

* 6 MEASUREMENTS *

1. Smallest unit of measurement by;
HiMeasurement tape $\rightarrow$ 1 cm or 1 mm
Meter rule or half meter rule $\rightarrow$ 0.1 cm or 1 mm
Vernier caliper $\rightarrow$ 0.01 cm or 0.1 mm
Screw gauge $\rightarrow$ 0.001 cm or 0.01 mm
2. $\theta = s/r$
3. $2\pi \text{ rad} = 3600$
4. $3600 = 1 \text{ revolution}$
5. $1 \text{ radian} = 57.30$
6. $1 \text{ degree} = 60 \text{ minute}$
7. $1 \text{ minute} = 60 \text{ seconds}$
8. Angle at circle is 2π radian.
9. Angle at sphere is 4π steradian.
10. Volume of slid cylinder $= \pi r^2 l$
11. Area of sphere $= 4\pi r^2$
12. Volume of sphere $= \frac{4}{3} \pi r^3$
13. Dimension of velocity $= [LT^{-1}]$

14. Dimension of acceleration = $[LT^{-2}]$

15. Energy of photon; $E = hf$

16. Time period of pendulum; $T = 2\pi$

*  VECTORS AND SCALAR*

17. Commutative property of vector = $A+B$
 $= B+A$

18. $F_x = F \cos \theta$

19. $F_y = F \sin \theta$

20. $F =$

21. $A \cdot B = AB \cos \theta$

22. $A \times B = AB \sin \theta$

23. Scalar product; work and power

24. Vector product; torque

25. $\tau = r \times F$

26. First condition of equilibrium; $\sum F = 0$

27. Second condition of equilibrium; $\sum \tau = 0$

*  MOTION AND FORCE*

28. $v = s/t$

29. $a = v/t$

30. $v_f = v_i + at$

31. $s = v_i t + \frac{1}{2} at^2$

32. $2as = v_f^2 - v_i^2$

33. $S = v_{ave} \times t$

34. $V_{ave} = (v_i + v_f)/2$

35. $g = 9.8 \text{ ms}^{-2} = 32 \text{ ft}^{-2}$

36. $F = ma$

37. $a = v/t$

38. $P = mv$

39. $P = F t$

40. Impulse; $J = F \times t = \Delta P$

41. $J = \Delta P$

42. Law of conservation of momentum;
 $\Delta p = 0$

43. Elastic collision in one dimension; $[v_1 + v_2] = [v_1' + v_2']$

44. Magnitude of projectile velocity; $V_f =$

45. Height of projectile; $H = v_i^2 \sin^2 \theta / 2g$

46. Time of flight; $T = 2 v_i \sin \theta / g$

47. Time of summit or time to reach to
highest point; $T = v_i \sin \theta / g$

48. Range; $R = v_i^2 \sin 2\theta / g$

49. $R_{max} = v_i^2 / g$

50. $R = R_{\text{max}}$ at 450

*  WORK ENERGY POWER*

51. $W = Fd \cos\theta$

52. Power; $p = W/t$ or $p = Fv$

53. 1 watt = Js^{-1}

54. 1 hp = 746 watts

55. $\text{K.E} = \frac{1}{2} mv^2$

56. $\text{P.E} = mgh$

57. Efficiency = output/input = $W \times D/P \times d$

58. Absolute potential energy = $Fr = -GmMe/R_e$ (- because work is done against gravity)

59. Gravitational potential = $E/m = GMe/R_e$

60. For escape velocity compare K.E with Absolute potential energy; $v_{\text{esc}} = \rightarrow v_{\text{esc}} =$

61. $G = 6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$

62. $R_e = 6.4 \times 10^6 \text{ m}$

63. $M_e = 6 \times 10^{24} \text{ kg}$

64. $V_{\text{esc}} = 11.2 \times 10^3 \text{ ms}^{-1}$

65. $W_h = \text{K.E} + f_h \rightarrow (W_h = \text{loss in potential energy})$

66. Loss in P.E = Gain in K.E + work done against friction

67. $E = mc^2 \rightarrow (c = 3 \times 10^8 \text{ ms}^{-1})$

* CIRCULAR MOTION *

68. Angular velocity; $\omega = \Delta\theta/\Delta t$

69. Angular acceleration; $\alpha = \Delta\omega/\Delta t \rightarrow a = \alpha \times r$

70. $v = r \omega$

71. $F_c = mv^2/r$

72. $a_c = -(v^2/r)$

73. Centrifugal force = mv^2/r

74. $F \sin \theta = mv^2/r$

75. $F \cos \theta = mg$

76. $\tan \theta = v^2/gr$

77. Torque = $r F = rma = rm (r\alpha) = (r^2m)\alpha = I \alpha$

78. Moment of inertia; $I = mr^2$

79. Ring or thin walled cylinder inertia (I) = MR^2

80. Disc or solid cylinder inertia = $\frac{1}{2} MR^2$

81. Disc inertia = $\frac{1}{2} M (R_2^2 + R_1^2)$

82. Solid sphere inertia = $\frac{2}{5} MR^2$
83. Solid rod or meter stick inertia = $\frac{1}{12} ML^2$
84. Rectangular plate inertia = $\frac{1}{12} M(a^2 + b^2)$
85. Angular momentum = $L = r \times p = r mv = r m r \omega = r^2 m \omega = I \omega$
86. $L = r mv \rightarrow L/t = r mv/t = r ma = r F = \tau$
87. $L/t = \tau$
88. Linear kinetic energy = $\frac{1}{2} mv^2$
89. Rotational kinetic energy = $\frac{1}{2} I \omega^2$
90. Velocity of hoop = $v =$
91. Velocity of disc = $v =$
92. Critical velocity = $v = 7.9 \text{ km/s}$
93. The orbital velocity = $v =$
94. Lift at rest $\rightarrow T = w$
95. Lift moving downward $\rightarrow T = w - ma$
96. Lift moving upward $\rightarrow T = w + ma$
97. Lift falling freely = $T = 0$
98. Frequency for artificial satellite $\rightarrow f =$

*  FLUID DYNAMICS *

99. Drag force $\rightarrow F_d = 6 \pi \eta r v$
100. Terminal velocity $\rightarrow v_t =$
101. Continuity equation $\rightarrow A_1 v_1 = A_2 v_2$
102. $Av = \Delta V / \Delta t = \text{constant}$
103. $\Delta m / \Delta t = \rho \Delta V / \Delta t$
104. Bernoulli's Equation $= P + \frac{1}{2} \rho v^2 + \rho gh = \text{constant}$
105. Torricelli's Theorem $\rightarrow v =$
106. Flow meter or the venture meter $\rightarrow v_1 =$

* OSCILLATIONS *

107. Frequency $\rightarrow f = 1/T$
108. Angular frequency $\rightarrow \omega = 2\pi f$
109. Time period $\rightarrow T = 2\pi / \omega$
110. Velocity of projection $\rightarrow v_y = \omega$
111. Simple pendulum time period $\rightarrow T = 2\pi$
112. Simple pendulum potential energy $= \frac{1}{2} kx^2$
113. Simple pendulum kinetic energy $=$

$$\frac{1}{2} kx^2 - \frac{1}{2} kx^2 t$$

114. Total energy of simple pendulum = $\frac{1}{2} kx^2$

115. Resonance frequency = $F_n = nf_1$

116. Phase $\rightarrow \theta = \omega t$

* 🌀 WAVES *

117. Transverse wave speed $\rightarrow$

118. Longitudinal waves speed $\rightarrow$

119. Phase change $\rightarrow 2\pi = \lambda$

120. Phase difference $\rightarrow \delta = 2\pi/\lambda$

121. Speed of sound by newton $\rightarrow v =$
 $= 281 \text{ ms}^{-1}$

122. Laplace correction $\rightarrow v = 332$
 ms^{-1}

* 🌀 Chap No.11 ELECTROSTATICs *

123. $1 e = 1.602 \times 10^{-19} \text{ C}$

124. $Q = ne$

125. Coulomb's Law; $F = k$

126. $K =$

127. $K = 9.0 \times 10^9 \text{ N m}^2 \text{ C}^{-2}$

128. $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2$

129. $\epsilon_r =$

130. $F_{med} =$

131. $E = = = K$

132. $\Phi = E A \cos \theta = N m^2 C^{-1}$

133. $\Phi =$

134. E due to sheet of charge; $E =$

135. E due to charge plates; $E =$

136. $V = =$ Volt =

Joule / Coulomb

137. Electric potential energy; $U =$

138. Electric potential; $V = = =$

139. Potential Gradient = $E = -$

140. $1 \text{ eV} = 1.602 \times 10^{-19} \text{ C} \times 1 \text{ V}$

$\rightarrow (1 \text{ eV} = 1.602 \times 10^{-19} \text{ J})$

141. $C = = C V^{-1} = \text{farad}$

142. Charge density; $\sigma =$

143. $C_{vac} = = =$

144. $\epsilon_r = C_{med} / V_{vac}$

146. Capacitors In Series;

147. $Q = Q_1 = Q_2 = Q_3$

148. $V = V_1 + V_2 + V_3$

165. $\tan \theta = I/V = 1/R$
166. Resistance, $R = V/I \rightarrow 1\Omega = 1V/1A$
167. $R = \rho L/A \rightarrow \Omega.m$
168. Conductance, $G = 1/R \rightarrow$
Siemen(S) or mho
169. Conductivity, $\sigma = 1/\rho = L/RA$
 $\rightarrow \text{mho/m or S/m}$
170. Pure metals R inc with T inc.
171. Electrolytes and insulators, R dec
with T inc.
172. $\Delta R = \alpha R_0 T \rightarrow R_T = R_0 (1 + \alpha T)$
173. Temperature co-efficient of
Resistance, $\alpha = \frac{R_T - R_0}{R_0 T} \rightarrow K^{-1}$
174. Resistivity, $\rho_T = \rho_0 (1 + \alpha T)$ OR α
 $= \frac{\rho_T - \rho_0}{\rho_0 T} \rightarrow K^{-1}$
175. Electromotive Force, $\varepsilon = W/q \rightarrow$
1 volt = 1 joule/coulomb
176. Open circuit, $I = 0$ so $V = \varepsilon$
177. Terminal Voltage, $V_t = \varepsilon - Ir$
178. Power, $P = W/t = VI \rightarrow 1 \text{ Watt} =$
1V x 1A

179. 1 kWh = 1 unit of electrical energy

180. 1 J = 1W x 1s

181. Maximum output power,

$$(P_{out})_{max} = \varepsilon^2 / 4r = \varepsilon^2 / 4R$$

182. Thermo emf, $\varepsilon = \alpha T + \frac{1}{2} \beta T^2$

183. KCL, $\Sigma I = 0$

184. KVL, $\Sigma \varepsilon = \Sigma V = \Sigma IR$

185. KCL based on L.O.C.O.CHARGE

186. KVL based on L.O.C.O.ENERGY

187. Wheatstone Bridge, $X = PQ/R$

188. Potentiometer, $\varepsilon_2 / \varepsilon_1 = I_2 / I_1$

189. $\tan \theta = I/V = 1/R$

*  Chap No. 13 ELECTROMAGNETISM*

190. Force on current carrying wire,
 $F = BIL \sin \theta$.

191. Magnetic field or magnetic
induction, $B = F/IL \rightarrow 1 \text{ tesla} = 1 \text{ NA}^{-1} \text{ m}^{-1} =$
 1 Wb m^{-2}

192. 1 T = 10⁴ G

193. Magnetic Flux, $\Phi = B A \cos \theta$
 $\rightarrow 1 \text{ Wb} = 1 \text{ N m A}^{-1}$.

194. Ampere's Law, $B \oint dl/r = \mu_0 (I/2\pi r)$

OR $\Sigma B \cdot \Delta L = \mu_0 I$

195. $B_{\text{net}} = B_1 + B_2$

196. Magnetic field due to current carrying solenoid, $B = \mu_0 n I \rightarrow n = N/L$

197. Motion of charge particle in uniform magnetic field, $F = q v B$

198. Centripetal Force = Magnetic force $\rightarrow mv^2/r = qvB$

199. Time period of charge particle in B, $T = 2\pi m/qB$

200. Frequency of charge particle in B, $f = qB/2\pi m$

201. Velocity selector, $FE = FM$
 $\rightarrow qE = qvB \rightarrow v = E/B$

202. Torque on current carrying coil, $\tau = NBIA \cos \theta$

203. Restoring torque, $\tau = C \theta$

204. Galvanometer, $NBIA \cos \theta = C \theta$
 $\rightarrow I = C\theta/NAB \rightarrow I \propto \theta$

205. Conversion of galvanometer into

ammeter, small R connected in parallel
206. Conversion of galvanometer into
voltmeter, large R in series are connected

207. Ammeter, $R_s = R_g I_g / (I - I_g)$

→ Ideal ammeter → $0 R$

208. Voltmeter, $R_h = (V/I_g) -$

R_g → Ideal voltmeter → infinite R

*  Chap No. 14 ELECTROMAGNETIC
INDUCTION*

209. Faraday's Law, $\varepsilon = N (\Delta\Phi/\Delta t)$ →

$\varepsilon = N (\Delta\Phi/\Delta t)$

210. Lenz Law, $\varepsilon = -N (\Delta\Phi/\Delta t)$

211. Flux motional emf, $\varepsilon = Blv \sin \theta$

212. Rate of work done, $W = Blv$

213. Rate of production of electrical
energy, energy $= \varepsilon I$

214. $W = \text{energy} \rightarrow Blv = \varepsilon I$

215. Power, $P = F v$

216. $\varepsilon = L \Delta I/\Delta t$ or $\varepsilon = N \Delta\Phi/\Delta t \rightarrow LI$
 $= N\Phi$

217. Self-Inductance, $L = N\Phi / I$

218. $\varepsilon = M \Delta I / \Delta t$ or $\varepsilon = N \Delta \Phi / \Delta t \rightarrow MI = N\Phi$
219. Mutually inductance, $M = N\Phi / I$
220. $F = 1/T$
221. Induced emf, $\varepsilon = NAB \cos \omega t$ or $NAB \omega \sin \omega t$
222. $\varepsilon = \varepsilon_{\max} \sin \omega t$
223. Back emf, $V = \varepsilon + IR$
224. $N_s / N_p = V_s / V_p = I_p / I_s$

* Chap 16 PHYSICS OF SOLIDS *

225. Elastic modulus =
226. Tensile stress =
227. Tensile strain =
228. Young modulus = $= \text{Nm}^{-2}$
229. Shear stress =
230. Shear strain = $= \tan \theta$
231. Shear modulus = rigidity modulus
232. Bulk or volume stress =
233. Bulk modulus (in fluids) = $\Delta p =$
234. Volume strain = -
235. Bulk modulus = $=$

236. Stress strain (Hook's law)

237. $A = r^2$

238. $W = \frac{1}{2}Fe$ (work done on stretching wire).

239. Strain energy = $\frac{1}{2} F e$

240. Strain energy per unit volume = $\frac{1}{2} (\text{stress}) (\text{strain})$

* Chap 18 DAWN OF MODERN PHYSICS*

241. $E = m_0 c^2$

242. $L = L_0$

243. $T = t_0$

244. $M = m_0$

245. $\lambda_{\max} T = 0.2898 \times 10^{-2} \text{ m K}$
(Wein's displacement law)

246. $E = \sigma T^4$
(Steffan-Bolts Law)

247. $\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-1} \text{ K}^{-4}$

248. $E = n h f$

249. $K.E_{\max} = e V_0$

250. $K.E_{\max} = h f - \phi$

$$251. \quad H f_0 = \Phi =$$

$$252. \quad K.E_{\max} = hf - Hf_0$$

$$253. \quad Hf = K.E + hf'$$

$$254. \quad P =$$

$$255. \quad \Delta\lambda = 1 -$$

$$256. \quad = + 1 -$$

$$257. \quad E_{\text{photon}} = E_{\text{electron}} + E_{\text{positron}}$$

$$258. \quad \text{Photon rest mass energy} = 2m_0c^2 = 1.02 \text{ MeV}$$

$$259. \quad = m_{e^-} + m_{e^+}$$

$$260. \quad \lambda = =$$

$$261. \quad \Delta p = \quad \text{and} \quad \Delta x = \lambda$$

$$262. \quad (\Delta p)(\Delta x) = h$$

$$263. \quad (\Delta E)(\Delta t) = h$$

$$* \text{ Chap 19 ATOMIC SPECTRA} *$$

$$264. \quad = R \left(\frac{1}{n^2} - \frac{1}{m^2} \right)$$

$$265. \quad R = E_0 / hc = 1.097 \times 10^7 \text{ m}^{-1}.$$

$$266. \quad mvr = nh/2\pi.$$

$$267. \quad h = \text{planks constant} = 6.6256 \times 10^{-34} \text{ J s.}$$

$$268. \quad E = hf = E_n - E_p$$

269. $r_n =$
270. $E_n = -$
271. $E_n = -2.17 \times 10^{-18} \text{ J} / n^2 = -13.6 \text{ eV} / n^2$
272. $r_n = n^2 r_1 \rightarrow r_1 = 0.53 \text{ Å}$
273. $1 \text{ Å} = 10^{-10} \text{ m}$
274. $2\pi r = n\lambda$
275. $\text{eV} \rightarrow hf_{\text{max}} = hc/\lambda_{\text{min}}$
276. $\lambda_{\text{min}} = hc/\text{eV}$
277. excited state for 10^{-8} s .
278. metastable state for 10^{-3} s

* Chap 20 NUCLEAR PHYSICS*

279. Nuclear size is of the order of 10^{-14} m .
280. The mass of the nucleus is of the order of 10^{-27} kg .
281. $\frac{1}{2} mv^2 = Vq$
282. $Bqv = mv^2/r$
283. $Bqv = mv^2/r \rightarrow m = Bqr/v$
284. $\frac{1}{2} mv^2 = Vq \rightarrow v^2 = 2Vq/m$

285. So $m = q r^2 B^2 / 2V$

286. $\Delta m = Z m_p + N m_n - M(A, Z)$

287. The binding energy in MeV is $931 \times \Delta m$.

288. The binding energy per nucleon = E_b / A .

289. ${}^0_1n \rightarrow {}^1_1H + {}^{-1}_0\beta + \text{antineutrino}$
12 MIN

290. $\Delta N / \Delta t = -\lambda N$

291. $R = -\Delta N / \Delta t = \lambda N$

292. $N = N_0 e^{-\lambda t}$

293. $1 \text{ Bq} = 1 \text{ decay per second}$

294. $1 \text{ Ci} = 3.70 \times 10^{10} \text{ decay/s}$

295. $\lambda T_{1/2} = 0.693$

296. The charge on u, t and c, in term of electron is $+2/3e$.

297. The charge on s, b and d in term of electron is $-1/3e$.

298. $\text{proton} = 2u \rightarrow d$.

299. neutron

Remember Me In Your Prayers(capt. ALam)