

NUMS 2019 + Key

MDCAT1

**National University of Medical Sciences (NUMS)
(Admission Test)**

ANSWER KEY (Blue)

Test Held on: **Sunday 1st September, 2019**

Question No	Correct Choice	Question No	Correct Choice
Q 1	D	Q 101	A
Q 2	A	Q 102	A
Q 3	C	Q 103	A
Q 4	B	Q 104	E
Q 5	A	Q 105	B
Q 6	D	Q 106	C
Q 7	A	Q 107	D
Q 8	B	Q 108	A
Q 9	A	Q 109	B
Q 10	B	Q 110	D
Q 11	A	Q 111	C
Q 12	C	Q 112	A
Q 13	A	Q 113	D
Q 14	C	Q 114	C
Q 15	D	Q 115	E
Q 16	C	Q 116	A
Q 17	C	Q 117	C
Q 18	B	Q 118	D
Q 19	D	Q 119	B
Q 20	A	Q 120	E
Q 21	C	Q 121	C
Q 22	B	Q 122	A
Q 23	D	Q 123	C
Q 24	E	Q 124	B
Q 25	A	Q 125	C
Q 26	D	Q 126	D
Q 27	C	Q 127	D
Q 28	C	Q 128	C
Q 29	B	Q 129	B
Q 30	C	Q 130	A
Q 31	A	Q 131	B
Q 32	A	Q 132	D
Q 33	D	Q 133	E
Q 34	A	Q 134	B
Q 35	A	Q 135	A
Q 36	C	Q 136	A
Q 37	D	Q 137	B
Q 38	C	Q 138	A
Q 39	B	Q 139	D
Q 40	D	Q 140	D
Q 41	C	Q 141	C
Q 42	D	Q 142	D
Q 43	B	Q 143	A
Q 44	D	Q 144	B
Q 45	C	Q 145	B
Q 46	B	Q 146	C
Q 47	E	Q 147	D
Q 48	C	Q 148	B

Q 47	E	Q 147	D
Q 48	C	Q 148	B
Q 49	E	Q 149	B
Q 50	C	Q 150	A
Q 51	C	Q 151	B
Q 52	C	Q 152	E
Q 53	C	Q 153	D
Q 54	A	Q 154	B
Q 55	B	Q 155	E
Q 56	B	Q 156	C
Q 57	C	Q 157	C
Q 58	B	Q 158	E
Q 59	B	Q 159	C
Q 60	D	Q 160	E
Q 61	C	Q 161	C
Q 62	A	Q 162	B
Q 63	C	Q 163	B
Q 64	D	Q 164	A
Q 65	D	Q 165	C
Q 66	D	Q 166	D
Q 67	A	Q 167	B
Q 68	C	Q 168	C
Q 69	E	Q 169	C
Q 70	B	Q 170	D
Q 71	A	Q 171	A
Q 72	A	Q 172	D
Q 73	E	Q 173	B
Q 74	D	Q 174	C
Q 75	D	Q 175	D
Q 76	C	Q 176	B
Q 77	A	Q 177	C
Q 78	A	Q 178	D
Q 79	A	Q 179	B
Q 80	C	Q 180	C
Q 81	E	Q 181	A
Q 82	D	Q 182	B
Q 83	C	Q 183	D
Q 84	C	Q 184	C
Q 85	E	Q 185	C
Q 86	C	Q 186	E
Q 87	B	Q 187	E
Q 88	C	Q 188	A
Q 89	A	Q 189	B
Q 90	E	Q 190	A
Q 91	A	Q 191	E
Q 92	B	Q 192	C
Q 93	D	Q 193	A
Q 94	B	Q 194	E
Q 95	D	Q 195	B
Q 96	C	Q 196	E
Q 97	D	Q 197	C
Q 98	E	Q 198	B
Q 99	B	Q 199	B
Q 100	C	Q 200	C

78. The boiling point of carboxylic acids is relatively high due to formation of _____ structure by hydrogen bonding.

- A. Dimeric ✓
- B. Tetrameric
- C. Hexameric
- D. Octameric
- E. Polymeric

79. When carboxylic acids reacts with alkali metals, they liberate:

- A. Hydrogen ✓
- B. CO_2
- C. CO
- D. water
- E. Oxygen

Robert F. NA

80. In a polypeptide chain of protein, amino acids are linked by carboxylic group of one amino acid to amino group of next amino acid, bond is known as:

- A. Ionic
- B. Hydrogen
- C. Peptide
- D. Ester
- E. Glycosidic

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BIOLOGY

81. Which of the following is NOT the observation of theory of natural selection?

- A. Over production of individuals ✓
- B. Struggle for survival ✓
- C. Action of natural selection ✓
- D. Evolution of new species ✓
- E. Survival in struggle for existence is random

82. According to $p^2 + 2pq + q^2 = 1$ relationship, if 23% of individuals show the recessive trait, what will be the frequency of dominant allele in the population?

- A. 23
- B. 77
- C. 0.23
- D. 0.77 ✓
- E. 7.7

83. The organs which are functionally alike but have different internal structure are known as:

- A. Homologous organs
- B. Hetrologous organs
- C. Analogous organs ✓
- D. Vestigial organs
- E. Both B and C

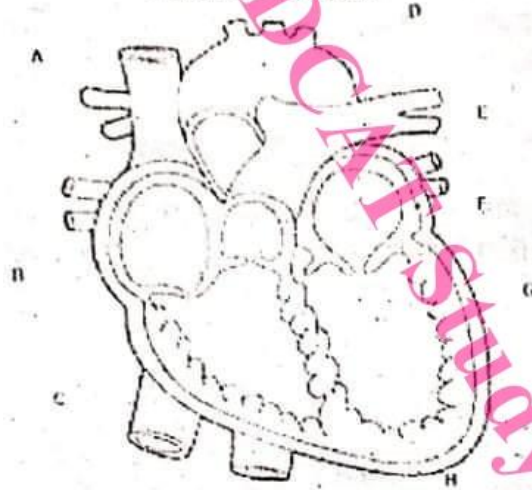
84. According to $p^2 + 2pq + q^2 = 1$ relationship, if AA genotype is p , $p=0.6$ then what will be the value of Aa in population?

- A. 0.16
- B. 0.36
- C. 0.48 ✓
- D. 0.1152
- E. 11.52

$$2 \times 0.6 \times 0.4 = 0.48$$

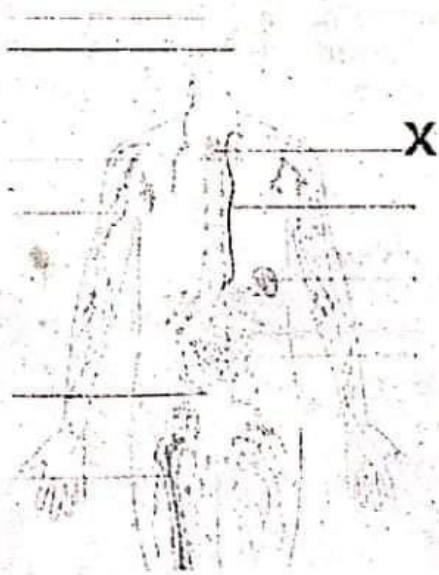
35. Which part of the heart is known as aorta to supply oxygenated blood to almost whole body?

HEART ANATOMY



- A. B
- B. C
- C. F
- D. G
- E. D

86. Name the part of lymphatic system marked as 'X'?



- A. Lymph nodes
- B. Spleen
- C. Thymus
- D. Lymph duct
- E. Bone marrow

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87. Which one of the following is related to defense system of human body?

- A. Red blood cells
- B. White blood cells
- C. Platelets
- D. Plasma
- E. Both A and C

88. Protein layers which are NOT continuous on the surface make _____ percent of total in plasma membrane.

- A. 50-60
- B. 60-70
- C. 60-80
- D. 70-80
- E. 70-90

89. Which part of the heart receives deoxygenated blood from whole body?

- A. Right Auricle
- B. Left Auricle
- C. Right Ventricle
- D. Left Ventricle
- E. Aorta

90. Albumins constitute _____% of plasma proteins that help in maintaining the colloid osmotic pressure of blood.

- A. 10
- B. 20
- C. 25
- D. 50
- E. 75

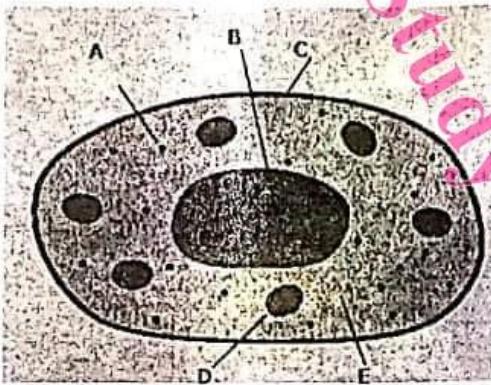
91. Chromosomes present in the nucleus have _____ function in the cell.

- A. hereditary
- B. secretory
- C. power house
- D. food synthesis
- E. protein formation

92. Which of the following are related to the synthesis of excretory proteins by the cell?

- A. Cell membranes
- B. Rough Endoplasmic Reticulum
- C. Smooth Endoplasmic Reticulum
- D. Centrioles
- E. Both A and B

93. Which of these alphabets indicate presence of power house of the cell?



- A. A
- B. B
- C. C
- D. D
- E. E

94. The power of a microscope by which we can distinguish two closely located points is termed as:

- A. Magnification
- B. Resolution
- C. Fixation
- D. Electrophoresis
- E. Ultracentrifugation

95. Due to the deficiency of _____ hormone, synthesis of glycogen gets depressed, glucose level increases in blood and leads to a condition called Diabetes mellitus.

- A. Oxytocin
- B. Parathormone
- C. Glucagon
- D. Insulin
- E. Cortisol

96. During active membrane potential, _____ conducts the impulse in the form of nerve impulse.

- A. Axon
- B. Soma
- C. Neuron
- D. Cytoplasm
- E. Ribosome

97. The most important function of _____ hormone is cell division in apical meristem of young plants.

- A. Gibberellines
- B. Ethylene
- C. Cytokinins
- D. Auxins
- E. Abscisic acid

98. Which of the following is the main transmitter for synapse that lies outside the central nervous system?

- A. Adrenaline
- B. Nor-epinephrine
- C. Serotonin
- D. Dopamine
- E. Acetylcholine

99. Which of the following muscles that make the walls of heart and are NOT present anywhere else in the body?

- A. Smooth muscles
- B. Cardiac muscles
- C. Skeletal muscles
- D. Voluntary muscles
- E. Both A and C

100. When the muscle is required to contract, calcium ion binds with _____ molecule and causes them to move slightly.

- A. Actin
- B. Myosin
- C. Troponin
- D. Tropomyosin
- E. ATP

101. Which of the following are present in the internal organs like stomach, intestine etc.?



- A. A
- B. B
- C. C
- D. Both A and B
- E. Both A and C

102. Sarcoplasmic reticulum is like endoplasmic reticulum but devoid of _____ and exhibit a highly specialized _____ pattern.

- A. Ribosome, repeating
- B. Mitochondrion, repeating
- C. Ribosome, simplified
- D. Mitochondrion, simplified
- E. Ribosome, zig zag

103. If we cross round yellow seeded plant with green wrinkled seeded plants, what will be phenotypic ratio at F₂ generation?

- A. 9:3:3:1
- B. 9:4:3:2
- C. 3:9:3:1
- D. 8:3:3:2
- E. 9:1:3:3

104. If we cross round (RR) seeded plants with wrinkled (rr) seed plant, and get F₁ round seeded. In F₂ generation, what will be genotypic ration of plants by Punnet square method?

- A. 3:1
- B. 1:1
- C. 2:1
- D. 1:1:2
- E. 1:2:1

105. A continuously varying trait is encoded by alleles of two or more different genes located at different loci, all influencing the same trait in an additive way is known as _____.

- A. Poly traits
- B. Polygenes
- C. Multiple alleles
- D. Different genes
- E. Allele frequency

106. To check the homozygosity or heterozygosity of apparently dominant trait, we do the test cross by crossing it with:

- A. Any Dominant trait
- B. Homozygous dominant trait
- C. Homozygous Recessive trait
- D. Heterozygous dominant trait
- E. A self-cross

107. The total number of genes present in a particular population, at a particular time is called:

- A. Gene
- B. Genome
- C. Genotype
- D. Gene Pool
- E. Allele

108. Phenotype for both TT and Tt is tall, so the allele T is known as:

- A. Dominant
- B. Recessive
- C. Homozygous
- D. Heterozygous
- E. Linked

109. Which of the following is a physical relationship of genes present on same chromosomes?

- A. Epistasis
- B. Gene Linkage
- C. Crossing over
- D. Pleiotropy
- E. Bombay Phenotype

110. Which of the following X-linked dominant trait that is more common in human females than in human males?

- A. Hemophilia
- B. Sickle cell Anemia
- C. Color Blindness
- D. Hypophosphatemic rickets
- E. Testicular feminization syndrome

111. Luteinizing hormone, which is produced by the pituitary gland, promotes ovulation and stimulate the ovaries to produce:

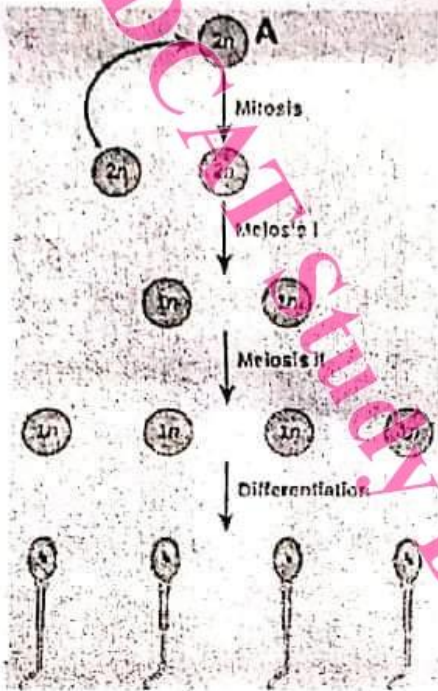
- A. Estrogen
- B. Estrogen and progesterone
- C. Progesterone
- D. Oxytocin
- E. Prolectin

112. Follicle-stimulating hormone, which is produced by the pituitary gland, stimulates the ovaries to produce:

- A. Estrogen
- B. Estrogen and progesterone
- C. Progesterone
- D. Oxytocin
- E. Prolectin

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113. The cell A, in the given figure is:



- A. Gametophyte
- B. Oogonium
- C. Sperm
- D. Spermatocyte
- E. Spermatid

114. Menstruation is the shedding of the lining of the uterus (endometrium) accompanied by:

- A. Shivering
- B. Fever
- C. Bleeding
- D. Vomiting
- E. Headache

115. Which of the following is the constituent of RNA molecule?

- A. Fatty acids
- B. Riboluse
- C. Ascorbic acid
- D. Deoxyribonucleic acid
- E. Ribonucleic acid

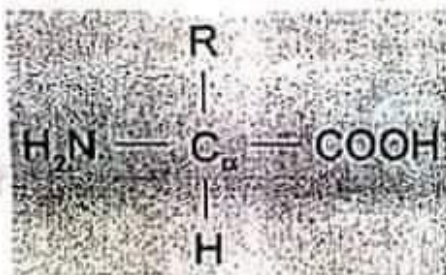
116. Which of the following are instant source of energy in living organisms, like glucose? Their general formula is:

- A. $C_x(H_2O)_y$
- B. $C_6H_{12}O_6$
- C. $C_x(H_2O)_x$
- D. $C_x(HO)_y$
- E. $C_x(H_2O_2)_y$

117. Which of the following are the most prominent part of cell membranes in living organisms?

- A. Terpenoids
- B. Waxes
- C. Phospholipids
- D. Acylglycerols
- E. Polysaccharides

118. The structure given below is the constituent part of:



- A. Lipids
- B. Carbohydrates
- C. Vitamins
- D. Proteins
- E. Nucleic acids

119. In pressure flow theory, when water moves out of sieve tube cells by osmosis, it lowers the _____

- A. Solute Potential
- B. Hydrostatic Pressure
- C. Water Potential
- D. Source Concentration
- E. Rate of Transpiration

120. Evaporation of water from the aerial parts of the plants, especially through the stomata of the leaf creates a force which is cause of water movement in higher plant is

- A. Root pressure
- B. Leave pressure
- C. Imbibitions
- D. Transpiration
- E. Transpiration Pull

121. Which of the following reduces the rate of transpiration by adaptations in xerophytes?

- A. Large surface area of leaves
- B. Increase number of stomata
- C. Thick waxy cuticle
- D. Excessive loss of water
- E. Stomata on both sides of leaves

122. Which of the following types of transpiration account for 5-7% of total transpiration that take place in plants?

- A. Cuticular
- B. Lenticular
- C. Stomatal
- D. Leaves
- E. Stem

123. Vocal cords, which help in voice production are two thin edged fibrous bands, present in:

- A. Glottis
- ✓ B. Bronchis
- C. Larynx
- D. Trachea
- E. Pleura

124. The causing agent of the tuberculosis that grows very well in poor living conditions and malnutrition is:

- A. Spirobacterium
- ✓ B. Mycobacterium
- C. E.Coli
- D. Staphylococcus
- E. Pseudomonas

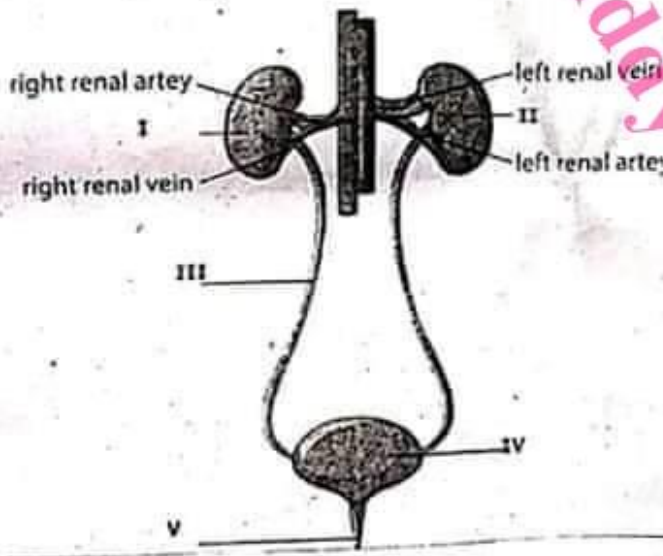
125. The most important cause of many of the respiratory disorders is:

- A. Bacterial infection
- B. Pollution
- C. Smoking
- D. Drinking
- E. Radiations

126. Hemoglobin can absorb maximum oxygen at sea level, which is _____ ml/100ml of blood.

- A. 15
- B. 19
- C. 19.6
- D. 20
- E. 25

127. Which of the following part of urinary system temporarily stores urine, and releases it when filled?



- A. I
- B. II
- C. III
- D. IV
- E. V

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128. Which one of the following is hypertonic solution to cells present in it?



- A. A ✓
- B. B
- C. C
- D. Both A and B
- E. Both C and D.

129. Humans maintain their body temperature within a narrow limit due to their _____ characteristics.

- A. Ectothermic
- B. Endothermic
- C. Heterothermic
- D. Hypothermic
- E. Hyperthermic

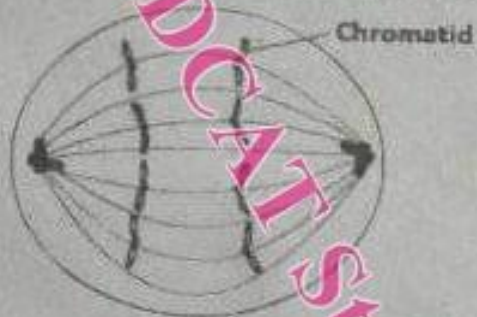
130. Human body maintains all of its cell _____ to internal body fluid.

- A. Isotonic
- B. Hypotonic
- C. Hypertonic
- D. Hyposmotic
- E. Hyperosmotic

131. Which of the following cells recognize antigens and form plasma cell clone?

- A. A cell
- B. B cells
- C. F cells
- D. T cells
- E. Z cells

158. Which stage of mitosis is shown in the given below structure?



- A. Prophase
- B. Metaphase
- C. Interphase
- D. Telophase
- E. Anaphase

159. In microtubules, the spindle fibers in mitotic apparatus are made up of:

- A. Actin proteins
- B. Myosin proteins
- C. Tubulin proteins
- D. Actin and myosin proteins
- E. Troponin proteins

160. In case of human cell, average cell cycle is completed in about _____ hours.

- A. 02
- B. 06
- C. 09
- D. 12
- E. 24

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PHYSICS

161. The binding per nucleon of deuteron (${}^2_1\text{H}$) and helium nucleus (${}^4_2\text{He}$) are 1.1 MeV and 7 MeV respectively. If two deuterons merge to form a single helium nucleus, then energy released will be:

- A. 04.8 MeV
- B. 13.6 MeV
- C. 23.6 MeV
- D. 25.8 MeV
- E. 26.2 MeV

$$2 \times 2 + 2 \times 7 = 2 \times 28$$

$$30.2 = 2 \times 28$$

$$2 \times 28 = 26$$

162. A bullet of mass 20 g leaves the gun with a velocity of 200 m/s. If the mass of gun is 2 kg then the speed of recoil of the gun is:

- A. 2000 m/s
- B. 2 m/s
- C. 20 m/s
- D. 200 m/s
- E. 100 m/s

$$v = \frac{20 \times 200}{2000}$$

163. In a coil, when current changes from 10A to 4A in 1s, an induced emf of 1.2 V is induced across the coil. The self-inductance of the coil is:

- A. 2 H
- B. 0.2 H
- C. 0.002 H
- D. 4 H
- E. 6 H

$$E = L \frac{\Delta I}{\Delta t}$$

$$1.2 = L \frac{10 - 4}{1}$$

$$L = \frac{1.2}{6} = 0.2 \text{ H}$$

164. If the wave length of K X-ray from Cu is $1.337 \times 10^{-10} \text{ m}$, then the energy difference between two levels from which transition results will be:

- A. 9.03 keV
- B. 9.90 keV
- C. 90.3 keV
- D. 8.03 keV
- E. 10.0 keV

$$E = \frac{hc}{\lambda}$$

$$E = \frac{6.6 \times 10^{-34} \times 3 \times 10^8}{1.337 \times 10^{-10}}$$

$$E = \frac{1.98 \times 10^{-25}}{1.337 \times 10^{-10}}$$

$$E = 1.48 \times 10^{-15} \text{ J}$$

$$E = \frac{1.48 \times 10^{-15}}{1.6 \times 10^{-19}} \text{ eV}$$

$$E = 9.25 \times 10^3 \text{ eV} = 9.25 \text{ keV}$$

165. If u and d represent up quark and down quark respectively; then composition of Proton and Neutron can be written as:

- A. Proton: $1u + 1d$, Neutron: $2u + 1d$
B. Proton: $2u + 2d$, Neutron: $2u + 1d$
C. Proton: $2u + 1d$, Neutron: $1u + 2d$ ✓
D. Proton: $\frac{1}{3}u + \frac{2}{3}d$, Neutron: $\frac{2}{3}u + \frac{1}{3}d$
E. Proton: $\frac{1}{3}u + \frac{1}{3}d$, Neutron: $\frac{2}{3}u + \frac{2}{3}d$

166. If starting from left, the colour bands in a carbon resistor are as follows; first band is brown, second is black and third is orange colour, then the value of resistance will be:

- A. $1000 \Omega \pm 5\%$
B. $1000 \Omega \pm 10\%$
C. $1000 \Omega \pm 20\%$
D. $10000 \Omega \pm 20\%$
E. 10000Ω

167. A ball of mass m is dropped from a certain height h on a sand floor. If the ball penetrates d meters into the sand, the average resistive force offered by sand on the ball is:

- A. $mg(d/h)$
B. $mg(h/d)$
C. $mg(1+h/d)$
D. $mg(1-h/d)$
E. $mgh + mgd$

$mg(1 + \frac{h}{d})$

168. What are the particles emitted in a nuclear reaction in which ${}^7_3\text{Li}$ nuclei are bombarded by protons, the ${}^8_4\text{Be}$ nuclei are produced?

- A. Alpha particles
B. Beta particles ✓
C. Gamma photons
D. Neutrons
E. Positrons

169. An alternating voltage source is connected to a resistor R , and a capacitor C , then which of the following statement about phase difference between voltage V and current I is correct?

- A. In Resistance I leads V by 90° , In Capacitor I leads V by 90°
- B. In Resistance I lags V by 90° , In Capacitor I leads V by 90°
- C. In Resistance I and V are in phase, In Capacitor I leads V by 90°
- D. In Resistance I and V are in phase, In Capacitor I lags V by 90°
- E. In Resistance I lags V by 90° , In Capacitor I lags V by 90°

170. A D.C power supply is connected in series to a resistor $R = 3\Omega$ and a capacitor of capacitance $C = 1F$. If emf of battery is $9V$, then values of Maximum charge Q_0 on each plate of capacitor and time t required to obtain this maximum charge Q_0 will be:

- A. $Q_0 = 1C$ and $t = 3s$
- B. $Q_0 = 3C$ and $t = 3s$
- C. $Q_0 = 9C$ and $t = 3s$
- D. $Q_0 = 9C$ and $t = 15s$
- E. $Q_0 = 3C$ and $t = 15s$

$$Q = CV$$
$$= 1 \times 9V$$

171. Radiation emitted from a certain star has maximum intensity near the wavelength $\lambda = 580 \text{ nm}$. Assuming star as a black body, then temperature of its surface is:

- A. 5000K
- B. 6000K
- C. 6500K
- D. 7000K
- E. 7500K

$$\frac{Q}{t} = v = \frac{c}{\lambda}$$
$$v = \frac{c}{\lambda} R$$

172. A capacitor and an inductor are connected to A.C supply. If we double the frequency of A.C supply then the effect on reactance of capacitor X_C and reactance of inductor X_L will be:

- A. Both X_C and X_L are doubled
- B. Both X_C and X_L are halved
- C. X_C is doubled and X_L reduces to half
- D. X_L is doubled and X_C reduces to half
- E. Both X_C and X_L are unchanged

$$\frac{v}{\omega L} = \frac{1}{\omega L}$$
$$= \frac{1}{2 \times L}$$

173. A body of mass 2kg executes a SHM under a force of $F = -(200 \text{ N/m})x$. If its velocity at mean position is 100 m/s, the value of its amplitude is:

- A. 1m
- B. 10m
- C. 100m
- D. 200m
- E. 1000m

$$\omega = \sqrt{\frac{200}{2}} \quad v_0 = \omega x_0$$

$$10 = 10 x_0 \quad x_0 = 10$$

174. Unit of magnetic flux is weber (Wb). In terms of S.I. base units, weber can be written as:

- A. NmA
- B. $\text{N}^{-1}\text{m}^{-2}\text{A}$
- C. NmA^{-1}
- D. NmA^2
- E. N^{-2}mA^2

$$\phi = B \cdot A$$

$$\frac{\text{N}}{\text{A} \cdot \text{m}} \cdot \text{m}^2 = \text{NmA}^{-1}$$

175. A block of mass 20 g is thrown vertically upward with a speed of 10 m/s. The work done by the force of gravity during its upward motion is:

- A. 1000 J
- B. -1000 J
- C. 1 J
- D. -1 J
- E. 2 J

$$W = mgh$$

$$= 0.02 \times 10 \times 5 = 1 \text{ J}$$

176. The resistance of a wire is 6 Ω at 50 $^\circ\text{C}$ and 8 Ω at 100 $^\circ\text{C}$. The resistance of wire at 0 $^\circ\text{C}$ will be:

- A. 5 Ω
- B. 4 Ω
- C. 3 Ω
- D. 2 Ω
- E. 1 Ω

$$R = R_0(1 + \alpha \Delta T)$$

$$6 = R_0(1 + \alpha(50 - 0))$$

$$8 = R_0(1 + \alpha(100 - 0))$$

177. An electric bulb is marked 200 W, 220V. If the same bulb is connected to 110 V supply line, the power consumed by it is:

- A. 100 W
- B. 75 W
- C. 50 W
- D. 25 W
- E. 300 W

$$P = \frac{V^2}{R}$$

$$200 = \frac{220^2}{R}$$

$$R = \frac{220^2}{200}$$

$$P_{110} = \frac{110^2}{R} = \frac{110^2 \times 200}{220^2} = 25 \text{ W}$$

178. If the magnitude of the sum of two vectors is equal to the magnitude of the difference between two vectors, then what will be the angle between these vectors?

- A. Zero
- B. π
- C. $\frac{\pi}{2}$ ✓
- D. $\frac{\pi}{4}$
- E. $\frac{\pi}{3}$

179. A cathode ray oscilloscope is displaying an AC signal. If one wave is completed in 2 cm along X-axis and time-base setting is 10 ms/cm, then frequency of AC signal will be:

- A. 100 Hz
- B. 50 Hz
- C. 20 Hz ✓
- D. 10 Hz
- E. 200 Hz

180. Two bodies are projected at an angle of α and $(90 - \alpha)$ to the horizontal with the same speed. The ratio between their time of flight is:

- A. $\cos \alpha : 1$
- B. $\sin \alpha : 1$
- C. $\sin \alpha : \cos \alpha$ ✓
- D. $\cos \alpha : \sin \alpha$
- E. $\sin \alpha : \tan \alpha$

0	30	45	60	90
0	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{4}{4}$
0	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{4}{4}$

$\sin(30^\circ) = \frac{1}{2}$

$\sin(60^\circ)$

$\sqrt{\frac{1^2 + 3^2}{4}} = \frac{2}{2} = 1$

$\frac{\sin \alpha}{\sin(90 - \alpha)} = \frac{1}{\sqrt{3}}$

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181. A particle having mass m and charge q , moves in a circular path in a magnetic field of strength B . If the radius of the circular path is r , the time required by this particle to complete one revolution is:

A. $\frac{2\pi m}{qB}$

B. $\frac{2\pi m}{qr}$

C. $\frac{qrB}{m}$

D. $\frac{2\pi m}{rB}$

E. $\frac{2mq}{rB}$

182. If M and m represent the mass of Earth and mass of a satellite respectively; then the orbital speed v of satellite in a circular orbit of radius r around Earth will be:

A. $V = \frac{GM}{r}$

B. $V = \sqrt{\frac{GM}{r}}$

C. $V = \sqrt{\frac{r}{GM}}$

D. $V = \sqrt{\frac{2GM}{r}}$

E. $V = \sqrt{\frac{2r}{GM}}$

183. A $2\mu\text{F}$ capacitor is connected to 10V dc supply, if 'Q' represents the charge on each plate and 'E' the energy stored on each plate, which of the following represents the values of Q and E?

A. $Q = 20\mu\text{C}$ and $E = 50\mu\text{eV}$

B. $Q = 10\mu\text{C}$ and $E = 100\text{eV}$

C. $Q = 10\mu\text{C}$ and $E = 500\text{eV}$

D. $Q = 20\mu\text{C}$ and $E = 100\mu\text{J}$

E. $Q = 10\mu\text{C}$ and $E = 200\mu\text{J}$

$\frac{1}{2} \times 2 \times 10$
 10^4
 $100 \times 10^{-6} \text{ C} \times 10 \text{ V}$
 $= 200 \times 10^{-6} \text{ J}$
 $200 \mu\text{J}$

184. Two strings A and B of a sitar produce 5 beats per second. When the tension in string B is slightly increased, 2 beats per second are produced. If the frequency of string A is 400 Hz, then the original frequency of string B was:

- A. 405
- B. 402
- C. 395
- D. 392
- E. 391

185. If N , m , V and c represents number of molecules, mass of a molecule, volume of cubical container and speed of a molecule respectively. Then by using the method of dimensions, check which of the following expressions represents the pressure (p) of a gas?

- A. $P = \frac{1}{3} \frac{Nm}{V} (c^2)$
- B. $P = \frac{1}{3} \frac{Nm}{V^2} (c)$
- C. $P = \frac{1}{3} \frac{Nm}{V} (c^2)$
- D. $P = \frac{1}{3} \frac{Nm^2}{V} (c^2)$
- E. $P = \frac{1}{3} \frac{N^2 m^2}{V} (c^2)$

$$P = \frac{1}{3} \rho v^2$$

$$= \frac{1}{3} \frac{2}{2} \frac{1}{2} m v^2$$

$$= \frac{1}{3} m v^2$$

186. Moment of inertia of a thin rod of mass m , length l about a line passing through its center is:

- A. ml^2
- B. $\frac{1}{2} ml^2$
- C. $\frac{1}{3} ml^2$
- D. $\frac{2}{5} ml^2$
- E. $\frac{1}{12} ml^2$ ✓

187. Using the concept of significant figures, the sum and product of three numbers 4.342, 3.02 and 2.0 were calculated. Which of the following choice is most accurate?

- A. Product = 26.22568 & Sum = 9.362
- B. Product = 26.226 & Sum = 9.362
- C. Product = 26.23 & Sum = 9.36
- D. Product = 26.2 & Sum = 9.3 ✓
- E. Product = 26 & Sum = 9.4

$$\begin{array}{r} 4.3 \\ 3.0 \\ \hline 2.0 \end{array}$$

188. The orbit of electron moving at rate of $1.6 \times 10^6 \text{ m/s}$ in uniform magnetic field of 1.0×10^{-3} . The radius of orbit of electron is:

take $m_e = 9.1 \times 10^{-31} \text{ Kg}$; $e = 1.6 \times 10^{-19} \text{ C}$.

- A. $9.1 \times 10^{-3} \text{ m}$
- B. $9.1 \times 10^{-2} \text{ m}$
- C. $1.9 \times 10^{-3} \text{ m}$
- D. $1.9 \times 10^{-2} \text{ m}$
- E. $9.1 \times 10^{-1} \text{ m}$

$$r = \frac{mv}{Bq} = \frac{1.75 \times 10^{-26} \times 1.6 \times 10^6}{10^{-3} \times 1.6 \times 10^{-19}}$$

189. The moment of inertia of a solid sphere of mass 'm' having radius 'r' about a line passing through its center is:

- A. $\frac{5}{2} mr^2$
- B. $\frac{2}{5} mr^2$ ✓
- C. $\frac{1}{2} mr^2$
- D. $\frac{1}{3} mr^2$
- E. mr^2

$$I_{cm} = \frac{2}{5} mr^2 = \frac{1.75 \times 10^{-26} \times 1.6 \times 10^6}{10^{-3} \times 1.6 \times 10^{-19}}$$

190. The total energy of a block, executing simple harmonic motion is:

- A. Independent of 'x'
- B. Proportional to 'x'
- C. Proportional to 'x²' ✓
- D. Proportional to 'x⁻²'
- E. Proportional to 'x'

$$E = \frac{1}{2} kx^2$$

191. When an Operational amplifier is used as Inverting amplifier, the angle between its output and input signal is:

- A. 30°
- B. 45°
- C. 50°
- D. 90°
- E. 180° ✓

192. An air craft of wingspan 50m flies horizontally at an area where the vertical component of the Earth's magnetic field is $2.0 \times 10^{-4} \text{T}$. In order to produce an emf of 1 volt between the aircraft's wingtips, its speed should be:

- A. 1000 m/s
- B. 500 m/s
- C. 100 m/s
- D. 15000 m/s
- E. 250000 m/s

$$\mathcal{E} = vBL$$
$$\frac{1}{2 \times 10^{-4} \times 50} = 100$$

193. An astronomical telescope has Magnifying power 5. If the focal length of eyepiece is 20 cm then what is the focal length of objective?

- A. 1m ✓
- B. 0.1 m
- C. 50 cm
- D. 25cm
- E. 15cm

$$5 = \frac{f_o}{20 \text{ cm}}$$

194. The dimensions of angular velocity (ω) is:

- A. MLT
- B. MLT^{-1}
- C. MLT^{-2}
- D. $\text{M}^0\text{L}^{-2}\text{T}^{-3}$
- E. $\text{M}^0\text{L}^0\text{T}^{-1}$ ✓

$$v = r\omega$$
$$\frac{\text{ms}^{-1}}{\text{m}}$$

195. If $0.3\vec{i} + 0.5\vec{j} + d\vec{k}$ represents a unit vector, the value of 'd' is:

- A. $\sqrt{0.64}$
- B. $\sqrt{0.66}$
- C. 1
- D. 0.2
- E. $\sqrt{0.1}$

$$\sqrt{(0.3)^2 + (0.5)^2 + (d)^2} = 1$$
$$0.09 + 0.25 + d^2 = 1$$
$$d^2 = 1 - 0.34 = 0.66$$
$$d = \sqrt{0.66}$$