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1. Acceleration due to gravity  $g = 980 \text{ cm/sec}^2$ . The value in  $\text{km/min}^2$  is  
A) 9.8                      B) 19.6                      C) 35.28                      D) 49.46
2. The magnitudes of scalar and vector products of the two vectors are  $48\sqrt{3}$  and 144. The angle between the vectors is  
A)  $30^\circ$                       B)  $45^\circ$                       C)  $60^\circ$                       D)  $90^\circ$
3. Two vectors  $\vec{a}$  and  $\vec{b}$  are at the angle of  $60^\circ$  with each other. Their resultant makes an angle of  $45^\circ$  with  $\vec{a}$ . If  $|\vec{b}| = 4$  then  $|\vec{a}|$  is  
A)  $(\sqrt{3} - 1)$                       B)  $2(\sqrt{3} - 1)$                       C)  $2(\sqrt{3} + 1)$                       D)  $\sqrt{3}$
4. The velocity of a particle  $v$  changes with displacement  $x$  as  $v = \sqrt{(25 - 6x)}$  m/sec. The acceleration of the particle is  
A)  $5 \text{ m/s}^2$                       B)  $3 \text{ m/s}^2$                       C)  $-3 \text{ m/s}^2$                       D)  $-6 \text{ m/s}^2$
5. Two skaters have weight in the ratio 4:5 and are 9m apart, on a smooth friction less surface. They pull on a rope stretched between them. The ratio of distance covered by them when they meet each other will be  
A) 25 : 16                      B) 16 : 25                      C) 4 : 5                      D) 5 : 4
6. The escape velocity of the body on the earth, from a height equal to radius of the earth R is  
A)  $\sqrt{2gR}$                       B)  $\sqrt{gR}$                       C)  $\sqrt{4gR}$                       D)  $(\sqrt{2gR})/2$
7. A train of mass 3000 Ton is running with 72 km/h. The friction force acting between rails and wheels is 10 N/Ton. The power of the engine is  
A) 6 KW                      B) 600 KW                      C) 720 KW                      D) 3000 KW
8. If a cyclist moving with a speed of 4.9 m/sec on a level road takes a sharp circular turn of the radius 4m. Then the coefficient of friction between the cycle tires and road is  
A) 0.41                      B) 0.51                      C) 0.61                      D) 0.71

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9. A satellite is orbiting a planet at a certain height in a circular orbit. If the mass of the planet is suddenly reduced to half, the satellite would
- A) continue to revolve around the planet at the same speed.
  - B) falls freely on the planet
  - C) orbit the planet at the lesser speed
  - D) escape from the planet





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21. Two rain drops reach the earth with different terminal velocities having ratio 9:4. Then the ratios of their volume is

A) 3 : 2

B) 4 : 9

C) 27 : 8

D) 9 : 4

22. The coefficient of viscosity of a liquid does not depend on

A) The density of liquid

B) Pressure of liquid

C) Temperature of liquid

D) Nature of liquid

23. The spherical bubbles of radii  $r_1$  and  $r_2$  coalesce in vacuum under isothermal conditions. The radius of the resulting bubble R is

A)  $R = (r_1 \times r_2) / (r_1 + r_2)$

B)  $R = (r_1 + r_2) / 2$

C)  $R = \sqrt{(r_1^2 + r_2^2)}$

D)  $R = \sqrt{(r_1^3 + r_2^3)}$



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33. The capacitive reactance of a condenser of capacity  $125 \mu\text{F}$  for an A.C of frequency  $4000 \text{ Hz}$  will be

A)  $\pi \Omega$

B)  $\frac{1}{\pi} \Omega$

C)  $2\pi \Omega$

D)  $\frac{1}{2\pi} \Omega$

34. A transformer changes  $220 \text{ volt}$  to  $22 \text{ volt}$ . If the current in the primary and secondary coils are  $10 \text{ A}$  to  $70 \text{ A}$  respectively then, its efficiency will be

A)  $35\%$

B)  $50\%$

C)  $70\%$

D)  $90\%$

35. The nature of electro Magnetic wave is

A) Longitudinal

B) Longitudinal stationary

C) Transverse

D) Transverse stationary

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36. A transverse wave is represented by  $y = 2\sin(60t - 2x)$  and measurements in meters. Then the velocity of propagation is
- A) 15 m/s                      B) 30 m/s                      C) 45 m/s                      D) 60 m/s
37. The velocity of approach of an observers towards a stationary source that the apparent frequency is double to real frequency is (velocity of sound in air 340m/s)
- A) 165 m/s                      B) 260 m/s                      C) 340 m/s                      D) 680 m/s
38. A tuning fork of frequency 340 Hz is vibrated just above a cylindrical tube of length of 1m. water is slowly pored in. what is the minimum height of water required for resonance. Velocity of sound in air is 340 m/s
- A) 0.25 m                      B) 0.35 m                      C) 0.45 m                      D) 0.15 m
39. The temperature at which the velocity of sound in air is double to that of at  $0^{\circ}C$  is
- A)  $546^{\circ}C$                       B) 546K                      C)  $819^{\circ}C$                       D) 819K
40. The displacement of particle executing simple harmonic motion is given by  $y = 2\sin(0.5\pi t)$  cm its time period is
- A) 2 sec                      B) 0.5 sec                      C) 3 sec                      D) 4sec
41. An erect image, three times the size of the object, is obtained with a concave mirror of radius of curvature 30 cm. The position of the objet from the mirror is
- A) 10 cm                      B) 12 cm                      C) 15 cm                      D) 30 cm
42. Which of following phenomena is not explained by Huygens's construction of wave front?
- A) Refraction                      B) Reflection                      C) Diffraction                      D) Origin of spectra
43. Two mono chromatic light waves of amplitudes  $A$  and  $2A$  interfering at a point, have a phase difference of  $60^{\circ}$ . The intensity at that point will be proportional to

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A)  $A^2$

B)  $2A^2$

B)  $5 A^2$

D)  $7 A^2$

44. A meniscus lens has convex surface 20 cm and concave surface 30 cm. If the lens is constructed of glass ( $\mu = 1.5$ ), the focal length will be

A)  $-40$  cm

B)  $+40$  cm

C)  $-120$  cm

D)  $+120$  cm

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45. The number of thermions emitted from a cathode does not depend on
- A) Surface area of cathode                      B) Cathode temperature  
C) Work function of cathode                      D) Specific heat of cathode
46. Triode valve can not be used as
- A) Rectifier                      B) Amplifier                      C) A source of emf                      D) An Oscillator
47. How many diodes are used in a bridge rectifier
- A) 1                      B) 2                      C) 3                      D) 4
48. The depletion layer in a silicon diode is  $1\mu\text{m}$  wide and its knee potential is 0.5 volt. Then electric field in the depletion layer will be
- A)  $0.5\text{ V/m}$                       B)  $5 \times 10^{-7}\text{ V/m}$                       C)  $5 \times 10^5\text{ V/m}$                       D)  $2 \times 10^5\text{ V/m}$
49. The order of magnitude of current in the reverse bias connection of a junction diode is
- A) A                      B) mA                      C)  $\mu\text{A}$                       D) kA
50. A transistor has  $\alpha = 0.95$ . The current amplification factor will be
- A) 11                      B) 19                      C) 21                      D) 35
51. The main cause of Zener break down is
- A) The base semi conductor being germanium.  
B) Production of electron-hole pair due to thermal excitation.  
C) Low doping                      D) High doping
52. The rest mass of an electron is  $m_0$ . what would be its mass if it moves with velocity  $0.6c$  ( $c$ = velocity of light)
- A)  $\frac{1}{2}m_0$                       B)  $\frac{1}{6}m_0$                       C)  $\frac{4}{3}m_0$                       D)  $\frac{5}{4}m_0$
53. One of the postulates of special theory of relativity is
- A) Speed of light is relative  
B) Speed of the light is same in all inertial frames

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- C) Time is relative
- D) Mass is relative

54. Einstein's mass energy relation ( $E = mc^2$ ) show that

- A) Mass disappear to reappear as energy
- B) Energy disappear to re appear as mass
- C) Mass and energy are two different forms of the same entity
- D) All the statements are correct

55. The un decayed fraction of 1 gram of radio active substance after 5 half lives will be

- A)  $\frac{1}{8}$  gram
- B)  $\frac{1}{16}$  gram
- C)  $\frac{1}{32}$  gram
- D)  $\frac{1}{4}$  gram

56. From the following equation, find out the possible nuclear fusion reaction

- A)  ${}_6\text{C}^{13} + {}_1\text{H}^1 \rightarrow {}_6\text{C}^{14} + {}_{+1}\text{e}^0 + 4.3 \text{ Mev}$
- B)  ${}_4\text{Be}^9 + {}_2\text{He}^4 \rightarrow {}_6\text{C}^{12} + {}_0\text{n}^1 + 5 \text{ Mev}$
- C)  ${}_7\text{N}^{14} + {}_1\text{H}^1 \rightarrow {}_8\text{O}^{15} + 7.3 \text{ Mev}$
- D)  ${}_{92}\text{U}^{235} + {}_0\text{n}^1 \rightarrow {}_{54}\text{Xe}^{140} + {}_{38}\text{Sr}^{94} + 2({}_0\text{n}^1) + 200 \text{ Mev}$

57. The maximum binding energy for nucleon is for

- A) Hydrogen
- B) Helium
- C) Iron
- D) Cobalt

58. Which of the following isotope is used for treatment of cancer

- A)  $\text{I}^{131}$
- B)  $\text{Co}^{60}$
- C)  $\text{K}^{40}$
- D)  $\text{Sr}^{90}$

59. The radius of the nucleus varies with mass number A as

- A)  $A^2$
- B)  $A^3$
- C)  $A^{1/2}$
- D)  $A^{1/3}$

60. During a negative  $\beta$ -decay

- A) An atomic electron is ejected
- B) A neutron in the nucleus decay emitting an electron
- C) An electron which is already present inside the nucleus is ejected
- D) A part of binding energy of the nucleus is converting into an electron

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## ANSWER KEY

1. C      2.C    3.B    4.C    5.D    6.B    7.B    8.C    9.C  
10. C     11. B    12. A    13. C    14. B    15. C    16. A    17. B  
18. A     19. D    20. C  
21. C     22. A    23. C  
24. C     25. C    26.A    27. C    28. D    29. C    30. B    31. C    32. A    33. B    34. C  
35.C     36. B    37.C    38.A    39.C    40.D  
41. A     42. D    43. D    44. D  
45. D     46. A    47. D    48. C    49. C    50. B    51. B  
52. D    53. B    54. D    55. C    56.C    57. C    58. B    59. D    60. B