Q. Booklet Sl. No. :

ENTRANCE TEST FOR DIPLOMA HOLDERS – 2011

COURSE : CHEMICAL ENGINEERING

GROUP CODE : CH

VERSION CODE
A

Maximum Marks : 180
Maximum Time : 205 Minutes
(Including initial 25 minutes for filling Name, Admission Ticket No., Version Code and Serial Number in the OMR Answer Sheet and Question Booklet.)

Please fill your Admission Ticket No. Below				

INSTRUCTIONS TO CANDIDATES

1. Do not remove the seal on the right side of this booklet during the first fifteen minutes after the 2nd bell at 2.00 P.M. You should not look inside the Question Booklet or start answering on the Answer Sheet during initial 10 minutes. Break the seal at the right side to open this booklet only after the 3rd bell at 2.10 P.M.
2. The initial fifteen minutes are meant for the candidates to enter Name, Admission Ticket No., Version code (should be shaded) and Serial No. on the Answer Sheet. As Answer Sheets are designed to suit the Optical Marks Reader (OMR) system, special care should be taken to fill those items accurately. **DO NOT DAMAGE OR MUTILATE THE TIMING MARKS ON THE OMR ANSWER SHEETS.**
3. The Question Booklet and OMR Answer Sheet are issued separately at the start of the examination.
4. This Question Booklet contains 180 questions, check whether 180 multiple choice questions are printed (40 in Applied Science, 40 in Applied Mathematics and 100 questions in Engineering Subject).
5. **Candidate must ensure that he/she has received the correct Question Booklet, corresponding to his/her branch of Engineering/Technology (Group code).**
6. **In case of any discrepancy, immediately exchange the Question Booklet by bringing the error to the notice of the Invigilator.**
7. During the subsequent 180 minutes :
   (a) Read each question carefully.
   (b) Determine the correct answer from the four available choices given under each question.
   (c) **Completely darken/shade the relevant circle with a blue or black ink ballpoint pen against the question number on the Answer Sheet.**
   For Example :
   Q. No. 14 : The product of 0.5×0.05 is : (1) 0.05 (2) 0.005 (3) 0.025 (4) 0.25
   As the correct answer is Option No. 3, the candidate should darken the circle corresponding to Option No. 3 completely with a blue or black ink ballpoint pen on the Answer Sheet.

   ① ② ● ④
8. Please stop writing when the last bell rings at 5.10 P.M. Hand over answer paper set to the invigilator **who will separate top sheet and will retain the same with him and return the bottom sheet replica to you to carry home.**

1. Small pressure differences in liquids is measured using

(1) U-tube manometer (2) inclined tube manometer

(3) pitot tube (4) None of these

2. What is the unit of thermal conductivity ?

(1) kcal/hr. m^2 °C (2) kcal/hr. m °C

(3) kcal/hr. m. (4) kcal/hr. °C

3. Which of the following has the highest thermal conductivity ?

(1) Brick (2) Water

(3) Air (4) Silver

4. Thermal diffusivity is

(1) $k/\rho.C_p$ (2) $\rho.C_p/k$

(3) $\frac{C_p.\mu}{a}$ (4) $\mu/h.C_p$

5. Fourier law of heat conduction applies to

(1) Convection (2) Conduction

(3) Radiation (4) All (1), (2) and (3)

6. An insulator should have

(1) low thermal conductivity (2) high thermal conductivity

(3) less resistance to heat flow (4) a porous structure

7. Molecular diffusion is caused by

(1) Transfer of molecules from low concentration to high concentration region

(2) Thermal energy of molecules

(3) Activation energy of the molecules

(4) Potential energy of the molecules

8. Mass transfer co-efficient is defined as

(1) Flux = Co-efficient/Concentration difference

(2) Co-efficient = Flux/Concentration difference

(3) Flux = Concentration difference/Co-efficient

(4) None of these

9. Diffusivity (D) in a binary gas mixture is related to the pressure (p) as

(1) $D \propto T$

(2) $D \propto T^{0.5}$

(3) $D \propto T^{1.5}$

(4) $D \propto T^{2}$

10. What is the emissivity of a black body ?

(1) 1

(2) 0

(3) 0.90

(4) 0.5

11. Heat transfer co-efficient (h_l) for liquids increases with

(1) increasing temperature

(2) decreasing temperature

(3) decreasing Reynolds number

(4) none of these

12. Fouling factor

(1) is a dimensionless quantity

(2) does not provides a safety factor for design

(3) accounts for additional resistances to heat flow

(4) none of these

13. Baffles in the shell and tube heat exchanger

(1) increase the cross-section of the shell side liquid

(2) force the liquid to flow parallel to the bank

(3) increase the shell-side heat transfer co-efficient

(4) decrease the shell-side heat transfer co-efficient

14. N.T.P. corresponds to

(1) 1 atm. absolute pressure and 0 °C

(2) 760 mm Hg gauge pressure and 0 °C

(3) 760 torr and 15 °C

(4) 101.325 kPa gauge pressure and 0 °C

15. 1 bar is almost equal to _____ atmosphere.

(1) 1 (2) 10

(3) 100 (4) 1000

16. Number of gm. moles of solute dissolved in 1 kg of solvent is called its

(1) Normality (2) Molarity

(3) Molality (4) Equivalent weight

17. S.T.P. corresponds to

(1) 1 atm. absolute pressure and 15.5 °C

(2) 760 mm Hg gauge pressure and 15.5 °C

(3) 760 torr and 0 °C

(4) 101.325 kPa gauge pressure and 15.5 °C

18. C_v for monoatomic gases is equal to

(1) R (2) 1.5 R

(3) 2 R (4) 3 R

19. Real gases approach ideal behaviour at

(1) high pressure and high temperature

(2) low pressure and high temperature

(3) high pressure and low temperature

(4) low pressure and low temperature

20. The value of gas constant 'R' is _____ kcal/kg mole °C.

(1) 2.79 (2) 1.987

(3) 3.99 (4) None of these

21. The total number of atoms in 8.5 gm of NH_3 is _____ $\times 10^{23}$.

(1) 9.03 (2) 3.01

(3) 1.204 (4) 6.02

22. Thermocouple is suitable for measuring

(1) liquid temperature only.

(2) very high temperatures only.

(3) very low temperature only.

(4) both high and low temperatures.

23. Gas analysis is commonly done using

(1) Thermal conductivity cell (2) X-ray diffraction

(3) Mass spectrometer (4) Emission spectrometer

24. Pirani gauge is used for

(1) measurement of very high pressure

(2) measurement of high vacuum

(3) liquid level under pressure

(4) liquid level at atmospheric pressure

25. A barometer measures _____ pressure.

(1) absolute (2) guage

(3) both absolute and guage (4) dynamic

26. The temperature range for the working of Radiation pyrometer is _____.

(1) 70 °C to 5500 °C (2) 80 °C to 1200 °C

(3) 70 °C to 5000 °C (4) None of the above range

27. Instrumentation in a plant offers the advantage of

(1) greater safety operation (2) better quality of product

(3) greater operation economy (4) all (1), (2), (3)

28. Which of the following controllers has maximum offset ?

(1) P-controller (2) P-I controller

(3) P-D controller (4) P-I-D controller

29. Which of the thermocouple can be used to measure temperature around 1400 °C ?

(1) Copper–Constantan

(2) Aluminium–Chromel

(3) Platinum–Platinum + Rhodium

(4) None of these

30. pH meter has

(1) one cell (2) two cells

(3) three cells (4) no cells

31. Final control element is a _____.

(1) Valve (2) Switch

(3) Signal (4) None of these

32. Flapper nozzle is a _____ controller.

(1) Pneumatic (2) Hydraulic

(3) Electronic (4) None of these

33. _____ can be used continuously measuring specific gravity or density of liquids.

(1) Barometer (2) pH meter

(3) Hydrometer (4) Hygrometer

34. V-Notch is used to measure flow rate of a liquid in

(1) an open-channel

(2) a non-circular cross-section closed channel

(3) vertical pipeline

(4) none of these

35. Pitot tube is used to measure (directly)

(1) Viscosity (2) Flow rate of fluids

(3) Surface tension of fluid (4) None of these

36. A rotameter

(1) incurs constant and small permanent pressure drop.

(2) incurs constant but very large permanent pressure drop.

(3) is inaccurate for low flow rates.

(4) need not be mounted always vertically.

37. Which of the following is not a head flow meter ?

(1) Segmental orifice plate (2) Pitot tube

(3) Rotameter (4) Flow-nozzle

38. Starting temperature of optical radiation pyrometer is

(1) 800 °C (2) 400 °C

(3) 1200 °C (4) 1500 °C

39. Bellows are made of

(1) Leather (2) Paper

(3) Plastic (4) Thin copper sheet

40. Humidity is most commonly measured by

(1) Partial vapour pressure determination

(2) Dry and wet bulb temperature measurement

(3) Physical expansion

(4) Evaporation

41. On-off control is a special case of

(1) Proportional control (2) P-I-D control

(3) P-D control (4) P-I control

42. Isotopes are atoms having same

(1) mass number (2) number of neutrons

(3) atomic mass (4) none of these

43. Average molecular weight of air is about

(1) 21 (2) 29

(3) 23 (4) 79

44. The heat change for the reaction $C(s) + 2S(s) \rightarrow CS_2(l)$ is 104.2 kJ. It represents the heat of _____.

(1) Formation (2) Solution

(3) Combustion (4) Fusion

45. Heat of reaction is a function of

(1) Pressure (2) Temperature

(3) Both (1) and (2) (4) Neither (1) nor (2)

46. Heat of _____ of a fuel is called its calorific value.

(1) formation (2) combustion

(3) reaction (4) vapourisation

47. The heat of vapourisation _____ with increase in pressure.

(1) increases

(2) decreases

(3) becomes zero at critical pressure

(4) both (2) and (3)

48. Avogadro's number is equal to

(1) 6.023×10^{23} molecules / kg. mole.

(2) 6.023×10^{23} molecules / gm. mole.

(3) 6.023×10^{16} molecules / kg. mole.

(4) 6.023×10^{26} molecules / gm. mole.

49. Heat of solution in a system in which both solute and solvent are liquids is termed as

(1) heat of solvation

(2) heat of hydration

(3) standard integral heat of solution

(4) heat of mixing

50. The number of water molecules present in a drop of water weighing 0.018 gm is $6.023 \times$ _____.

(1) 10^{26} (2) 10^{23}

(3) 10^{20} (4) 10^{19}

51. Number of gram equivalent of solute dissolved in one litre of solution is called its

(1) Normality (2) Molarity

(3) Molality (4) None of these

52. The compounds which consists of open chain of carbon atoms are called _____ compounds.

(1) Aromatic
(2) Aliphatic
(3) Alicyclic
(4) Aeterocyclic

53. An hydrocarbon is said to be unsaturated if it contains _____ and _____.

(1) C = C or C ≡ C bonds
(2) C = C or C – C bonds
(3) both (1) and (2)
(4) none of these

54. Compounds with the same molecular formula but different structural formulas are called _____.

(1) Alkoxides
(2) Iso-compounds
(3) Isomers
(4) Ortho compounds

55. Hydrocarbons are

(1) Insoluble in water
(2) Composed of carbon & Hydrogen
(3) Both (1) and (2)
(4) None of these

56. Methane can be prepared by

(1) the reaction of iodomethane with sodium in dry ether.
(2) the reaction of methanol with conc. H_2SO_4.
(3) the reaction of sodium methanoate with sodalime.
(4) the reaction of sodium ethanoate with sodalime.

57. LPG (house hold cooking gas) is mainly a mixture of

(1) Methane + ethane (2) Acetylene + O_2

(3) Butane + Isobutane (4) Acetylene + H_2

58. The octane rating of gasoline provides information on

(1) its antiknock properties.

(2) its ignition properties.

(3) its percentage proportion of octane.

(4) its percentage content of iso-octane.

59. In which solvent alkenes most soluble ?

(1) Water (2) Ethyl alcohol

(3) Ammonia (4) CCl_4

60. Acetylene reacts with water in the presence of H_2SO_4 and mercuric sulphate to give

(1) Acetone (2) Formaldehyde

(3) Acetic acid (4) Acetaldehyde

61. The major carbon compound formed from the incomplete combustion of a hydrocarbon in air is

(1) carbon dioxide (2) carbon monoxide

(3) water (4) alkyl chains

62. Any computer is controlled by a set of _____.

(1) hardware (2) software

(3) information (4) instructions

63. _____ holds the data and program instructions as the CPU works with them.

(1) RAM (Random Access Memory)

(2) ROM

(3) Storage devices

(4) None of these

64. Operating system falls into the category of _____.

(1) System software

(2) Application software

(3) Database management software

(4) Both (1) and (2)

65. The keys make up the part of the keyboard that looks like a typewriter's keys are

(1) Special purpose keys (2) Function keys

(3) Typing keys (4) Alphanumeric keys

66. A single unit of data is called a bit and _____ bits makeup one byte.

(1) ten (2) eight

(3) twelve (4) four

67. The _____ is an electrical path that connects the CPU, memory and the other hardware devices on the motherboard.

(1) data bus (2) address bus

(3) local bus (4) none of these

68. The process of connecting separate networks together is called _____.

(1) Network connection (2) Internet

(3) Arpanet (4) Both (1) and (2)

69. An Internet is open to _____.

(1) Members (2) Government Agencies

(3) University researchers (4) Anyone who can access it

70. One kilobyte is equivalent to _____ bytes.

(1) 1024 (2) 1000

(3) 1200 (4) 100

71. Keyboard, Mouse, Joystick, Pen, Scanner etc. are _____ type of devices.

(1) output devices (2) input devices

(3) input and output devices (4) none of these

72. Screw conveyors are

(1) run at very high rpm.

(2) suitable for sticky materials.

(3) suitable for highly abrasive materials.

(4) all (1), (2) and (3).

73. A belt conveyor used for transportation of materials can

(1) run upto 1 km.

(2) travel at a speed upto 300 mts/min.

(3) handle upto 5000 tons/hr.

(4) all (1), (2), (3).

74. Short distance transportation of grain, gravel, sand, ash, asphalt etc. is done by using a _____ conveyor.

(1) Flight (2) Slat or drag

(3) Ribbon (4) Screw

75. Bucket elevators are not suitable for vertical lifting of _____.

(1) fine materials
(2) sticky materials
(3) small lumpy materials
(4) free flowing materials

76. The Power number is

(1) $\frac{ND_a^2P}{\mu}$
(2) $\frac{N^2Da}{\rho}$
(3) $\frac{P}{N^3D_a^5P}$
(4) None of these

77. To improve the rate of mixing and minimise vortex formation _____ are usually incorporated in vertical vessels.

(1) Baffles
(2) Agitators
(3) Impellers
(4) Paddles

78. _____ are very effective for thin paste and for powders that do not flow readily.

(1) Ribbon blenders
(2) Tumblers
(3) Muller mixers
(4) Banburry mixers

79. Moisture contained by a substance in excess of the equilibrium moisture is called

(1) unbound moisture
(2) free moisture
(3) critical moisture
(4) bound moisture

80. Rotary dryers cannot handle _____ materials.

(1) free flowing
(2) dry
(3) sticky
(4) granular

81. Heat sensitive materials like certain pharmaceuticals and food stuffs can be dried

(1) in indirect tray dryer
(2) in spray dryer
(3) by freeze drying
(4) none of these

82. A fluid is one which

(1) cannot remain at rest under the action of shear force.

(2) continuously expands till it fells any container.

(3) is incompressible.

(4) permanently resist distortion.

83. With increase in the temperature viscosity of a liquid

(1) increases

(2) decreases

(3) remains constant

(4) may increase or decrease depends on the liquid

84. The units of force in SI units is

(1) Newton (2) Kilogram

(3) Tonne (4) Gram

85. Water, kerosene, air, the common fluids are _____.

(1) Newtonian fluids (2) Non-newtonian fluids

(3) Plastics (4) Thinotrofice substances

86. The unit of mass density is _____

(1) kg/m^3 (2) kg/cm^3

(3) kg m/sec (4) m^3/kg

87. _____ are the simplest devices used for measuring the pressure differences.

(1) Manometers (2) Barometers

(3) Viscometers (4) None of these

88. If $N_{Rc} < 2100$, the flow is usually

(1) Laminar (2) Turbulent

(3) Flow in transition region (4) None of these

89. _____ is the variable area meter which is used for measuring the flow rate of fluid through the pipe.

(1) Venturimeter (2) Rotameter

(3) Orificemeter (4) None of these

90. While starting a centrifugal pump, its delivery valve should be kept

(1) opened

(2) either opened or closed, it does not make any difference

(3) closed

(4) none of these

91. Vena-Contracta formed during flow of a liquid through an orificemeter has

(1) minimum liquid cross-section

(2) more diameter compared to orificemeter

(3) minimum velocity of fluid stream

(4) none of these

92. The removal of air from the suction line and pump is known as _____.

(1) Air binding (2) Cavitation

(3) Priming (4) None of these

93. _____ type of pump can handle relatively viscous liquids and liquid containing solids.

(1) Centrifugal pump (2) Reciprocating pump

(3) Metering pumps (4) Gear pump

94. The pitot tube is used to measure local or point _____.

(1) pressure (2) density

(3) velocity (4) viscosity

95. Equivalent length of a filling is

(1) dependent on Reynolds Number.

(2) independent of Reynolds Number.

(3) dependent on the length of the pipe.

(4) None of these.

96. For pumping slurry, one can use a _____ pump.

(1) reciprocating (2) diaphragm

(3) centrifugal (4) pneumatic

97. An ideal fluid is

(1) inviscous (2) incompressible

(3) both (1) and (2) (4) neither (1) nor (2)

98. When the pipe Reynolds Number is 6000, the flow is generally

(1) viscous (2) laminar

(3) turbulent (4) transition

99. The density of manometric fluid should be _____ than that of the flowing fluid.

(1) greater (2) lower

(3) equal to (4) none of these

100. In case of compressible fluids _____ of it is sensitive to changes in temperature and pressure.

(1) density (2) pressure

(3) viscosity (4) thermal conductivity

101. Write the third term in the expansion of $\left(x^2 - \frac{1}{x}\right)^5$.

(1) $-10x^2$ (2) $10x^4$

(3) $-10x^4$ (4) $10x^2$

102. Find coefficient of x^4 in the expansion of $\left(x^4 + \frac{1}{x^3}\right)^{15}$.

(1) $15C_5$ (2) $15C_6$

(3) $15C_7$ (4) $15C_8$

103. If $(2+\sqrt{3})^4 = 97 + 56\sqrt{3}$ find the value of $(2+\sqrt{3})^4 + (2-\sqrt{3})^4$

(1) 194 (2) 97

(3) 306 (4) 82

104. The value of $nc_1 + nc_{n-1}$ = _____.

(1) $\frac{n^2}{4}$ (2) $\frac{n(n-1)}{2}$

(3) $2n$ (4) $\frac{n}{2}$

105. The distance between (1, –1) and (–1, 1) is

(1) 8 (2) $2\sqrt{2}$

(3) 4 (4) 2

106. The mid point of the line joining the points (8, 6) and (2, 10) is

(1) (5, 8) (2) (8, 5)

(3) (10, 16) (4) (16, 10)

107. The y-intercept of the line $3x - 5y + 6 = 0$ is

(1) –2 (2) $\frac{1}{2}$

(3) $\frac{6}{5}$ (4) $\frac{5}{6}$

108. The centroid of the triangle whose vertices are (2, 5), (3, –7) and (4, –4) is

(1) (3, –2) (2) (2, –3)

(3) (1, – 6) (4) (6, –1)

109. The radius of the circle
$x^2 + y^2 + 4x - 6y + 4 = 0$ is
(1) 4
(2) 2
(3) 3
(4) 6

110. The acute angle between the straight lines $3y - 4x - 2 = 0$ and $x - 7y + 1 = 0$ is
(1) $\frac{\pi}{4}$
(2) $\frac{\pi}{2}$
(3) $\frac{\pi}{3}$
(4) $\frac{\pi}{6}$

111. Numerical value of $\operatorname{cosec}\left(\frac{5\pi}{3}\right)$ is
(1) $\frac{\sqrt{3}}{2}$
(2) $\frac{-\sqrt{3}}{2}$
(3) $\frac{-2}{\sqrt{3}}$
(4) $\frac{2}{\sqrt{3}}$

112. $\sin^2(45° + A) + \sin^2(45° - A)$ is equal to
(1) 1
(2) -1
(3) 0
(4) $\frac{1}{2}$

113. $\tan 75°$ is equal to
(1) $\frac{\sqrt{3}-1}{\sqrt{3}+1}$
(2) $\frac{\sqrt{3}+1}{\sqrt{3}-1}$
(3) $\frac{\sqrt{3}+1}{2\sqrt{2}}$
(4) $\frac{\sqrt{3}-1}{2\sqrt{2}}$

114. The simplified answer of
$\frac{\cos 7\theta - \cos 9\theta}{\sin 9\theta + \sin 7\theta}$ is
(1) $\cos\theta$
(2) $\tan\theta$
(3) $\sin\theta$
(4) $\cot\theta$

115. $\sin^{-1}(\cos x)$ is equal to
(1) $x - \frac{\pi}{2}$
(2) $\frac{\pi}{2}$
(3) x
(4) $\frac{\pi}{2} - x$

116. $\frac{1+\cos 2A}{\sin 2A}$ is equal to

(1) cot A (2) tan A

(3) sin A (4) cos A

117. The angle of elevation of the top of a tower at a distance of 75 m is 60°. The height of the tower is

(1) 37.5 m (2) $\frac{75}{\sqrt{2}}$ m

(3) $\frac{75}{\sqrt{3}}$ m (4) $75\sqrt{3}$ m

118. $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right)$ is equal to

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{3}$

(3) $\frac{\pi}{6}$ (4) $\frac{\pi}{2}$

119. $\lim_{x \to 0} \frac{(1-\cos 2x)}{x^2} =$

(1) 2 (2) –2

(3) 1 (4) –1

120. $\frac{d}{dx}(\log_e 3x) =$

(1) $3x$ (2) x

(3) $\frac{1}{x}$ (4) $-3x$

121. If $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then $\frac{dy}{dx}$ is

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

(3) $\frac{bx}{ay}$ (4) $\frac{bx^2}{ay^2}$

122. If $y = x^x$, then $\frac{dy}{dx} =$

(1) $x^x (1 + \log x)$ (2) $x (1 + \log x)$

(3) $x^x (1 - \log x)$ (4) $(1 + \log x)$

123. If $y = a \cos mx + b \sin mx$, then $\frac{d^2y}{dx^2} =$

(1) m^2y (2) my^2

(3) $-m^2y$ (4) $-my^2$

124. The equation of normal to the curve $(3x^2 - xy + y^2) = 3$ at (1, 1)

(1) $x - 5y + 4 = 0$ (2) $x - 5y - 4 = 0$

(3) $x + 5y + 4 = 0$ (4) $x + 5y - 4 = 0$

125. Slope of the tangent to the curve $\sqrt{x} + \sqrt{y} = 5$ at (4, 5) is

(1) $\frac{-5}{2}$ (2) $\frac{5}{2}$

(3) $\frac{-\sqrt{5}}{2}$ (4) $\frac{\sqrt{5}}{2}$

126. The maximum value of the function $x^3 - 18x^2 + 96x$.

(1) 160 (2) 60

(3) $\frac{1}{160}$ (4) 180

127. $\int \sqrt{1 + \sin 2x}\, dx$ is equal to

(1) $\sqrt{x + \cos 2x} + c$ (2) $\sqrt{x - \cos 2x} + c$

(3) $\cos x - \sin x + c$ (4) $-\cos x + \sin x + c$

128. $\int 3 \sin x \cdot \sec^4 x\, dx$ is

(1) $\frac{1}{3}\sec^3 x + c$ (2) $\sec^4 x + c$

(3) $\sec^3 x + c$ (4) $\frac{3}{4}\sec^4 x + c$

129. $\int \frac{x^3 \tan^{-1}(x^4)}{1+x^8}\,dx$ is

(1) $\tan^{-1}(x^4) + c$

(2) $\frac{[\tan^{-1}(x^4)]^2}{8} + c$

(3) $\frac{x^4 \tan^{-1}(x^4)}{4} + c$

(4) $\frac{x^3[\tan^{-1}(x^4)]^2}{2} + c$

130. $\int x \sin x\,dx$ is equal to

(1) $-x \cos x + \sin x + c$

(2) $x \cos x + \sin x + c$

(3) $x \sin x - \cos x + c$

(4) $x \sin x + \cos x + c$

131. $\int_0^{\pi} \sin^2 x\,dx$ is equal to

(1) 0

(2) $\frac{\pi}{2}$

(3) $\frac{\pi}{4}$

(4) π

132. The area bounded by the curve $y = x^2 + 1$, the x-axis and the ordinates at $x = 1$ and $x = 3$ is

(1) $\frac{40}{3}$ sq. units

(2) $\frac{26}{3}$ sq. units

(3) $\frac{36}{3}$ sq. units

(4) $\frac{32}{3}$ sq. units

133. The differential equation of the function $y = \sin mx$ is

(1) $\frac{d^2y}{dx^2} + m^2 = 0$

(2) $\frac{d^2y}{dx^2} + m^2y = 0$

(3) $\frac{d^2y}{dx^2} - m^2 = 0$

(4) $\frac{d^2y}{dx^2} - m^2y = 0$

134. The solution of differential equation $\frac{dy}{dx} + \frac{y}{x} = 0$ is

(1) $xy = c$

(2) $\log(xy) = 0$

(3) $x + y = c$

(4) $\frac{y}{x} = c$

135. If $A = \begin{bmatrix} 1 & a & -b \\ -a & 1 & c \\ b & -c & 1 \end{bmatrix}$,
then ΔA =

(1) $a^2 + b^2 + c^2$ (2) $a^2 - b^2 - c^2$

(3) $1 + a^2 + b^2 + c^2$ (4) $a + b + c + 1$

136. Solve for 'x'

$5y + 2x + z + 1 = 0$

$x + 7y - 6z + 18 = 0$

$3y + 6z = 9$

(1) 1 (2) –1

(3) 2 (4) –2

137. Name the matrix

$$\begin{bmatrix} 0 & 2 & -3 \\ -2 & 0 & -4 \\ 3 & 4 & 0 \end{bmatrix}$$

(1) Conjugate (2) Skew symmetrics

(3) Transpose (4) Singular

138. Find the adjoint by Matrix method.

$x + y = 3$

$x - y = 1$

(1) $\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$ (2) $\begin{bmatrix} 1 & 3 \\ 1 & 1 \end{bmatrix}$

(3) $\begin{bmatrix} 1 & 3 \\ -1 & 1 \end{bmatrix}$ (4) $\begin{bmatrix} -1 & -1 \\ -1 & 1 \end{bmatrix}$

139. Find cofactor of –2 in the square matrix given below :

$$\begin{bmatrix} 2 & 3 & -1 \\ -1 & 0 & 5 \\ 4 & 1 & -2 \end{bmatrix}$$

(1) –5 (2) 0

(3) –1 (4) 3

140. If $\begin{bmatrix} 1 & 0 \\ y & 5 \end{bmatrix} + 2\begin{bmatrix} x & 0 \\ -1 & -2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ find x, y.

(1) 0, 2 (2) 2, 0

(3) 2, 2 (4) 0, 0

141. A body of mass 1 kg whirled round in a circle of diameter 9 m with a velocity of 3 m/s then the centripetal force on it is

(1) 27 N (2) 3 N

(3) 2 N (4) 1 N

142. The relation between angular velocity (w) and inner velocity (v) is

(1) $w = r \cdot v$ (2) $v = r.\ w$

(3) $v^2 = r.\ w$ (4) $w^2 = r.\ v$

143. The gravitational constant is equal to

(1) $6.67 \times 10^{11}\ N - m^2/kg^2$

(2) $6.67 \times 10^{-11}\ N - m^2/kg^2$

(3) $66.7 \times 10^{-11}\ N - m^2/kg^2$

(4) $66.7 \times 10^{11}\ N - m^2/kg^2$

144. Acceleration due to gravity decreases as the height

(1) decreases (2) increases

(3) becomes zero (4) None

145. The escape velocity of satellite is

(1) 1.12 km/sc (2) 112.2 km/s

(3) 11.2 km/s (4) 1.122 km/s

146. The expression connecting force, displacement and work is

(1) $W = \frac{S}{F}$ (2) $F = SW$

(3) $F = \frac{W}{S}$ (4) $W = \frac{F}{S}$

147. If the velocity of a body is doubled, then its K.E.

(1) becomes twice
(2) becomes half
(3) remains same
(4) increases by four times

148. Energy required to lift 100 kg mass through a height of 1 m is

(1) 0.098 kJ
(2) 0.98 kJ
(3) 98 kJ
(4) 9.8 kJ

149. The resultant of two forces P, Q acting at 90° to each other is

(1) $P + Q$
(2) $P - Q$
(3) $\sqrt{P^2 + Q^2}$
(4) $\sqrt{P^2 - Q^2}$

150. Moment of a force is positive if the body move in

(1) Parallel Direction
(2) Anticlockwise Direction
(3) Perpendicular Direction
(4) Clockwise Direction

151. The algebraic sum of moment of force about any point in their plane is

(1) more than zero
(2) less than zero
(3) equal to their resultant
(4) equal to moment of their resultant about the same point

152. A vector is completely described by

(1) Its magnitude
(2) Its direction
(3) Its magnitude and direction
(4) Neither magnitude nor direction

153. The power developed when a constant couple of 50 Nm. rotates a shaft at 120 rpm is

(1) 62.8 kW
(2) 628 kW
(3) 6.28 kW
(4) 0.628 kW

154. The relation between Celsius and Fahrenheit scale is

(1) $C = (9/5)(F - 32)$ (2) $F = (9C/5) + 32$

(3) $C = (5/9)(F - 32)$ (4) $F = (9C / 5) - 32$

155. The following is not the application convention :

(1) Land and sea breeze (2) Ventilators

(3) Cooling system in automobiles (4) Davy's safety lamp

156. Fastest mode of transfer of heat is

(1) Conduction (2) Convection

(3) Radiation (4) Transmission

157. The temperature of the gas is 300 K at a pressure keeping volume constant the pressure is increased 4 times, its new temperature is

(1) 720 °K (2) 1200 °C

(3) 1200 °K (4) 720 °C

158. Bicycle chain is an example for

(1) Tensile strain (2) Volume strain

(3) Shear strain (4) Compressive strain

159. When small piece of camphor is dropped into water, the piece move randomly because of

(1) increase in surface tension (2) decrease in surface tension

(3) constant surface tension (4) zero surface tension

160. The SI unit of co-efficient of viscosity is

(1) $\frac{Ns}{m^2}$ (2) $\frac{Nm^2}{s}$

(3) $\frac{Ns}{m}$ (4) $\frac{Nm}{s}$

161. A wire of stress 650 N/m^2 with an area of cross section of wire is 500 m^2 the maximum force that the wire can withstand is

(1) 325×10^{10} N (2) 3.25×10^5 N

(3) 3.25×10^{11} N (4) 3.25×10^9 N

162. Water rises to a height of 4 cm in a capillary tube. If the radius is reduced to half, the water rises to a height of

(1) 2 cm (2) 4 cm

(3) 6 cm (4) 8 cm

163. The maximum displacement of the vibrating body from its mean position is

(1) Amplitude (2) Frequency

(3) Oscillation (4) Period

164. Distance between a node and antinode is

(1) λ (2) $\frac{\lambda}{2}$

(3) $\frac{\lambda}{3}$ (4) $\frac{\lambda}{4}$

165. The super-position of two waves with nearly same frequency and same amplitude constitute

(1) Resonance (2) Beats

(3) Interference (4) Polarisation

166. The minimum distance between sound & reflecting surface to observe echo is

(1) 17 km (2) 17 m

(3) 70 km (4) 70 m

167. Acceleration of a body performing SHM is maximum at

(1) left extreme position (2) right extreme position

(3) both (1) and (2) (4) at mean position

168. A wave of frequency 600 MHz travels at a speed of 3×10^8 m/s. Its wavelength is

(1) 2 cm (2) 0.5 m

(3) 0.5 cm (4) 2 m

169. In an auditorium of volume 4500 m^3, the total reflecting surface is 1200 m^2. If the average absorption coefficient is 0.4, then the reverberation time is

(1) 1.6 sec (2) 1 sec

(3) 1.5 sec (4) 2 sec

170. The positively charged ions produced during electrolytic dissociation are called

(1) Anions (2) Cations

(3) Electrons (4) Protons

171. The process of deposition of thin layer of metal over the surface of another metal is called

(1) Electrolysis (2) Extraction of metals

(3) Electroplating (4) Refining

172. The mass of copper deposited on the cathode of a copper voltameter by a current of 2 amps in 30 mins is (given e.c.e. of copper = 0.0003 gm / coulomb)

(1) 1.08 kg (2) 1.08 g

(3) 18 kg (4) 18 g

173. Which of the following has the pH value greater than 7 ?

(1) Blood (2) Sea water

(3) Ammonium Hydroxide (4) All

174. A scale divided into half mm and having a vernier containing 20 divisions has a LC of

(1) 0.01 cm (2) 0.05 cm

(3) 0.025 cm (4) 0.0025 cm

175. The prefix 10^{-9} stands for

(1) Tera (2) Nano

(3) Mega (4) Giga

176. The dimension formula for surface tension is

(1) $[ML^0 T^{-2}]$ (2) $[ML^{-1} T^{-2}]$

(3) $[ML^2 T^2]$ (4) $[M^0L T^{-2}]$

177. The value of acceleration due to gravity in S.I. unit is

(1) 980 dynes (2) 980 Newtons

(3) 9.8 dynes (4) 9.8 m/s^2

178. A 8 N force acting on a 4 kg mass can impart to it an acceleration of

(1) 2 m/s^2 (2) 4 m/s^2

(3) 32 m/s^2 (4) $\frac{1}{2}$ m/s^2

179. The product of mass and velocity of a body is

(1) Force (2) Impulse

(3) Momentum (4) Work

180. Recoil of a gun is an example for Newton's

(1) First Law (2) Second Law

(3) Third Law (4) None