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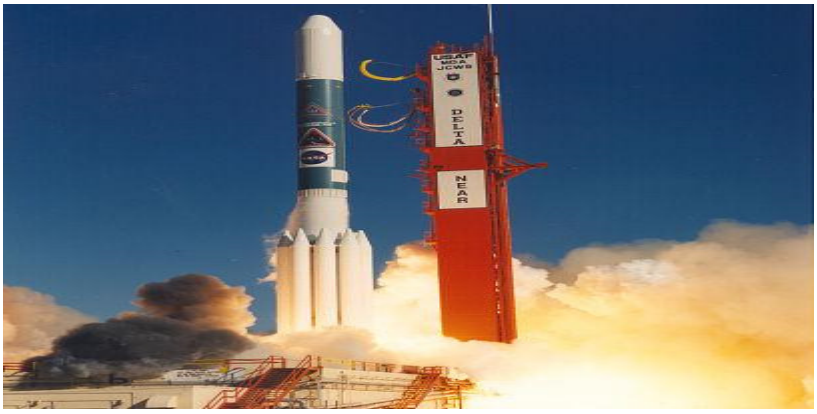

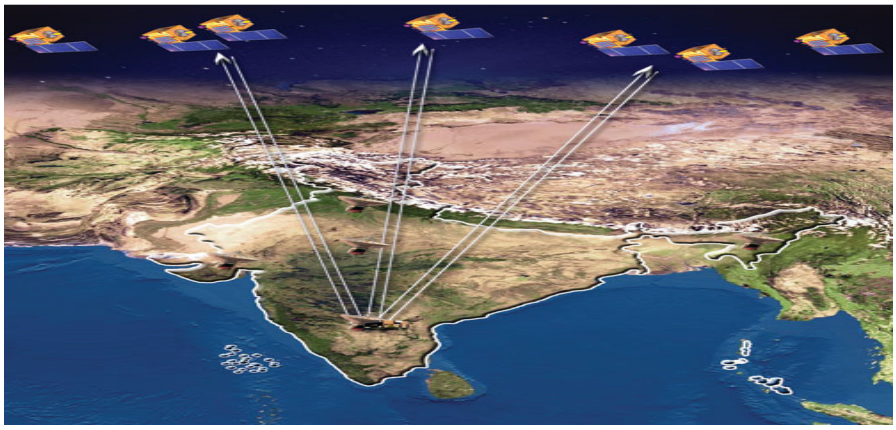

TRB

LECTURERS OF GOVERNMENT FOR POLYTECHNIC COLLEGES

(PHYSICS)

(Previous Year QUESTIONS & ANSWERS)

by

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PHYSICS

1) The Lagrangian for a particle moving in a central potential in terms of spherical polar coordinates is $\frac{1}{2}(r^2+r^2\theta^2)+\frac{k}{r}$

2) In Boolean algebra, if $f = (A+B)(\bar{A}+C)$, then **$f = AC+\bar{A}B+BC$**

3) The stack pointer is **a 16 bit register in µP that indicates beginning of stack memory**

4) If the *npn* transistor in a CE circuit is replaced by a *pnp* transistor having same parameters, the circuit will work **only if power supply polarity is reversed**

5) Virtual earth in Op-Amp is due to **both high gain and high input impedance**

6) In an emitter follower circuit the feedback is **current series type**

7) When curl $\vec{A}$ is zero the line integral of $\vec{A}$ over a closed path is also zero, the field is **solenoidal**

8) The scattering amplitude $f(\theta,\varphi)$ and differential cross-section $\vec{\sigma}$ can be calculated by **Partial wave analysis**

9) A black body radiation chamber is filled with radiation and also with simple harmonic oscillator of molecular dimensions, which vibrates with all possible frequencies. This is **Planck's hypothesis**

10) $G(\vec{r}, \vec{r'}) = \exp\frac{(ik|\vec{r}-\vec{r'}|)}{|\vec{r}-\vec{r'}|}$ is called **Green's function**

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11) $\underline{ABCD} + B\bar{C}D + \bar{A}\bar{C} + A$ is equivalent to **1**

12) ADD M in microprocessor 8085 has which of the following addressing modes **Indirect addressing**

13) In the following reactions, what are the emitted particles?
$_{28}Ni^{64} \rightarrow {}_{29}Cu^{64}$, $_{29}Cu^{64} \rightarrow {}_{80}Zn^{64}$. **Answer: β^+**

14) The method used to prevent a continuous series of pulses from taking place in the GM counter is called **Quenching**

15) $\pi^+ + n \longrightarrow K^o + K^+$ This reaction is classified on the basis of conservation as **none of these** { (a) allowed reaction b) forbidden reaction c) chain reaction}

16) For a photon, de Broglie relation is $\lambda = \frac{h}{p}$

17) The plot of isotherms will be a straight line when a plot is drawn between **V and P**

18) If $J_{\pm} = J_x \pm i J_y'$ where J is the total angular momentum operator then $[J_{+'} J-]$, $[J_{z'} J_+]$ are equal to **$2\hbar J_{z'}$ $\hbar J_+$**

19) The wavelength separation between two component lines which are observed in normal Zeeman effect is **0.1335 Å**

(Given $\vec{B} = 0.4$ Wb/m^2, e = 1.76 x 10^{11} c/kg, $\lambda = 6000$Å

20) If ê is a unit vector and $\vec{r} = xi+y z+z k$, then $\vec{\nabla}[(\hat{e} \times r) \times \hat{e}]$ **Zero**

21) Which of the following is not true about wiedemann-Franz law? **none of these.** { a) $\frac{K}{\sigma T} = 2.45 \times 10^{-8}$ WΩ /K^2 b) Ratio $\frac{k}{\sigma}$ is a function of temperature
c) Ratio $\frac{k}{\sigma}$ is not same for all metals }

22) The eigenvalues and eigenvectors of A = $\begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$ are **1,6;** $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$ $\begin{pmatrix} 4 \\ 1 \end{pmatrix}$

23) Residue of $f(z) = \frac{z^4}{(z-1)^4 (z-2)(z-3)}$ at $z = 1$ is **$\frac{175}{16}$**

24) Using single particle shell model nucleonic configuration, ground state spin and parity of $_9F^{17}$ is **$\frac{5}{2}$ +**

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25) $L\left\{\frac{1-e^{-t}}{t}\right\} = \log\left(\begin{matrix} + \frac{1}{s} \end{matrix}\right)$

26) The function $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ satisfies **Laplace equation**

27) The book 'The Discovery of India' was written by **Jawaharlal Nehru**

28) Penguins live in which region? **Antarctica**

29) The Indian National Army, organized by Subhas Chandra Bose, surrendered to the British after the collapse of **Germany**

30) Who was the first Indian to become a Member of the British Parliament? **Dadabhai Naoroji**

31) Where and when will 2008 Olympics be commenced? **Beijing, August 8**

32) where is the permanent Secretariat of SAARC? **Bangladesh**

33)Who invented Electric Fan? **Thomas Alva Edison**

34) Number of languages recognized in the Constitution of India is **18**

35) Superconductores are **diamagnetic**

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36) Boolean expression $\bar{x}\,yz + yz + xz$ can be reduced to **x+y**

37) A J – K flip – flop is in the toggle condition when ***J* =1, *K*=1**

38) Asynchronous counters are known as **ripple counters**

39) when used in a circuit, Zener diode is always **reverse biased**

40) The depletion region of semiconductor diode decreases during **forward bias**

41) When an input electrical signal A = 10100 is applied to a NOT gate, its output signal is **01011**

42) In a certain 2 – input logic gate, when A = 0, B= 0 then C = 1 and when A = 0, B = 1 then again C = 1. It must be a **NAND gate**

43) The value of total collector current in a CB circuit is $\mathbf{I_c = \alpha I_E}$

44) The clipping level is primarily determined by **shape of input waveform**

45) Which of the following is not a β-decay? **Internal conversion**

46) I barn = $\mathbf{10^{-28}\ m^2}$

47) Mesons and Baryons are **Leptons**

48) Nuclear species which have same atomic and mass numbers but different radioactive properties are called **nuclear isotopes**

49) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, then $\vec{\nabla} \times \vec{r} =$ **Zero**

50) If total torque acting on a system is zero then physical quantity which is conserved is **angular momentum**

51) The momentum of a particle of rest mass m_0 which moves with speed $\frac{C}{\sqrt{2}}$ is **m_0C^2**

52) $TV^{\gamma-1}$ = constant represent a **adiabatic process**

53) The relation connecting slope of an isothermal (S_i) and an adiabatic (S_α) is $\left[\text{if } \gamma = \frac{C_p}{C_v}\right]$ **$S_\alpha = \gamma S_i$**

54) Efficiency of a reversible Carnot engine depends on **temperatures of source and sink**

55) Which of the following is not a correct relation **$\vec{A} = \vec{\nabla} \times \vec{B}$**

56) When a matrix is diagonalised, the non-zero elements of the diagonalised matrix are **eigenvectors of the matrix**

57) Any vector field is uniquely determined if its divergence and curl sources are given. This is called **Helmholtz theorem**

58) Which of the following is a semiconductor **Germanium**

59) What is the nature of binding in CH_4 **Covalent**

60) The number of lattice points in a primitive cell is **1**

61) The nearest neighbor distance in the case of bcc structure is **$\frac{a\sqrt{3}}{2}$**

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62) The conduction number in simple cubic crystal structure is **6**

63) The number of atoms present in unit cell of *hcp* structure is **6**

64) The Poynthing vector $\vec{S}$ gives **energy/unit time/unit area**

65) Which of the following waves cannot occur in a waveguide? **TEM waves**

66) Which of the following is not true about Quantum mechanics? **Wave function specifies the complete physical state.**

67) In the single particle shell model, if l is orbital angular momentum of nucleon, then the energy separation between spin orbit pair is proportional to $\frac{2l+1}{2}$

68) The electron is moving with a speed 0.5C in a direction opposite to a moving photon with respect to electron is **C**

69) CMRR of an Op-Amp in 10^5 and $A_d = 10^5$, then A_c of Op-Amp is **1**

70) A square wave generator is called as **astable multivibrator**

71) In a class A amplifter with sinusoidal input signal, output current flows for **full cycle**

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72) In an RC coupled amplifter the reduction in voltage gain in the high frequency range is due to **coupling capacitor**

73) A multiplexer is also known as **Data selector**

74) The velocity of the electron in the 1st Bohr orbit is $\frac{1}{137}$

75) The selection rules for optical transition from vector atom model are **$\Delta L = \pm 1$, $\Delta J = \pm 1$, ($0 \rightarrow 0$ excluded) and $\Delta S = 0$**

76) In normal transverse Zeeman effect the lines on either side of original line are **plane polarized**

77) The half-life period of a radioactive element whose disintegration constant λ=0.00232/day is **300 days**

78) Optical theorem in scattering theory is given as $\frac{4\pi}{k} I_m f(0)$

79) Rutherford's differential cross-section **is independent of scattering angle**

80) The equation of motion for a simple pendulum is $\ddot{\theta} + \frac{g}{l} \sin\theta = 0$

81) The number of Bravais space lattices with two lattice points is **5**

82) The atomic diameter of an *f*cc crystal (lattice parameter α) is $\frac{a\sqrt{2}}{2}$

83) The number of lattice points in the rhombohedral unit cell is **1**

84) A cation vacancy and an anion vacancy in a crystal of type AB is called **Schottky defect**

85) The SI unit of electrical conductivity is **ohm-m^{-1}**

86) The magrietisation of a superconductor is **zero**

87) $L\{t_n\} = \frac{\Gamma(n+1)}{s^{n+1}}$

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88) When electromagnetic waves propagate through a conducting media, propagation constant k is **complex**

89) Displacement vector is defined by $\vec{D} - \varepsilon_0 \vec{E} = \vec{P}$

90) Consider a particle of mass m at temperature T which follows classtical Maxwell-Boltzmann statistics. The average speed (υ) is $\sqrt{\frac{8kT}{\pi m}}$

91) In Kepler's problem of planetary motion, the value of eccentricity ε and energy E for a parabolic orbit is **$\varepsilon = 1$, $E = 0$**

92) Nuclear fission provides **less energy than nuclear fusion**

93) The expression for $\nabla^2\phi = \frac{\partial^2\phi}{\partial r^2} + \frac{1}{r^2}\frac{\partial^2\phi}{\partial\theta^2} + \frac{\partial^2\phi}{\partial z^2} + \frac{1}{r}\frac{\partial^2\phi}{\partial r}$

94) If $\frac{\partial \vec{r}}{\partial u} = h_1 \hat{e}_1$; $\frac{\partial \vec{r}}{\partial v} = h_2 \hat{e}_2$; $\frac{\partial \vec{r}}{\partial w} = h_3 \hat{e}_3$ in an orthogonal curvilinear co-ordinate system, then $\left[\frac{\partial \vec{r}}{\partial u}\ \frac{\partial \vec{r}}{\partial v}\ \frac{\partial \vec{r}}{\partial w}\right] = h_1 h_2 h_3$

95) If P = $\frac{1}{2}$(A+Aψ), Q = $\frac{1}{2}$ (A-Aψ), where P,Q,A are square matrices, then **P is Hermitian,Q are not Hermitian**

96) The necessary and sufficient condition for a square matrix to be invertible is that it should be **Non-singular**

97) Residue of $f(z)$ at $z=\infty$ is $\lim_{z\to\infty}\{-Zf(z)\}$

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98) The Fourier sine transform of e^{-x} is $\frac{n}{1+n^2}$

99) An Op-Amp Schmitt trigger is basically **an Op-AMP comparator with positive feedback**

100) When m=o, the spherical harmonics y_{im} is essentially **constant**

Best of Luck

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thœ¤J¡fSl‹