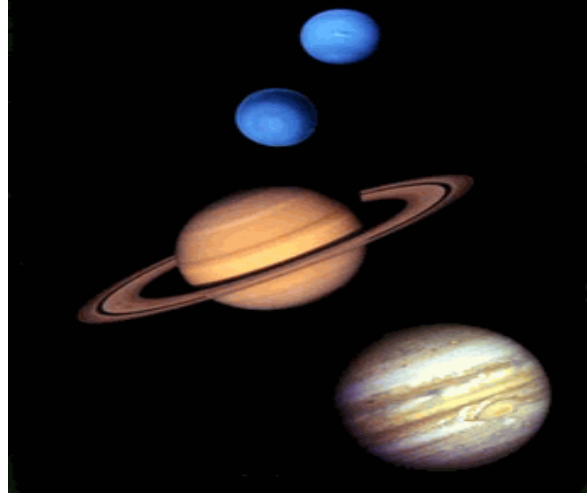# வெற்றி நிச்சயம்

TRB
P.G. PHYSICS
(Previous Year QUESTIONS & ANSWERS)
by

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TRB
(Previous Year QUESTIONS & ANSWERS)
PHYSICS

1) Kiystron is a device used to generate **Microwaves**

2) Intel 8085 microprocessor is a **8 bit device**

3) The mnemonic used to transfer contents of one register into another is **MOV**

4) EEROM is a **read only but erasable memory**

5) Video RAM is a **both static and dynamic memory**

6) Fermi's theory of beta decay is based on the following assumption **the rest mass of the electron is negligible**

7) Nuclear fission can be successfully explained using **liquid drop model of the nucleus**

8) The particles which cannot be accelerated by means of cyclotron are **electrons**

9) Nuclear radiation can be detected by **G.M. Counter**

10) The material used as a moderator in a nuclear reactor is **graphite**

11) Maxwell's thermodynamic relations make use of **temperature, entropy pressure and volume**

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12) The process which takes place in the liquefaction of gases is **Joule-Kelvin effect**

13) The effective unit of charge in BCS theory is **2e**

14) According to uncertainty principle $\mathbf{\Delta x. \Delta p_x \geq \hbar}$ **(or) h/2π**

15) The zero-point energy of a linear harmonic oscillator is equal to **½ hv**

16) The lambda point which separates Helium I and Helium II is **2.186K**

17) Thermal conductivity of Helium II is **more than that of copper**

18) The value of permittivity of free space in $c^2N^{-1}m^{-2}$ is **$10^{-9}/36\pi$**

19) The total normal electric flux over a closed surface surrounding a charge is **directly proportional to the charge**

20) Laplace's equation for free space is $\nabla^2 V = 0$

21) The total internal energy of a diatomic molecule is made up of **vibrational energy only**

22) The pure rotation bands in the far I.R. were first noticed in the absorption spectra of **Water**

23) In the case of Stokes' line observed in Raman effect the frequency of the line is **less than that of the incident radiation**

24) Raman effect may be considered as the optical analogue of **Phototelectric effect**

25) Frank-Condon principle explains **Photochemical dissociation**

26) Lagrangian represents the **difference between K.E and PE**

27) The equation of motion of a simple pendulum is $\ddot{\theta} - \dfrac{l}{g}\,\theta = 0$

28) The relation between angular momentum ($\vec{L}$), angular velocity ($\vec{\omega}$) and moment of intertia (I) is **$\vec{L} = I\vec{\omega}$**

29) Only one phase point can occupy one phase cell according to **Fermi-Dirac statistics**

30) The statistical theory which readily leads to Planck's law of radiation is **Bose – Einstein statistics**

31) If the probability of husband's selection is 1/7 and that of wife's selection is 1/5 in an interview, then the probability for both of them to be selected is **12/35**

32) The probability of getting 4 heads in 6 tosses of a fair coin is **15/64**

33) If m is the mean of Poisson distribution, then the standard deviation of the distribution is **$\sqrt{m}$**

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34) The mean for normal distribution is **greater than zero**

35) The number of sum values to be found out in order to fit a straight line to the given points using method of least squares is **2**

36) If a vector function V is said to be solenoidal, then **$\nabla \cdot \vec{V} = 0$**

37) The condition for a vector function $\overline{F}$ to be irrotational is **$\nabla \times \vec{F} = 0$**

38) Stokes' theorem relates **line integral with surface integral**

39) The characteristic roots of a Hermitian matrix are all **imaginary**

40) The rank of the matrix **2**

41) The binary equivalent of the decimal number 51 is **110011**

42) The decimal equivalent of the hexadecimal number 12A is **298**

43) The correct Boolean equation is $\overline{A.B} = \overline{A} + \overline{B}$

44) One of the following statements is correct **The output of the AND gate in a half adder is the SUM**

45) In the case of a JK M/S flip-flop **if the master sets, the slave resets**

46) For j=0, the components of $\vec{J}$ are all represented by null matrices of rank **1**

47) If a wave function is normalized, then $\int \psi^s \psi d\tau = 1$

48) Born approximation may be used to find out **total scattering cross-section**

49) The binding energy per nucleon is maximum for **iron nucleus**

50) The strongest available force is **gravitational force**

51) Accoding to Debye's theory of specific heats, at very low temperatures, the specific heat capacity is **directly proportional to the cube of temperature**

52) Wiedemann-Franz law gives the relation between **thermal conductivity and electrical conductivity**

53) Lorenz number (L) is defined as **L=K/σ T**

54) A pure semiconductor becomes an insulator at **0 K**

55) The eigen functions of the wave equation for a periodic potential may be obtained using **Poynting theorem**

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56) The value of $1/\sqrt{\mu_o \varepsilon_o}$ is **3x10^8**

57) If rod of length l moves with a velocity C with respect to an observer, then the apparent length of the rod will be **none of these (more than l, equal to l , equal to zero)**

58) The proper time of a moving object is always **less than the corresponding interval in the clock at rest**

59) The maximoum velocity attainable in nature is **3x10^8 m/sec**

60) The mass of an object moving with velocity of light will appear to be **equal to infinity**

61) The statistical theory which supports the zero point energy of a gas even at absolute zero is **Classical statistics**

62) According to M.B. Statistics, the number of particles in the given energy range is given by $n_i = \dfrac{Z_i}{A e^{E_i/KT}}$

63) Phase points are endowed with a distinct unchanging individuality of their own, according to **B.E. Statistics**

64) The number of dimensions of phase space is **4**

65) A divergence in the behavior of an actual gas from that of a perfect gas is referred to as **pressure of the gas**

66) The order of full linear group is ∞

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69) Every sub-group of a cyclic group is **unitary**

70) For equilibrium of a system, virtual work of the applied forces is **zero**

71) Hamiltonian represents the **Potential energy of a system**

72) If A represents the action in mechanics, then according to the principle of least action **$\Delta A \neq 0$ but positive**

73) The matrix which satisfies its own characteristic equation is **square matrix**

74) The value of $\overline{(m+1)}$ is **n!**

75) The relation between Beta and gamma functions is **$\beta(m,n) = \overline{m}\ \overline{n} / \overline{(m+n)}$**

76) The value of $P_o(x)$ **is 1**

77) The probability of getting a king while drawing a card at random from a pack of 52 cards is **1/13**

78. Stoke's theorem relates **line intergral and surface intergral**

79. The rank of the matrix $\begin{pmatrix} 1 & 3 & 4 & 7 \\ 2 & 4 & 5 & 8 \\ 3 & 1 & 2 & 3 \end{pmatrix}$ is **3**

80. The eigen values of a Hermitian matrix are **all really only**

81. The eigen values of the matrix are $\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$ **1,1,5**

82. If Pn(x) is the Legendre polynomial of order n, then $P_2(x)$ equals **(3x2-1)/2**

83. If the probability for x to solve a problem is, P_1 and the probability for y to solve the same is p_2, then the probability for both of them to solve it is **P_1P_2**

84. If a die is thrown 5 times, the probability for an ace to turn up 3 times is **$256/6^5$**

85. The probability that the ace of spade is drawn from a pack of 52 cards at least
    once in 104 consecutive trials is **$1-e^2$**

86. The sum the the squares of the distance of the points (1,2),(2,4),(3,6) and (4,8)
    from the fittest straight line for these points is **0**

87. The curve for the equation $y=e^x$ a straight fine, if it is drawn between **x and log y**

88. According to D' Alemberts principle, **$\Sigma(F_i-\dot{p}_i).\delta ri=0$**

89. If T and V represent the kinetic and potential energe is respectively. Lagrangian
    L is given by **L=T-V**

90. Hamiltonian H is given by **H=T+V**

91. If the time Integral of n times the kinetic energy is called the action; then the
    value of n is **2**

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92. If H, L and T represent the Hamiltonlan, Lagrangian and kinetic energy
    respectively, the value of (H+L)/T is **2**

93. An equilibrium macroscopic state is one for which the number of microscopic
    states is **maximum**

94. As the energy of a cell increases, the number of particles distributed in the cell
    decreases

95. The unit of phase space volume is **$kg^3m^6s^{-3}$**

96. Pauli's exclusion principle is imposed on **Fermi-Dirac statistics**

97. Planck's law governing the blackbody radiation can be deduced using **Bose-Einstein statistics**

98. The total normal electric flux through a spherical surface which encloses a dipole
    of charge q and length 2d is **zero**

99. The equation, $\nabla^2 \phi= -\rho /\varepsilon_0$ is known as **Poisson's equation**

100. Poisson's equation reduces to Laplace's equation, if **charge per unit volume is zero**

101. The unit of polarizability is $\mathbf{Cm^{-2}}$

102. Which of the following is wrong? The unit of the ratio of magnetic induction to the intensity of magnetic field is $\underline{\mathbf{Tm^2}}$

103. If the mass of a body in motion is $2/\sqrt{3}$ times its rest mass, then its velocity ms^{-1} is $\underline{\mathbf{1.5 \times 10^8}}$

104. The energy equivalence of 1kg mass is $\underline{\mathbf{9 \times 10^{16}J}}$

105. Pure rotation spectra lie in the **far infrared region**

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106. Electronic spectra are effected by quantum changes in **rotational energy only, vibrational energy only, electronic energy**

107. Franck-Condon principle can be used to explain **photochemical dissociation**

108. The coherence length in a superconductor is **inversely proportional to the transition temperature**

109. The radio of the penetration depth to the coherence length for type II superconductors is **greater than 1/√2**

110. The total expulsion of magnetic flux from the Interior of a specimen on entering the superconducting state is called **Meissner effect**

111. SQUID can be constructed using the principle of **Josephson effect**

112. Which of the following is not correct? Low temperature can be obtained by means of **magnetization**

113. In the depletion layer of a junction diode, **Charge carriers are not present**

114. The unit of mobility of electrons is $\underline{\mathbf{m^2V^{-1}s^{-1}}}$

115. Which of true following is wrong? According to uncertainty principle $\underline{\mathbf{\Delta E.\Delta x \geq h}}$

116. If the wavefunction Ψ (r,t) is normalized, $\underline{\mathbf{\int |\Psi(r,t)|^2 \, d^3r = 0}}$

117. The energy of particle in a square potential well is **proportional to the square of the quantum number,n**

118. Born approximation cannot be used for **scattering of slow electrons by atoms**

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119. The four matrices $\alpha_x, \alpha_y, \alpha_z$ and β in Dirac's free particle equation, **must be hermitian**

120. If the mass defect in the case of Lithium(L^7) is 0.04048 amu, the bind energy per nucleon is **5.4MeV**

121. The mass number of the most stable nucleus is **56**

122. Which of the following statements is not correct? The nuclear force between two nucleons is **an electrostatic force**

123. The atomic number of fission products in the nuclear fission of U-235 range from **34 to 58**

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124. Chain reaction can be set up only if the mass of the fissionable material is **greater than the critical mass**

125. Which of the following is wrong? the energy released in the nuclear fission of 1kg of U-235 is **1.5×10^{25}J**

126. The material used as the moderator and coolant in a nuclear reactor is **heavywater**

127. Natural Uranium consists of **0.72% of U-235 and 99.28% of U-238**

128. The number of bits which can be added by a full adder is **3**

129. The number of stable states in a flip-flop is **2**

130. In the case of JK M/S flip-flop **the master is active and the slave is inactive while the clock is high**

131. The number of clock pulses required to store a 4-bit word in a register parallel loading is **1**

132. The IC number of widely used decade counter is **7490**

133. Which of the following is not correct? Microwaves are generated by means of **phase shift oscillator**

134. In the case of 8085 microprocesser, +5V is connected to pin number **40**

135. The instruction MOV B,A **copies A into B**

136. RAM is a **read-write only memory**

137. In the case of EPROM **data can be erased with ultraviolet light**

138. The condition for a vector to be solenoidal is $\mathbf{\nabla \cdot \bar{v} = 0}$

139. For a vector F to be irrotational, the condition to be satisfied is $\mathbf{\nabla \times \vec{F} = 0}$

140. If $r = \sqrt{x^2 + y^2 + z^2}$, the value of $\nabla^2(1/r)$ is **0**

141. The value of $\int$ in spherical coordinate system is given by $\mathbf{tan^{-1}(y/x)}$

142. Gauss's divergence theorem relates **volume integral and surface integral**

143. Hermite's differential equation is given by $\mathbf{y'' - 2xy' + 2\lambda y = 0}$

144. Laguerre's polynomial $L_3(x)$ equals $\mathbf{-x^3 + 9x^2 - 18x + 6}$

145. The value of the gamma function $\Gamma\ \frac{1}{2}$ is $\mathbf{\sqrt{\pi}}$

146. The probability of drawing -2 aces in succession from a pack of 52 cards is **1/221**

147. If all the elements of a group commute with one another, the group is said to be **abelian**

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148. The order of full linear group is **∞**

149. If a matrix commutes with all matrices of an irreducible representation. than matrix is a **multiple of unit matrix**

150. Which of the following statements is wrong is wrong ? **To isomorphic groups need not have the same structure**

151. A system consists of 1000 particles with constraints expressed by 10 equations. Then, the number of degrees of freedom of system is **2990**

152. The products of inertia of a body about the principal axes are **zero**

153. The number of Euler's is **3**

154. Which of the following statements is wrong? In the case of Euler's angles, **the rotations are made clockwise and anti clockwise alternately**

155. If the external torque on rotating body is zero, the physical quantity when remains unchanged is **angular momentum**

156. According to stirling's theorem, logn! equals **n.logn-n**

157. As the temperature of the filament is doubled, thermionic current **increases 4times**

158. In the case of liquid Helium, the λ point corresponds to **2.186K**

159. Which of the following statements is wrong? function is **a constant in an adiabatic process**

160. Choose the wrong statement from the following: **The average kinetic energy of a diatomic molecule is 6.21×10^{-21} J at 300K**

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161. The electrostatic force between two charges separated by 3m distance is 0.075N. If the total charge is 20μC, the individual charges are **5μC,15μC**

162. The value of in $(\varepsilon_0 \mu_0)^{-1/2}$ in ms^{-1} is **3×10^8**

163. The value $\vec{E} \times \vec{H}$ represents the **intensity of the wave**

164. The wave produced by an oscillating electric dipole is a **spherical wave**

165. If a light source moves with a velocity **υ** towards an observer at rest, the velocity of light. (c) as observed by him is **C**

166. If a sphere is carried by an observer in motion, it will appear for an observed rest as **ellipsoid**

167. Which of the following is correct? **The means wavelength of Stokes' and Anti-Stockes' lines given the wavelength of the parent line.**

168. The induced magnetic moment is opposite the direction of applied field in **diamagnetic substance**

169. The susceptibility is negative and independent of temperature in the case of **bismuth**

170. The ratio of thermal conductivity to electrical conductivity is **proportional to the absolute temperature**

171. The BCS superconductor is described by **both annihilation and creation operators**

172. The conditions for the heat flow are specified in **second law of thermodynamics**

173. The variables in Maxwell's thermodynamic relations are **temperature and pressure**

174. At constant temperature, the heat absorbed or liberated by a substance brings about a change in **volume**

175. Which of the following statements is wrong? The specific heat capacity by Debye's law is **proportional to the temperature at low temperatures**

176. The width of the energy band gap is minimum in the case of **metals**

177. The total energy operator is $-\dfrac{\hbar^2}{2m}\nabla^2+V(r)$ **(or)** $\dfrac{-\hbar^2}{8\pi^2 m}\nabla^2+V(r)$

178. If the operator $\dfrac{d^2}{dx^2}$ operates on the eigen function cosx, the corresponding eigen value is **-1**

179. If γ is the frequency of a linear harmonic oscillator, is zero point energy is **1/2 hγ**

180. The eigen value corresponding to the eigen function L^2 is **l(l+1)$\hbar^2$**

181. The differential scattering cross-section is defined as **the scattering per unit incident flux**

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182. The first simple and logical explanation of the α-ray spectra was given by **Gamow**

183. The β- decay us due to the decay of a neutron giving rise to **proton, electron and neutrino**

184. The upper limit of continuous β-spectrum corresponds to the case **neutrino is emitted with zero energy**

185. The density of a nucleus a greater than **10^{17} kg.m^{-3}**

186. The magic numbers are **2,8,14,20,28,and 50**

187. The binary equivalent of the hexadecimal number F8 is **11111000**

188. The Gray Code for the binary number 1011 is **1110**

189. Which is not correct in the following? The output of a 3 input AND gate is 0, if **all the inputs are1**

190. Which of the following is correct by De Morgan's theorem? **$\overline{A.B} = \overline{A}+\overline{B}$**

191. The simplified form of $\overline{A}\,\overline{B}+\overline{A}B+AB+A\overline{B}$ is **1**

192. Which is wrong in the following? An operational amplifier is a **device with infinite output resistance**

193. If A_d and A_c represent the gains of a differential amplifier for the difference signal and common mode signal respectively, then its CMRR is given by $\dfrac{|A_d|}{|A_c|}$

194. If the input signal is $V = \sin\omega t$ in an operational differentiator, the output will be **$-RC\omega\cos\omega t$**

195. A comparator is **non-linear analog system**

196. Hartley oscillator is a type of **Harmonic oscillator**

197. The property that does not change in superconductivity transition is **elastic property**

198. In junction diode, if the reverse saturation current is 5nA at 25°C, then at 35°C it is **5nA**

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199. A substance is anti-ferromagnetic when exchange integral J is **J>0**

200. The magnetic susceptibility of a ferromagnetic material **at$T>T_N$, $\chi = \dfrac{C}{T\pm\theta}$**

201. Metal-semiconductor junction diode is **Schottky barrier diode**

202. The splitting up of the spectral lines in magnetic field is called **Zeeman effect**

203. The quantum of energy in an elastic wave is called **phonon**

204. $k/\sigma T = L$ is called **Wiedemann-Franz relation**

205. In an N-type semiconductor, the position of the Fermi level is **higher than the centre of energy gap**

206. The donor type impurities **must have only three valence electrons**

207. Which of the following molecules show a rotational spectrum? **O_2**

208. The study of interaction of the nuclear quadrupole moment with the electric field gradient is **NQR**

209. The effect chemical shift is explained by **NMR spectrum**

210. γ-ray emission and subsequent re-absorption results in **Mossbauer spectroscopy**

211. The diamagnetic behavior of a superconductor is known as **Meissner effect**

212. Law of addition of velocities applies only when the two velocities are in **perpendicular direction**

213. The mechanism of interaction in infrared spectrum is **change of electron distribution**

214. The selection rule for rotational transition is $\underline{\mathbf{\Delta J=\pm 1}}$

215. A prolate symmetric top molecule has $\mathbf{I_A \neq I_B \neq I_c}$

216. Which of the following statements is wrong?Raman effect **is coherent scattering**

217. In Galilean transformation **acceleration is invariant**

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218. The relativistic mass of particle moving with a velocity 0.9C is $\underline{\mathbf{3m_o}}$

219. Minkowski space *is **four** dimensional space*

220. How fast would a rocket have to go relative to an observer for its length to be contravted to 99% of its length at rest? $\underline{\mathbf{4\times 10^7 m/sec}}$

221. The relativistic energy of a particle is $\underline{\mathbf{E^2=C^2P^2-m_o^2C^4}}$

222. Poisson's equation in an electromagnetic theory is $\Delta^2 V = \dfrac{-\rho}{\varepsilon_0}$

223. Dielectric strength **is independent of temperature**

224. Maxwell's equation relates electric field intensity with **electric displacement vector**

225. According to Poynting's theorem $\mathbf{J.E.=\dfrac{\partial u}{\partial t} +\nabla.S}$

226. Oscillating electric dipole produces **electromagnetic waves**

227. Micro-canonical ensemble describes **the systems which are perfectly insulated**

228. The spin of boson is **1 or -1**

229. The value of $\dfrac{1}{4\pi\varepsilon_o}$ is 9×10^9 **N-m^2/Coul^2**

230. The differential form of Gauss'law is **div E=ρ/ε_o**

231. The unit of current density is $\underline{\mathbf{\dfrac{ampere}{m}}}$

232. The number of generalized coordinates required to describe the position of the simple pendulum is **2**

233. For non-conservative system, the generalized potential should be the function of **$U(q,t)$**

234. Generalised force is expressed as **$\sum F_i . \delta r_i$**

235. The product of inertia coefficient is **I_{xx}**

236. The total number of Euler's angle is **3**

237. The Hamiltonian represents **total energy**

238. The macrostate is defined by **pressure, temperature and volume of the gas**

239. Bose-Einstein Statistics is applied to the system **identical,indistinguishable and obeying Pauli's exclusion principle**

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240. The distribution law according to Maxwell-Boltzmann statistics is **$n_i = \dfrac{g_i}{f e^{BEi}}$**

241. The Hamilton Canonical Equation relates **$P_i = -\partial H / \partial q_i$**

242. Under multiplication composition the set {1,i,-1,-i} is a group of order **4**

243. Every cyclic group is **Finite**

244. Which of the following is a wrong statement? Homomorphism exists between the two groups. **There exist many to one correspondence**

245. The elemtns B and C are said to be conjugate elements if **$ACA^{-1}=B$**

246. The representation by similarity transformation is **Reducible representation**

247. Fermi temperature θ_F is given by **$\theta_F = E_F / K$**

248. Ideal gas molecule is explained by **Maxwell-Bol tzmaann Statistics**

249. The displacements of all atoms in a linear triatomic molecule are equal and in the same direction if **$\omega = \{k/m(1+2m/M)\}^{1/2}$**

250. For electron the degeneracy factor is **Q=2**

251. In canonical ensembles **sub –systems exchange energy but not particles**

252. $\int_0 \sqrt{\sin\theta}\, d\theta$ **is** $\dfrac{\left\lceil\dfrac{1}{2}\right.\ \left\lceil\dfrac{3}{4}\right.}{2\left\lceil\dfrac{5}{4}\right.}$

253. The probability that student A solves a problem is 3/4 and that student B solves is 2/3. The probability that the problem will be solved is **7/12**

254. Four persons are chosen at random from a group containing three men, two women and four children. The chance that exactly two of them will be children **4/9.**

255. The variance of the 500 heights about the mean is 0.000950; then the standard error of the mean is **0.014**

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256. A die is thrown 8 times and the probability that three will show up exactly two times is **13%**

257. The Legendre polybnomial $P_n(x)$ has **none of these** (**a) n real zeros between 0 and 1 b) n zeros of which only one is between -1 and 1 c) 2n-1 real zeros between -1 and 1**)

258. If $H_n(x)$ is the Hermite polynomial of order n, then $H_n(-x)$ **$(-1)^n H_n(x)$**

259. If $L_n(x)$ is the Laguerre polynomlal of degree n, then $L_n(0)$ is $\lfloor n$ **(or) n!**

260. The value of $\lceil 0$ is **∞**

261. The property of β function is **β(m,n)=β(n,m)**

262. The necessary condition for $\int .dr=0$ is **∇.F is continuous**

263. A square matrix A is said to be unitary if **$A^{-1}=\overline{A}$**

264. The rank of the matrix $\begin{pmatrix} 1 & 3 & 4 & 3 \\ 3 & 9 & 12 & 3 \\ 1 & 3 & 4 & 1 \end{pmatrix}$ is **3**

265. If the matrix A= $\begin{pmatrix} 4 & 2 \\ -1 & 1 \end{pmatrix}$ then (A-2I) (A-3I) **is zero**

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266. The eigen vector of the matrix A = $\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$ is $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$

267. For A×B to be solenoidal **div($\overline{A}×\overline{B}$)=0**

268. The value of $\dfrac{\nabla r}{r^2}$ is **zero**

269. In cylindrical co-ordinates **$\phi=\tan^{-1}(x/y)$**

270. $\vec{\nabla}(r^n)$ is **$nr^{n-2}\vec{r}$**

271. According to Stokes' theorem **$\int\vec{A}.\vec{dt}= \iint curl\ \vec{A}.\ \vec{ds}$**

272. The Periodic Table shows **all the known elements**

273. Decibel is a unit that measures **intensity of sound**

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274. In a homogeneous reactor the moderator is **cadmium**

275. The decimal equivalent of 10011_2 is **19_{10}**

276. According to Boolean algebraic laws **A.O=0**

277. A.B=B.A is called **Commutative law**

278. Which of the following is correct by de Morgan's theorem? **$\overline{A.B}=\overline{A}+\overline{B}$**

279. A group of D flip-flops connected in parallel are **Counters**

280. The number of memory locations which the 8085 microprocessor can address is **2^{16}**

281. The purpose for which the parity bit is added is **error detection**

282. The space between anode and cathode in magnetron oscillator is **cavity**

283. The simplest radiator is called **yagi antenna**

284. The nuclear stability is determined by **neutron/proton ratio**

285. The magic numbers are **2,8,20,50,82,126**

286. All even-even nuclei have **the same parity**

287. The machine in which the magnetic field is kept constant and frequency of the applied voltage is varied is **cyclotron**

288. The counting efficiency of a G.M. counter is **$1-e^{s/p}$**

289. Stationary states are those for which **div $\vec{J}$=0**

16

290. Which of the following statement is wrong? The uncertainty principle states that $\Delta J \Delta x \geq h$ (Correct Answer $\Delta x \Delta Px \geq \hbar$)

291. The zero point energy of a harmonic oscillator is $\dfrac{1}{2} h\omega_0$

292. According to quantum theory, for the lowest energy state the probability is **minimum near the ends**

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293. An operator P is said to be Hermitian if its average value in any state is **imaginary**

294. As pressure on a liquid increases, its boiling point **remains constant**

295. At 2.19 k liquid helium has **maximum density, specific heat and dielectric constant**

296. At absolute zero, the atomic heat of all solids tends to **zero**

297. The normalized wave function of a particle is $\Psi n = \sqrt{\dfrac{2}{L}} \ \sin(n\pi x/L)$

298. The certainty of finding a particle in a given volume is $\int l \Psi l^2 \, dv = 1$

299. Susceptibility of diamagnetic materials is always **negative**

300. The value of mechanical equivalent of heat is $\mathbf{4.18 \times 10^3 J}$

301. During adiabatic process the entropy of the system **remains constant**

302. If reversible engine is working between 800K and 400K , its efficiency is **75%**

303. Gibb's function is given by the equation **G=U-TS**

304. Nickel salt solution is **ferromagnetic**

305. Soft magnetic materials show **large coercivity and retentivity**

306. Superconductivity has never been observed in **alloys of metals**

307. Which of the following statements is not correct? At the transition temperature **there is a discontinuous change in specific heat**

308. The temperature at which the resistance of mercury drops to zero is **4.2K**

309. Laguerre's differential equation may by written as $\mathbf{xy'' + (1-x)y' + \lambda y = 0}$

310. The probability of a card being either red or king in a regular pack of 52 cards is 1**/26**

17

311. A and B stand in a ring with 10 others. If the arrangement of the persons is at random, the chance that there are exactly 3 persons between A and B is **3/10**

312. The compound probability of two independent events is **$P(AB) = P(A) + P(B)$**

313. In Binomial distribution the probability of r success in n independent trials is **$nC_r p^r q^{n-r}$**

314. The Hamilton canonical equation relations is $\dot{q_j} = \dfrac{\partial H}{\partial P_J}$

315. Fermi-Dirac statistics is applicable to **electrons of high concentration**

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316. In a linear triatomic molecule the motion is translational if $\omega = \left\{ \dfrac{K}{m} \left[1 + \dfrac{2m}{M} \right] \right\}^{1/2}$

317. Grand canonical ensemble is one which allows **exchange of both**

318. The value of ε_o is **9×10^{-12} N/M**

319. According to Born-Oppenheimer approximation **electronic, vibrational and rotational energies of a molecule are dependent on each other**

320. In NMR the nucleus may be visualized as a rotating spherical charge with **the magnetic moment pointing perpendicular to the axis of rotation**

321. The selection rule for transition in rotational spectra is **$\Delta J = \pm 1$**

322. The normal modes of vibration referred to in IR spectroscopy are **symmetric & asymmetric stretching, banding**

323. On increasing the temperature, the resistivity of an insulator **remains constant**

324. If $\vec{r} = x\vec{i} + y\vec{i} + z\vec{k}$, then $\nabla r = |\vec{r}|$

325. If ϕ is a Laplace function $\nabla^2 \phi = 0$

326. $\vec{A}$ is said to be solenoidal if $\vec{\nabla}.\vec{A} = 0$

327. Gauss theorem states that **$\iiint div\,\vec{A}\,dV = \iint \vec{A}\,\vec{dS}$**

328. The greatest line integral when computed for unit area is called **flux** of the vector field.

329. The eigen values of matrix $\begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$ **(1,6)**

18

330. The eigen values of a skew Hermitian matrix are **purely imaginary**

331. The value of $\Gamma(-n)$ is **∞**

332. The β and Γ functions are **related** $\boldsymbol{\beta(m,n) = \dfrac{\Gamma m \Gamma n}{\Gamma(m+n)}}$

333. If Pn(x) is the Legendre polynomial of order n then $\boldsymbol{P_n(-x)}$ **is** $\boldsymbol{(-1)^n P_n(x)}$

334. Under multiplication composition the set {1,-1}is a group of order **2**

335. A group generated by a single element is called **cyclic group**

336. Which of the following is a wrong statement? Isomorphism exists between two groups **where exists many to one corresponds**

337. The identity transformation is represented by **D**

338. A group that has only two normal subgroups, the group itself and the unit subgroup is called **symmetric group**

339. The mechanism of interaction in microwave spectrum is **change of spin**

340. A spherical top molecule is one in which $\boldsymbol{I_A = I_B = I_C}$

341. Pure vibrationals spectra are observed **only in solids**

342. Rule of mutual exclusion prevails between **IR and Raman spectra**

343. Study of transition between magnetic energy levels of nuclei of a molecule is **NMR**

344. The angular momentum of a rotating body is said to be conserved if **external torque is zero**

345. Nutation is a rotation about **line of nodes**

346. The microstate is defined by **pressure, temperature and volume of the gas**

347. Fermi-Dirac statistics is applied to systems of **identical and indistinguishable particles obeying Pauli's exclusion principle**

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348. The distribution law according to Bose-Einstein statics is $\boldsymbol{n_i = \dfrac{g_i}{f e^{BEi} - 1}}$

349. At absolute zero temperature, the semi conducting materials have **partially filled conduction band**

350. The diamagnetic behavior of superconductor is known as **Meissner effect.**

351. Of the following which is not paramagnetic? **NO**

352. Spin waves are **lattice vibration in solids**

353. In a PN junction diode, the depletion layer sets up **potential barrier**

354. Gauss law relates **flux and charge**

355. μ_0 and ε_o are related by $\upsilon_c = \dfrac{1}{\sqrt{\varepsilon_o \mu_o}}$

356. The unit of electric susceptibility is **No unit**

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357. Dielectric constant of a medium is **greater than 1**

358. $\vec{E} \times \vec{H}$ represents **rate of flow of energy through unit area**

359. The rationship between Cartesian and spherical coordinates is **$x = r\sin\theta\cos\phi$**

360. If $[A] = [A']$ then the matrix is **symmetric matrix**

361. For a matrix AA^{-1} exists only if **$|A| \neq 0$**

362. The rank of the matrix $\begin{pmatrix} 1 & 3 & 4 & 3 \\ 3 & 9 & 12 & 9 \\ -1 & -3 & -4 & -1 \end{pmatrix}$ is **1**

363. The matrix $A = \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$ is **unitary**

364. A non –holonomic constraint can be expressed as **$r^2 - a^2 > 0$**

365. Lagrangian L is expressed as **$L(q, \dot{q}, t)$**

366. The phase space is **6N dimensional space**

367. According to the principle of least action $\delta \int \sum p_j \dot{q}_i \, dt = $ **const**

368. The moment of Inertia coefficient is expressed as **I_{xx}**

369. Maxwell's electromagnetic equation relates the magnetic intensity with **current density and electric displacement vector**

370. A moving rod of length 1m and velocity 0.6C appears for a stationary observer as **0.8m**

20

371. The energy released on conversion of 1g matter into energy is **0.9×10^{14} J**

372. Lorentz transformation approximates to Galilean when **$v \ll c$**

373. The momentum of an electron moving with a velocity 1.8C is **36.44×10^{-23} kg m/s**

374. Which of the following is incorrect for an adiabatic process **PV=const.**

375. The clauslus equation is **$\dfrac{dp}{dT} = \dfrac{L}{(v_2 - V_1)^T}$**

376. The Helmoltz function is given by the equation **F=U-TS**

377. As pressure on solids increases, its melting point **decreases**

378. According to Einstein-Debye theory atomic heat **$A_H = 3R$**

379. Bloch wall denotes the transition layer which separates **alternate domains magnetised in same direction**

380. A nucleus in a chemical surround different from that of a source does not absorb the same frequency. This effect is referred to as **Chemical shift**

381. By BCS theory, in super-conductivity **attractive electron interaction by means of phonon exchange dominates**

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382. $\vec{J} = \dfrac{1}{\mu_0 \lambda_L^2} \vec{A}$ is **Lorentz equation**

383. Lande g factor for pure orbital motion is **lies between 1 and 2**

384. The threshold energy required fission of Uranium by photon is **7 Mev**

385. **The process applied in hydrogen bomb is fission fusion**

386. The system in which digits are expressed in powers of 10 is **decimal**

387. Conversion of Gray code 1011 to binary is **1101**

388. According to Boolean algebra **A+A=A**

389. For a free particle energy and momentum are related as **$E = p^2/2m$**

390. The wave functions are said tobe mutually orthogonal if **$\int \Psi_i^{*} \Psi_j \, d\tau = 0, i \neq j$**

391. The Symbol H represents the operator **$h/i\nabla$**

392. The relation $\nabla x \nabla p \geq$ is **uncertainty principle**

393. Of the following statement which is not correct? **nuclear forces are changes dependent force**

394. An αdecay occurs in nuclel **A>200**

395. The theory which explains continuous β-ray spectrum is **Fermi theory**

396. The accelerator that works on the principle of synchronous acceleration is **Betatron**

397. Vapour Bubble forms from a superheated liquid in **bubble chamber**

398. Which of the following is correct by De Morgan's theorem? $\overline{A+B}=\overline{A}.\overline{B}$

399. wien-bridge oscillator is **AF oscillator**

400. Schmitt trigger converts irregular waveforms to **square**

401. The voltage gain of an ideal Op-Amp is **infinity**

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402. In a voltage follower $\mathbf{V_0 = V_s}$

403. The purpose for which parity bit is added is **error detection**

404. In 8085 the data bus and address bus are **multiplexed in lower byte**

405. Which of the following is a zero address instruction? **JNZ4150**

406. This radiation resistance of a half wave antenna is **80Ω**

407. Word comparator makes use of **XOR**

408. The expectation value of any quantity f is $\mathbf{<f>= \dfrac{\int \Psi^{*} f_{op} \Psi \, d\tau}{\int \Psi^{*}\Psi \, d\tau}}$

409. The eigen function for a particle in a box is $\mathbf{\Psi n = A^{2} \sin^{2} n\pi X/L}$

410. The transition probability per unit time is **zero only between continuum states of same** energy

411. The operators which admit only real eigen values are called **Hermittian operator**

412. The value of one electron-volt is $\mathbf{1.6X10^{-19} \ J}$

413. A flip-flop is also called **bistable multivibrator**

414. The process of generating binary codes is **encoding**

415. A device which converts one from of energy into another is called **transducer**

416. The addressing mode in which the operand is specified within the instruction itself is **direct addressing**

417. The content of PROM can be erased using **U-V light**

418. The lightest metal is **Lithium**

419. A fuse wire is characterised by **low resistance and high melting point**

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420. When a radioactive nucleus emits a β particle, the mass number of the atom **remains the same**

421. The mass equivalent of 931 MeV energy is **1.66×10^{-27} kg**

422. $_{92}U^{238}$ can be fissioned by **fast neutrons**

423. Which of the following is used as a moderator in nuclear reactor **Heavy water**

424. The average energy released per fission is **200 MeV**

425. The wave function Ψ is said to be normalized, if **$\int \Psi(r_1 t) \Psi^*(r_1 t) dv=1$**

426. Born approximation is best applied where the kinetic energy of colliding particles is **small in comparison with the interaction energy**

427. For a free particle, energy and momentum are related as **$E=P^2/2m$**

428. The average binding energy per nucleon of a nucleus in an atom is **8 MeV**

429. Nuclear forces are stronger than **all of these forces (gravitational forces, magnetic forces, electrostatic forces)**

430. The operators which admit only real eigen values are called **hermitian operators**

431. If L represents the total angular momentum operator, then **$L^2 = \sqrt{1(1+1)}\ \hbar$**

432. Orthonormal functions are functions which are **orthogonal and normalized**

433. The transition probability per unit time is **zero only between continuum states of same energy**

434. The relation $\Delta x \Delta p \geq \hbar$ is **uncertainty principle**

435. By BCS theory, in superconductivity **attractive electron interaction by means of phonon exchange dominates**

436. In AC Josephson effect, the frequency of the oscillating current is **2eV/h**

437. Schrodinger's time – independent wave equation is $\nabla^2\Psi + \dfrac{2m}{\hbar^2}(E-V)\Psi = 0$

438. The expectation value of any quantity f, when Ψ is normalized, is

$$<f> = \dfrac{\int \Psi^* f_{op} \Psi d\tau}{\int \Psi^* \Psi d\tau}$$

439. The eigen values of harmonic oscillator are **(n+1/2) $\hbar\omega$ (or) (n+1/2) hυ**

440. Langevin's theory applies **only to gases**

441. The temperature above which ferromagnetic substance becomes paramagnetic is **Curie temperature**

442. Which one of the following is not diamagnetic? **Iron**

443. $\vec{J} = ne^2/mc\ \vec{A}$ is **London equation**

444. The diamagnetic bahaviour of superconductor is **Meissner effect**

445. The fundamental vibrational frequencies observed in IR spectrum H_2O molecule are **3**

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446. For a metal, according to Wiedemann – Franz law **K/σT= L**

447. Of the following which is not ferromagnetic? **O_2**

448. The Debye's theory of specific heat treats the atoms of the crystal as **harmonic oscillators and to be weakly coupled**

449. According to Deby's theory of specifi heat' at low temperature **$C_v \alpha\ T^3$**

450. In Raman spectra, spectral lines will have frequencies **grater and lesser than the incident frequency**

451. Which of the following is not true with respect to Raman Effect? **Separation of charges**

452. Franck-Condon principle is used in **electronic spectroscopy**

453. Frequency of vibration is **directly proportional to squrare root of force constant**

454. Chemical shift is used in **NMR** spectroscopy for structure determination of molecules.

455. The selection rule for transition in rotational spectra is **$\Delta J = \pm 1$**

456. Which of the following will not give IR absorption spectrum? **CO**

457. Pure vibrational spectra are observed **only in liquids**

458. A linear molecule of N atoms has **3N-5** vibrational degrees of freedom

459. Which of the following is correct? **The vibration-rotation spectrum of a diatomic molecule will have both P and R branches each consisting of equidistant lines of separation 2B**

460. A metre scale moves with a velocity 0.6 C along its length relative to an observer. Its length will be **0.8 m**

461. A Particle of rest mass m moves with a velocity 0.6 C. What is the fractional changes in mass? **1/4**

462. The correct relativistic relation between energy(E), momentum (p) and mass (m) of a particle is **$E^2 = p^2 C^2 + m_0^2 c^4$**

463. Relativistic momentum of a body is $\dfrac{m_0 v}{\sqrt{1 - v^2/c^2}}$

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464. According to special theory of relativity **mass length and time all are relative**

465. In terms of scalar and vector potentials, the electric field intensity (Ē) is expressed as $E = -\nabla V - \partial A / \partial t$

466. The outward flux of Ē through any closed surface S is equal to **$1/\varepsilon_0$ times the net charge inside**

467. Magnetic induction B at a point (r, θ,ϕ) due to an oscillating dipole **varies as sin θ**

468. $\vec{E} \times \vec{H}$ represents **rate of flow of energy through unit area**

469. The total radiated power by an oscillating dipole varies **directly as square of the dipole moment and in versely as the square of wavelength**

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470. Fermi-Dirac statistics is applied to system of **identical and in distinguishable particles obeying Pauli's exclusion principle**

471. Grand canonical ensemble is one which allows **exchange of both**

472. Gauss' law relates **flux and charge**

472. Poission's equation is $\nabla^2 \vec{V} = \dfrac{-\rho}{\varepsilon 0}$

473. Magnetic induction is expressed terms of vector potential as $\vec{B} = \vec{\nabla} \times \vec{A}$

474. The general form of Lagrange's equation is $\dfrac{d}{dt}\left[\dfrac{\partial T}{\partial q_k}\right] - \dfrac{\partial T}{\partial q_k} = 0$

475. According to the principle of least action $\nabla_{t1} \int^{t2} \Sigma\, p_i q_i\, dt = 0$

476. The phase space is **6N dimensional space**

477. The moment of inertia coefficient is expressed as $\mathbf{I_{xx}}$

478. In Binomial distribution, the probability of r success in n independent trials is $\mathbf{{}^nC_r p^r q^{n-r}}$

479. The compound probability of two independent event is $\mathbf{P(AB)= P(A)\, P(B)}$

480. Of the following statements, which is not correct? **The elements do not commute with each other in an Abelian group**

481. A group generated by a single element is called **cyclic group**

482. The number of irreducible representation is **equal to the number of classes of the group**

483. If $P_n(x)$ is the Legendre Polynomial of order n, then $P_n(-x)$ is $\mathbf{(-1)^n\, P_n(x)}$

484. Hermite differential equation is given by $\mathbf{y'' - 2xy' + 2xy = 0}$

485. The value of $\Gamma(-n)$ is $\underline{\infty}$

486. A problem is given to three students A,B and C whose changce of solving it are 1/3, ¼ and ½ respectively. The probability that the problem is solved is **3/4**

487. The eigen values of the matrix $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{pmatrix}$ are **0,1,2**

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488. A square matrix A is said to be Hhermitian , if $\mathbf{A^T = -A}$

489. A Square finite matrix A is a unitary matrix, if $\underline{A^+ A= I}$

490. If A^T A= 1 for a square matrix A, then the matrix is **skew symmetric matrix**

491. The matrix A = $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ is **unitary matrix**

495. The relationship between Cartesian and spherical coordinates is $\underline{X= r\cos\theta\cos\phi}$

496. The operator ………….. in orthogonal curvilinear coordinates is

$$\frac{\hat{u}_1}{h_1}\frac{\partial}{\partial q_1} + \frac{\hat{u}_2}{h_2}\frac{\partial}{\partial q_2} + \frac{\hat{u}_3}{h_3}\frac{\partial}{\partial q_3} \quad \textbf{divergence}$$

497. Which of the following is Gauss' Divergence theorem? $\iint \textbf{div } \bar{\textbf{A}}. \textbf{ dV= } \int \bar{\textbf{A}}.\overline{\textbf{dr}}$

498. If ϕ is a Laplace function, then $\boldsymbol{\nabla^2 \phi= 0}$

499. The rank of the matrix A = $\begin{pmatrix} 2 & 1 & -1 \\ 0 & 3 & -2 \\ 2 & 4 & -3 \end{pmatrix}$ is **2**

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500. Instruction to clear the accumulator is **SUB A**

501) In immediate addressing mode **the data is specified in the instruction itself**

502) Which of the following is volatile memory? EPROM

503) **ANA B** is a logical instruction.

504) MOV B, C is an example for **data transfer instruction**

505) Array gain is given by $10 \log_{10}\left[\dfrac{P^2_0}{P_n}\right]$

506) Radiation resistance of a quarter wave antenna is **80 ohms**

507) 8085 microprocessor has **5** flags.

508) In 8085 microprocessor **stack poin**ter is a 16 bit register

509) The highest interrupt priority in 8085 microprocessor is **TRAP**

510) Frequency of Wien bridge oscillator is $\dfrac{1}{2\pi\sqrt{6}\,\textbf{RC}}$

511) Monostable multivibrator has **one stable state and one quesi-stable state**.

512) Clamping is the process of **raising positive half cycle of the signal**.

513) The performance of a magnetron depends on **all the three mentioned**

517) The radiation resistance of the antenna depends on **$1/\lambda$**

514) In a JK master slave F/F. **while the clock pulse is high, the master is active and the slave is inactive.**

515)To design a mod-8 counter, the number of flip-flops required is **3**

516) Since the input impedance of an ideal Op-Amp is infinite **its output impedance is zero**

517) In an Op-Amp integrator circuit, the feedback component is a **capacitor.**

518) In a Colpitts oscillator circuit **no tuned LC. circuit is used**.

519) The binary equivalent of ED $_{16}$ is **$1110\ \ 1101_2$**

520) In a two input (A and B) logic gate, when A= O,B = 0 then output = 1 and when A= O, B = 1 output = 1 It must be **NAND** gate

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குறிப்பு : எப்படி **PG TRB-PHYSICS** தேர்வில் வெற்றி பெறுவது மற்றும் Physics Sylabus Unit-wise எப்படி படிப்பது போன்றப் விபரங்களை பெற:
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521) The following arrangement performs the logic function of **AND** gate.

522) According to Boolean algebra, A (A + B) is equal to **AB**

523) Half adder is constructed using **one EXOR gate and one AND gate**

524) A moderator is used in nuclear reactor to **slow down the speed of the neutron**

525) **Sheel model** is able to account for magic numbers.

526) Cyclotron is used to **accelerate neutrons**

527) According to the collective model **even- even nuclei** of the following will have spherical shapes.

528) Vapour bubble form s in a superheated liquid in **a bubble chamber**

விடா முயற்சி + தன்னம்பிக்கை = வெற்றி நிச்சயம்
வாழ்த்துக்களுடன்