$

Solution

Class 11 - Chemistry

MULTIPLE CHOICE EXAMINATION JANUARY 2020

Section A

41. **(d)** Portland cement
Explanation: Heating a pulverised mixture of limestone and clay in a rotary kiln is used in the manufacture of Portland cement. Cement is a product obtained by combining a material rich in lime, CaO with other material such as clay which contains silica, SiO_2 along with the oxides of aluminium, iron and magnesium.

42. **(c)** $Be^{2+} > Mg^{2+} > Ca^{2+} > Sr^{2+} > Ba^{2+}$
Explanation: As we move down the group ionic radii increases.

43. **(c)** $BaCO_3$
Explanation: $BaCO_3$ is very stable due to size compatibility factor . A larger cation can stablise a larger anion.Group 2 element become more thermally stable down the group.

44. **(a)** It is used in the preparation of bleaching powder
Explanation: $Ca(OH)_2$ is a white amorphous powder which is used in the manufacture of bleaching powder. It is used in white wash because of its disinfectant nature.

45. **(d)** $Be(OH)_2$
Explanation: $Be(OH)_2$ is soluble in NaOH.Since Be act as amphoteric unlike other group 2 elements

46. **(b)** High lattice enthalpy
Explanation: LiF has very high lattice energy which cannot be compensated by Hydration Energy.

47. **(c)** Na_2CO_3
Explanation: Sodium carbonate i.e. Na_2CO_3 is used in paper, paints and textile industries.

48. **(c)** Exceptionally small size of its atom
Explanation: The anomalous behaviour of lithium is due to the : (i) exceptionally small size of its atom and ion, and (ii) high polarising power (i.e., charge/ radius ratio). As a result, there is increased covalent character of lithium compounds which is responsible for their solubility in organic solvents.

49. **(b)** low ionization enthalpies
Explanation: The reason is that the atoms of alkali metals are of large sizes. therefore, the outermost electon is for away from the nucleus and canbe easily removed

50. **(b)** Calcium
Explanation: Cement is the important compound of Calcium. Cement is a product obtained by combining a material rich in lime, CaO with other material such as clay which contains silica, SiO_2 long with the oxides of aluminium, iron and magnesium.

51. **(a)** The electrons in magnesium are too strongly bound to get excited
Explanation: Electrons in Mg are held closer to nucleus as it is very small in size. So does not get excited by the energy provided by flame.

52. **(d)** KO_2
Explanation: KO_2 is super oxide

53. **(d)** Li
Explanation: Li reacts with water least vigorously, since the density of Li is only about half that of water,so it floats on the surface and ultimately dissappears,giving off H_2 gas

54. **(c)** Cs
Explanation: Cs is stimulated by direct sun light, and in photoelectric cell, these electrons flow to create an electric current

55. **(b)** magnesium
Explanation: Due to their nearly same polarizing power

56. **(a)** Cs

Explanation: Size of Cs is the biggest thus its melting point is the lowest 28.5^0 C

57. **(a)** Lithium and magnesium
Explanation: 1^st element of 1^st group and the second element of 2^nd group exist in diagonal relationship.Due to their nearly same polarizing power

58. **(d)** Be
Explanation: Beryllium oxide (BeO) can act as an acidic as well as basic oxide. BeO is essentially covalent in nature. BeO is amphoteric while oxides of other group 2 elements are ionic in nature.

59. **(a)** hydration enthalpy decreases down the group
Explanation: Solubility of sulphates and carbonates decreases down the group because of decrease in hydration energy. which is insufficient to over come the lattice energy of ions.

60. **(a)** Mg^{2+} ions

Explanation: When hard water containing Mg^{2+} & Ca^{2+} is passes through a bed of sodium zeolite ,thr sodium ions are replaced with by the calcium and megnisium ions. This is used in water softening process

61. **(a)** Groups 7, 8, 9
Explanation: Elements of group 7, 8, 9 of d – block do not form hydrides at all. This inability of metal, of group 7, 8, 9 of periodic table to form hydrides is referred to as hydride gap of d – block.

62. **(a)** H_3O^+ and OH^-

Explanation: Water molecules collide with one another to cause the self-ionization reaction represented by this equation:
$2H_2O \rightleftharpoons H_3O^+ + OH^-$
It is a reversible reaction so the equation is usually written with the arrows going in both directions.
The reaction does not form very much H_3O^+ or OH^-. In one liter of water there are about 55 moles of water molecules, but only 1.0 x 10^{-7} moles of H_3O^+ and OH^- are formed (at room temperature). So the concentrations of H_3O^+ and OH^- in pure water are 1.0 x 10^{-7} M.

63. **(c)** an oxidising agent in (A) and reducing agent in (B)
Explanation: H_2O_2 is an oxidizing agent in 1st reaction and Reducing agent in 2nd reaction.

64. **(b)** $2I^- + 2H^+ + H_2O_2 \rightarrow I_2 + 2H_2O$

Explanation: I^- gets oxidize to I_2 in presence H_2O_2 which itself get reduce to H_2O.

65. **(b)** Heavy water is used as a moderator in nuclear reactor.
Explanation: Heavy water is used in certain types of nuclear reactors, where it acts as a neutron moderator to slow down neutrons so that they are more likely to react with the fissile uranium-235 than with uranium-238, which captures neutrons without fissioning.

66. **(c)** $CaCO_3.Mg(OH)_2$
Explanation: $CaCO_3$.Mg$(OH)_2$ can be precipitate out in order to remove temporary hardness.

67. **(a)** vanaspati
Explanation: Vanaspati ghee is manufactured from vegetable or seed oil by a process called 'hydrogenation'.
Vegetable Oil is a viscous liquid, and contains unsaturated fatty acids, upon hydrogenation it is are converted to saturated fatty acids to form vanaspati ghee which is solid/semi solid in nature.
For quick and easy hydrogenation, catalyst like Ni, Pt which are capable of adsorbing hydrogen are used.

68. **(a)** it breaks the chemical bonds of the chromophores
Explanation: Because it can undergo bond dissociation randomly in presence of light. It dissociates and generates free radicals which is very reactive and acts like bleaching agent.

69. **(d)** Water gas
Explanation: Water gas is a combustion fuel containing carbon monoxide (CO) and hydrogen gas (H_2).
Water gas is made by passing steam over heated hydrocarbons.

The water-gas shift reaction can be used to reduce carbon dioxide levels and enrich hydrogen content, making water gas.

70. **(d)** neutral
Explanation: Cation exchange resin have exchangeable hydrogen ions which makes the water acidic while anion exchange resin have exchangeable hydroxide ion which makes the water basic. Passing water to anion exchange resin as a second process after passing through anion exchange resin makes the water neutral.

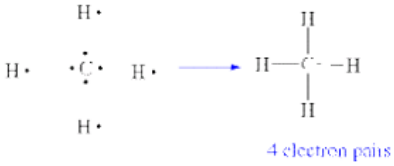
71. **(a)** all of these
Explanation: Hydrogen peroxide (H_2O_2) is a very pale blue liquid which appears colourless in a dilute solution, slightly more viscous than water. It is a weak acid. It has strong oxidizing properties and is therefore a powerful bleaching agent that is mostly used for bleaching paper, but has also found use as a disinfectant and as an oxidizer.
Hydrogen peroxide in acid solution is oxidized with KMnO4 and reduced with KI. When H_2O_2 serves as an oxidizing agent, the oxygen is reduced to H_2O. When H_2O_2 serves as a reducing agent, the oxygen is oxidized to O_2 and bubbles are noticed.

72. **(d)** sulphuric acid
Explanation: Hydrogen peroxide is manufactured in large amounts by the electrolysis of aqueous solutions of sulfuric acid (or of potassium bisulfate or ammonium bisulfate):
$H_2SO_4 \rightleftharpoons H^+ + HSO_4^-$
On cathode : $2H^+ + 2e^- \rightarrow H_2$
On anode : $2HSO_4^- - 2e^- \rightarrow H_2S_2O_8$
$2H_2SO_4 \rightarrow H_2S_2O_8 + 2H^+ + 2e^-;$
$H_2S_2O_8 + 2H_2O \rightarrow 2H_2SO_4 + H_2O_2.$

73. **(b)** Ca^{2+} ions
Explanation: Zeolites are characteristically soft to moderately hard, light in density, insoluble in water but can act as base exchangers in contact with water containing cations. Hence these can remove Ca^{2+} ions from water when hard water is passed through them.

74. **(b)** It can lose an electron to form a cation which can freely exist
Explanation: H^+ cannot exist freely due to its small size.

75. **(d)** CH_4
Explanation: Electron precise hydride is the type of hydride in which the number of electrons present is equal to the number of electrons required (octet or duplet). For example- CH_4
CH_4 has no lone pair of electron or vacant orbital so it is an electron precise hydride.



76. **(b)** Hydrated sodium aluminium silicate
Explanation: Zeolites are microporous, aluminosilicate minerals commonly used as commercial adsorbents and catalysts.
Average chemical composition of sodium zeolite is reported as Sodium Oxide - 17%, Aluminum Oxide - 28%, Silicon dioxide – 33% and water – 22%.
The formula of sodium zeolite may be represented by $NaAlSi_2O_6$-H_2O. Another name for this substance is hydrated sodium aluminum silicate.

77. **(a)** provides thermal insulation
Explanation: Since there is no heat flux, ice once formed grows quickly on the surface of lake. As this cover completely on the surface, the snow on the ice insulate the water from the atmosphere.
Due to this the rate of ice growth is slowed down. The heat lost from the water to the atmosphere must be taken from the latent heat released when ice is formed, since the water just below the ice is at the freezing

point. Due to this thermal insulation, water at the bottom of the lake does not freeze or the thickness of ice decreases on moving down the lake. Thus the aquatic animals and plant survive.

78. **(d)** Water-gas shift reaction
Explanation: The water gas shift reaction converts carbon monoxide and water to carbon dioxide and hydrogen. The reaction is catalysed by a number of different base metal catalysts, depending on the operating temperature and levels of poisons in the feedstock.
$CO + H_2O \rightleftharpoons CO_2 + H_2$

79. **(a)** Manufacturing of caustic soda
Explanation: The chloralkali process (also chlor-alkali and chlor alkali) is an industrial process for the electrolysis of NaCl. It is the technology used to produce chlorine and sodium hydroxide (lye/caustic soda), which are commodity chemicals required by industry.
Usually the process is conducted on a brine (an aqueous solution of NaCl), in which case NaOH, hydrogen, and chlorine result.
In remaining three processes, hydrogen is a main product.

80. **(c)** LiH < NaH < KH < RbH < CsH
Explanation: As the size of cation increases ionic character also increases.

Solution

Class 11 - Mathematics

Multiple Choice Questions Examination January (2019-20)

Section A

81. **(d)** $\frac{3}{5}$

Explanation: here c=3, b=4, from relation $a^2=b^2+c^2$ we get a=5.
e=c/a = 3/5

82. **(b)** on the line y = x
Explanation: point of intersection is(0,0) and (4,4). This implies y = x. Hence it intersects the line y = x

83. **(a)** y – a = 0
Explanation: From the equation we infer that the parabola is open downward.
Hence the directrix passes through the point (0,a) and will be parallel to the X-axis.
Hence the equation of the directrix is y = a or y - a = 0

84. **(d)** an ellipse
Explanation: The given equation can be written of the form
$(x-9/2)^2 + 3(y+1/3)^2 - \frac{81}{4} - \frac{1}{3} + 1 = 0$, i.e; $(x-9/2)^2 + 3(y+1/3)^2 = 235$
That is $\frac{(x-9/2)^2}{235} + 3\frac{(y+2/3)^2}{235} = 1$
This is an equation of an ellipse.

85. **(b)** $\sqrt{\frac{2}{3}}$
Explanation: $2b^2/a^2$ = 2a/3
Hence $\frac{b^2}{a^2}$ = 1/3. Hence $e^2 = 1 - \frac{b^2}{a^2} = 1 - (1/3) = 2/3$
Therefore e = $\sqrt{\frac{2}{3}}$

86. **(a)** $\frac{5}{4}$
Explanation: Given $9x^2 - 16y^2 = 144$
Dividing throughout by 144 we get,
$\frac{x^2}{16} - \frac{y^2}{9} = 1$
This implies $a^2 = 16$ and $b^2 = 9$
e = $\frac{\sqrt{a^2+b^2}}{a} = \frac{5}{4}$

87. **(c)** $\sqrt{\frac{31}{12}}$
Explanation: The general form of the given circle is $x^2 + y^2 - 2x + y - 4/3 = 0$
Hence g = 1, f = -1/2 and c = -4/3
Radius = $\sqrt{g^2 + f^2 - c}$
Substituting the values we get,
Radius = $\sqrt{1 + 1/4 + 4/3} = \sqrt{\frac{31}{12}}$

88. **(b)** none of these.
Explanation: If $a^2 = b^2$, then the equation becomes $x^2 + y^2 = a^2$ which represents the equation of a circle.

89. **(c)** $\left(\frac{1}{2}, -\sqrt{2}\right)$
Explanation: Since the circle passes through (0,0) the equation reduces to
c= 0 -----(1)
Since it passes through (1,0),
1 + 2g + c = 0
This implies g = -1/2

Since the circle touches the circle $x^2 + y^2 = 9$, their radii should be equal
$2\sqrt{g^2 + f^2 + c} = 3$
Substituting the values and simplifying we get f = $\pm\sqrt{2}$
Hence the centre is (1/2, $-\sqrt{2}$)

90. **(c)** Equal to 1
Explanation: Eccentricity of a parabola is 1

91. **(b)** an ellipse
Explanation: parametric form of ellipse.

92. **(b)** (- a, 0)
Explanation: Let the equa y = Y and (x+a) = X
Then the equation of the parabola can be written as
$Y^2 = 4aX$, whose vertedx is (0,0)
Therefore x+a=0 and y=0., implies x = -a and y = 0
Hence the vertex of the given parabola is (-a,0)

93. **(c)** $\sqrt{2}$
Explanation: $x^2 - y^2 = 9$
above equation can be written as,
$\frac{x^2}{(3)^2} - \frac{y^2}{(3)^2} = 1$
comparing it with the standard equation we get a=3 and b=3
as c=$\sqrt{a^2 + b^2}$
we get c= 3 $\sqrt{2}$
and as e = $\frac{c}{a}$
we get e = $\sqrt{2}$

94. **(b)** $\frac{2\sqrt{2}}{3}$
Explanation: here b/a=1/3
Hence $\frac{b^2}{a^2}$ = $\frac{1}{9}$, $b^2 = \frac{a^2}{9}$
Therefore $b^2 = a^2(1 - e^2)$
Substituting the values we get
e = $\frac{2\sqrt{2}}{3}$

95. **(d)** 4
Explanation: $\frac{x^2}{16} + \frac{y^2}{9}$=1
comparing with the standard equation we get a=4 and b=3 we get c =$\sqrt{16 - 9}$ =$\sqrt{7}$
so focus is $(\sqrt{7}, 0)$ and the given centre is (0,3).
using distance formulae. we get radius =4 units

96. **(d)** the X axis
Explanation: The equation $\vec{r} = \lambda\hat{i} represents$ represent X- axis
Explanation - $\vec{r} = \lambda\hat{i}$
$\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ = $\lambda\ \hat{i} + 0\hat{j} + 0\hat{k}$
x= λ , y= 0 ,z= 0 this is a general point on X axis , So given equation represent X axis

97. **(b)** x = 0 , z = 0
Explanation: Since on Y axis x and z coordinate are 0 .
So , Equations of Y axis are X=0 and Z=0

98. **(b)** coplanar
Explanation: $\vec{a} = 1\hat{i} + 1\hat{j} + 0\hat{k}), \vec{b} = (0\hat{i} + 1\hat{j} + 1\hat{k}), \vec{c} = ((\hat{i} + 0\hat{j} + 1\hat{k}), \vec{d} = (2/3\hat{i} + 2/3\hat{j} + 2/3\hat{k})$
$\overrightarrow{AB} = -\overrightarrow{1i} + 0\hat{j} + 1\hat{k}, \overrightarrow{AC} = -0\hat{i} + -1\hat{j} + 1\hat{k}, \overrightarrow{AD} = -1/3\hat{i} + -1/3\hat{j} + 2/3\hat{k}$

$$\text{Consider} \begin{vmatrix} -1 & 0 & 1 \\ 0 & -1 & 1 \\ -1/3 & -1/3 & 2/3 \end{vmatrix} = -1(-1/3) + 1(-1/3)$$

=0

Hence points are coplanar

99. **(b)** 1/ 3

Explanation: since XOZ plane is given y coordinate must be zero

k x 3 +1 x(-1) / k+1 =0

3k -1 = 0

k=1/3

100. **(d)** it is - 2 : 3

Explanation: The ratio in which the line joining (2 , 4 , 5) (3 , 5 , - 4) is divided by the YZ – plane is

Point in YZ plane will be P(0 , y, z) let it divides the line joning points A(2 , 4 , 5) and B(3 , 5 , - 4) in the ratio k : 1

then X coordinate of point P will be given by $\frac{3k+2}{k+1}$ which is equal to zero

i.e. $\frac{3k+2}{k+1}$ = 0 => 3k+2 =0 => k = -2/3

so , YZ plane divides in -2 :3

101. **(d)** $\frac{\sqrt{155}}{2}$

Explanation: let $\vec{a} = (1\hat{i} + 2\hat{j} + 3\hat{k}), \vec{b} = (2\hat{i} + 5\hat{j} - 1\hat{k}), \vec{c} = (-1\hat{i} + 1\hat{j} + 2\hat{k})$

Ares of triangle $= \frac{1}{2}[\vec{a} * \vec{b} + \vec{b} * \vec{c} + \vec{c} * \vec{a}]$

$$= \frac{1}{2}\left[\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 2 & 3 \\ 2 & 5 & -1 \end{vmatrix}\right] + \left[\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 5 & -1 \\ -1 & 1 & 2 \end{vmatrix}\right] + \left[\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -1 & 1 & 2 \\ 1 & 2 & 3 \end{vmatrix}\right]$$

$= \frac{1}{2}[-17\hat{i} + 7\hat{j} + 1\hat{k} + 11\hat{i} - 3\hat{j} + 7\hat{k} - 1\hat{i} + 5\hat{j} - 3\hat{k}]$

$= \frac{1}{2}[-7\hat{i} + 9\hat{j} + 5\hat{k}]$

Area $= \frac{1}{2}\sqrt{49 + 81 + 25}$

Area $= \sqrt{155}/2$

102. **(c)** an equilateral triangle

Explanation: To check which type of triangle these points form we need to check the distance between the two points

AB=$\sqrt{(\sqrt{3})^2 + 1 + 0} = 2$

BC = $\sqrt{(\frac{1}{\sqrt{3}} - \sqrt{3})^2 + (\frac{2\sqrt{2}}{\sqrt{3}})^2} = 2$,

similarly AC=2 by distance formula between two points

Since all sides are same so the triangle is equilateral

103. **(b)** passes through z – axis

Explanation:

$\text{Co} - \text{ordinates of any point on z} - \text{axis are } (0,\ 0,\ \text{z})$

$\therefore\ \text{The plane x} + \text{y} = 0 \text{ will pass through z} - \text{ axis if } (0,0,\text{z}) \text{ satisfies x} + \text{y} = 0 \ldots\ldots\ldots\ldots (1)$

$\text{Now L.H.S of } (1) = \text{x} + \text{y}$

$\text{For } (0,0,\text{z}),\ \text{L.H.S of } (1) = 0 + 0 = 0 = \text{R.H.S of } (1)$

Hence the result

104. **(a)** none of these

Explanation: The equation of plane passing through (0,0,0) is a(x-0)+b(y-0)+c(z-0)=0

ax+by+cz=0.if it passes through Q (2 , 0 , 0) , R (1 , $\sqrt{3}$, 0) then we get

2a=0 ;a+$\sqrt{3}$ b=0 i.e. we get a=0 and b=0

Now if we put co-ordinates of S it does not satisfy the equation.

hence points are not coplanar

105. **(d)** ax + cz + d = 0 , $a^2 + c^2 \neq 0$
Explanation: Since the plane ax+by+cz+d=0 is parallel to y axis hence b=0.
hence ax+cz+d=0.

106. **(b)** $\frac{1}{1+t^2}$
Explanation: $we\ have,$
$x = sin^{-1}\frac{t}{\sqrt{1+t^2}}$
$let\ t = \tan\theta$
$\Rightarrow x = \theta \Rightarrow \frac{dx}{d\theta} = 1$
$Also,\ \frac{dt}{d\theta} = \sec^2\theta$
$Now, \frac{dx}{dt} = \frac{1}{\sqrt{1+t^2}}$

107. **(d)** $\frac{1}{\sqrt{1-x^2}}$
Explanation: $Substitute\ x = \sin\theta;\ \frac{dx}{d\theta} = \cos\theta$
$\Rightarrow y = \theta$
$\Rightarrow \frac{dy}{dx} = \sec\theta$
$\Rightarrow \frac{1}{\sqrt{1-x^2}}$

108. **(d)** $\frac{-x}{\sqrt{1-x^2}}$
Explanation: $f'(x) = \frac{1}{2\sqrt{1-x^2}}.-2x$

109. **(c)** does not exist
Explanation: $R.H.L = \underset{x\to 1^+}{Lt}\ (\cos[x]) = \cos 1$
$L.H.L. = \underset{x\to 1^-}{Lt}\ (\cos[x]) = \cos 0 = 1$
$Since\ L.H.L. \neq R.H.L. therefore\ limit\ does\ not\ exists.$

110. **(c)** $\frac{1-x}{(2x-x^2)^{\frac{3}{2}}}$
Explanation: $y = \sin^{-1}(1-x)$
$\Rightarrow \sin y = 1 - x$
$\Rightarrow (\cos y)y' = -1$
$\Rightarrow y'' = (y')^2(\tan y) = \frac{(\sin y)}{(\cos y)^3}$
$\Rightarrow \frac{1-x}{(2x-x^2)^{\frac{3}{2}}}$

111. **(c)** $\frac{\cos\sqrt{x}}{2\sqrt{x}}$
Explanation: $\underset{h\to 0}{Lt}\ \frac{2\cos(\frac{\sqrt{x+h}+\sqrt{x}}{2})\sin(\frac{\sqrt{x+h}-\sqrt{x}}{2})}{h}$
$using\ L'Hospital$
$\Rightarrow \frac{\cos\sqrt{x}}{2\sqrt{x}}$

112. **(b)** $\frac{1}{x(2y-1)}$
Explanation: $y = \sqrt{\log x + y}$
$y^2 = \log x + y$
$2yy' = \frac{1}{x} + y'$
$y' = \frac{1}{(x)(2y-1)}$

113. **(c)** 1
Explanation: $we\ have;$
$$\sin y = x\ and \cos z = \sqrt{1-x^2} \implies \cos z = \cos y$$
$$\Rightarrow z = y$$
$$\Rightarrow \frac{dy}{dz} = 1$$

114. **(c)** $\frac{3}{1+x^2}$
Explanation: $Substitute\ x = \tan\theta;\ \frac{dx}{d\theta} = \sec^2\theta$
$$\Rightarrow y = 3\theta$$
$$\Rightarrow \frac{dy}{dx} = 3\cos^2\theta = \frac{3}{1+x^2}$$

115. **(c)** $\frac{3}{\sqrt{19}}$
Explanation: Using L'Hospital, $\underset{x\to 3}{Lt}\ \frac{\frac{2x}{2\sqrt{x^2+10}}}{1}$
$$Substituting\ x = 3\ in\ \frac{\frac{2x}{2\sqrt{x^2+10}}}{1}$$
$$we\ get$$
$$\frac{3}{\sqrt{19}}$$

116. **(c)** $\sqrt{2}$
Explanation: $Using\ L'Hospital;$
$$\underset{x\to\frac{\pi}{4}}{Lt}\ \frac{\sec x\ \tan x}{1}$$
$$\Rightarrow \sqrt{2}$$

117. **(d)** $2\sqrt{3}$
Explanation: $Using\ L'Hospital;$
$$\underset{x\to\frac{\pi}{3}}{Lt}\ \frac{\sec x\ \tan x}{1}$$
$$\Rightarrow 2\sqrt{3}$$

118. **(b)** 0
Explanation: $\underset{x\to 0}{Lt}\ \frac{\sin x^n}{(\sin x)^m}\cdot\frac{x^{m+n}}{x^{m+n}}$
$$\Rightarrow \underset{x\to 0}{Lt}\ \frac{\sin x^n}{x^n}\cdot\frac{x^m}{(\sin x)^m}\cdot\frac{x^n}{x^m}$$
$$\Rightarrow 1.1^m.x^{n-m}$$
$$\Rightarrow 1.0 = 0$$

119. **(a)** 0
Explanation: Put $x = \frac{1}{t}$
Then, $\underset{t\to 0}{Lt}\ \frac{\left(\sqrt{1+t^2}-1\right)}{t}$
Applying L'Hospital $\underset{t\to 0}{Lt}\ \frac{\frac{2t}{2\sqrt{1+t^2}}}{1} = 0$

120. **(d)** 0
Explanation: $\underset{x\to 0}{Lt}\ \left(\frac{\tan x}{x} - \frac{x}{x}\right)\sin\left(\frac{1}{x}\right)$
$$\Rightarrow 0.Finite\ number = 0$$