A

21724 **120 MINUTES**

1. The eigen values of the matrix $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ are:

   A) (1,6) B) (5,6) C) (2, 6) D) (5, 1)

2. Which one of the following is the Rodrigue's formula

   A) $H_n(x) = e^{x^2}(-1)^n \frac{d^n}{dx^n}(e^{-x^2})$

   B) $H_n(x) = e^{2x^2}(-1)^n \frac{d^n}{dx^n}(e^{x^2})$

   C) $H_n(x) = e^{x^2}(-1)^n \frac{d^n}{dx^n}(e^{x^2})$

   D) $H_n(x) = e^{-x^2}(-1)^n \frac{d^n}{dx^n}(e^{2x^2})$

3. $J_{1/2}(x)$ can be written as:

   A) $\sqrt{\frac{2}{\pi x}}$ cosx B) $\sqrt{\frac{2}{\pi x}}$ 2sinx C) $\sqrt{\frac{2}{\pi x}}$ sinx D) $\sqrt{\frac{2}{\pi x}}$ 2cosx

4. Which one of the constraints are independent of time

   A) Holonomic B) Non holonomic
   C) Rheonomous D) Scleronomous

5. Lagrangian for compound pendulum is:

   A) $\frac{1}{2}\mathrm{I}\dot{\theta}^2 + \mathrm{mglcos}\theta$ B) $\frac{1}{2}\mathrm{I}\dot{\theta}^2 + \mathrm{mglsin}\theta$

   C) $\frac{1}{2}\mathrm{I}\theta + \mathrm{mglcos}\theta$ D) $\frac{1}{2}\mathrm{I}\dot{\theta}^2 + m^2\mathrm{glcos}\theta$

6. Find the velocity at which the mass of a particle is double its rest mass:

   A) $\frac{\sqrt{3}\mathrm{C}}{2}$ B) $\frac{\sqrt{3}\,\mathrm{C}}{2}$ C) $\frac{\sqrt{7}\mathrm{C}}{2}$ D) $\frac{\sqrt{7}\mathrm{C}}{2}$

7. What is the momentum of an electron of mass (m) , which has the same kinetic energy as its rest mass energy.

   A) $\sqrt{3mc}$ B) $\sqrt{\frac{3mc}{2}}$ C) $\frac{mc}{\sqrt{3}}$ D) $\sqrt{3}\,mc$

8. The Jacobi's form of least action principle is:

   A) $\Delta \int_{t_1}^{t_2} \sqrt{H - V(q)}\, d\rho = 0$ B) $\Delta \int_{t_1}^{t_2} \sqrt{H + V(q)}\, d\rho = 0$

   C) $\Delta \int_{t_1}^{t_2} \sqrt{H + V^2(q)}\, d\rho = 0$ D) $\Delta \int_{t_1}^{t_2} \sqrt{H - V^2(q)}\, d\rho = 0$

9. Write the Hamiltonian of a charged particle in an em field

A) $H = \frac{1}{2m}(\bar{p} + q\bar{A})^2 + q\emptyset$ B) $H = \frac{1}{2}(\bar{p} - q\bar{A})^2 + q\emptyset$

C) $H = \frac{1}{2m}(\bar{p} - q\bar{A})^2 + q\emptyset$ D) $H = \frac{1}{2m}(\bar{p} - q\bar{A})^2 + qp\emptyset$

10. What is the de-Broglie wavelength of a particle of KE, E?

A) $\lambda = \frac{h}{\sqrt{2m}}$ B) $\lambda = \frac{h}{\sqrt{2E}}$ C) $\lambda = \frac{h}{\sqrt{3mE}}$ D) $\lambda = \frac{h}{\sqrt{2mE}}$

11. The probability current density is given by the equation:

A) $\frac{ih}{2m}[\varphi\nabla\varphi^* - \varphi^*\nabla\varphi]$ B) $\frac{ih}{4m}[\varphi\nabla\varphi^* + \varphi^*\nabla\varphi]$

C) $\frac{ih}{2m}[\varphi^2\,\nabla\varphi^* - \varphi^*\nabla\varphi]$ D) $\frac{ih}{2}[\varphi\nabla\varphi^* - \varphi^*\nabla\varphi]$

12. The wave function of the ground state of hydrogen has the form

A) $\varphi = \frac{1}{\sqrt{\pi a^3}}e^{r/a}$ B) $\varphi = \frac{1}{\sqrt{\pi a^3}}e^{-r/a}$

C) $\varphi = \frac{1}{\sqrt{\pi a^2}}e^{-r/a}$ D) $\varphi = \frac{1}{\sqrt{\pi a}}\,e^{-r/a}$

13. The value of $[L^2, L_x]$ is given by:

A) L^2 B) 0 C) L_z D) ih

14. The energy eigen values of hydrogen atom are proportional to:

A) n^3 B) n C) $\frac{-1}{n^2}$ D) $\frac{1}{n^2}$

15. The maximum number of electrons in a subshell with orbital quantum number l is:

A) $(2l+1)$ B) $(2l-1)$ C) $2(2l+1)$ D) $2(2l-1)$

16. The energy of the lowest state in a one dimensional potential box of length a is:

A) Zero B) $\frac{2h^2}{8m^{\ 2}}$ C) $\frac{h^2}{8ma^2}$ D) $\frac{h}{8ma^2}$

17. The electric field due to an infinitely long charged cylinder at an Internal point r < R is:

A) $E = \frac{\lambda}{4\pi\epsilon_0 R^2}$ B) $E = \frac{\lambda}{4\pi\epsilon_0 R}$

C) $E = \frac{q^2}{4\pi\epsilon_0 R^2}$ D) $E = \frac{\lambda r}{4\pi\epsilon_0 R^2}$

18. The displacement current arises due to :

A) Electrons & Holes B) Time varying electric filed

C) Electrons D) Holes

19. Which one of the following Maxwell's equation implies the absence of magnetic monopoles?

A) $\nabla.\overline{E} = \frac{\rho}{\epsilon_0}$ B) $\nabla.\bar{B} = 0$ C) $\nabla \times \bar{E} = \frac{-\partial B}{\partial T}$ D) $\nabla.\bar{E} = \frac{\rho}{\epsilon_0}$

20. The direction of propagation of electromagnetic wave is given by:

A) $\bar{E} \times \bar{B}$ B) $\bar{E}.\bar{B}cos\theta$ C) $\bar{E}.\bar{A}$ D) $\bar{B}$

21. The multiplicity and S value of the state $2D_{3/2}$ is given by:

A) $(2, \frac{3}{2})$ B) $(2, \frac{1}{2})$ C) (2, 3) D) (1, 2)

22. A laser beam of wavelength 740nm has coherence time 4×10^{-5} sec. What is its coherence length ?

A) 13 km B) 12 km C) 10 km D) 11.36 km

23. Which of the following is an example of mirror nuclei?

A) $(1H^3, 2He^3)$ B) $(3Li^7, 4Be^7)$

C) $(6C^{13}, 7N^{13})$ D) All the above

24. Nuclear fission energy per nucleon of U^{235} nuclide is nearly:

A) 8.5MeV B) 0.085MeV C) 85MeV D) 0.85MeV

25. The hyper charge 'Y' is define as the sum of the:

A) Baryon and neutrino number

B) Baryon and meson number

C) Baryon and strangeness number

D) Baryon and spin quantum number

26. The co-ordination number of face centered cubic structure is:

A) 12 B) 8 C) 9 D) 6

27. Transition temperature T_c and critical field H_C for a super conductor are related as:

A) $H_C = H_0\left[1 + \left(\frac{T}{T_c}\right)^2\right]$ B) $H_C = H_0\left[1 - \left(\frac{T}{T_c}\right)^{1/2}\right]$

C) $H_C = H_0\left[1 - \left(\frac{T_C}{T}\right)^2\right]$ D) $H_C = H_0\left[1 - \left(\frac{T}{T_c}\right)^2\right]$

28. The input and output signals of a common –emitter amplifier are in:

A) In phase B) Always equal

C) Always negative D) Out of phase

29. Which of the following ensemble is a collection of independent assemblies having the same temperature T, Volume V and the chemical potential μ is :-

A) Micro canonical ensemble B) Grand canonical ensemble

C) Canonical ensemble D) None of the above

30. The process of interfacing memories to microprocessor and allocating addresses to each memory locations is called:

A) Memory access time B) Bus idle cycle

C) Memory mapping D) Implied addressing

31. The G P Thomson experiment confirmed:

A) Very light mass of electrons B) Wave nature of electrons

C) Hall effect D) Particle nature of electrons

32. Under what condition is the Born approximation valid?
A) Strong magnetic field at low energies
B) Weak potentials at high energies
C) Weak potentials at low energies
D) Strong potentials at high energies

33. An element $_{90}\mathbf{A}^{232}$ under goes an alpha, beta, beta, alpha decay radiative disintegration. The atomic and mass number of the final element formed will be :
A) 88, 228 B) 90, 228 C) 89, 228 D) 88, 224

34. Boron has two isotopes $_5B^{10}$ and $_5B^{11}$. If the atomic weight of Boron is 10.81, the ratio of number of $_5B^{10}$ to $_5B^{11}$ atoms in nature is:
A) 20/53 B) 15/16 C) 19/81 D) 10/11

35. Particles and antiparticles have identical masses and lifetimes. This is the implication of:
A) CPT invariance
B) CP symmetry
C) Charge conjugation and Parity
D) Charge conjugation and time reversal

36. Out of the following which has negative charge?
A) Top quarks B) Bottom quarks
C) Charm D) None of the above

37. After 2 hours $1/16^{th}$ of the initial amount of a certain radioactive isotope remain un-decayed. The half-life of the isotope is:
A) 15 minutes B) 45 minutes C) 30 minutes D) 60 minutes

38. Isospin symmetry, is a flavour symmetry of the strong interactions between:
A) up and down quarks B) up and top quarks
C) up and bottom quarks D) None of the above

39. A structure with sharp diffraction peaks, but without lattice periodicity is called:
A) Amorphous crystal B) Liquid -crystal
C) Quasi crystal D) Top quarks

40. In liquid crystal systems, when the chiral pitch is of the same order as the wavelength of visible light the liquid crystal exhibits:
A) Blue phases B) Bragg reflection
C) Discotic phases D) Conic phases

41. An example of a 1-dimensional defect in a crystal is:
A) Interstitials B) Voids
C) Stacking fault D) Dislocations

42. A liquid which can flow without loss of kinetic energy is exhibiting:
A) Super conductivity B) Bose-Einstein Condensation
C) Super fluidity D) Disordered state

43. In precision metrology, the Josephson effect provides an exactly reproducible conversion between:
A) Frequency and voltage
B) Frequency and current
C) Frequency and magnetic flux
D) Current and voltage

44. BCS theory can explain superconductivity exhibited by:
A) Type I superconductors B) NbTi
C) Type II superconductors D) All of the above

45. Divergent susceptibility is a characteristic of ------ phase transitions.
A) Second order B) First order
C) First and second order D) Intermittent

46. For Bessel's function of the first kind $\mathbf{x\ J_{n-1}\ (x) + x\ J_{n+1}\ (x) =}$
A) $2n\,J_n(x)$ B) $x\,J_n(x)$ C) $n\,J_n(x)$ D) 0

47. In the Kronig-Penny model, there are certain values of *Energy* for which there are no eigenfunctions of the Schrödinger equation, these values constitute the
A) Brillouin zone B) Band gap
C) Pseudo potential D) None of the above

48. The fraction of electrons that contribute to specific heat follow:
A) Bose – Einstein Statistics B) Maxwell Boltzmann statistics
C) Farmi-Dirac statistics D) Pauli exclusion principle

49. The directions in which scattering from a crystal can have non-zero intensity is given by:
A) The structure factor B) The reciprocal lattices
C) The miller indices D) None of the above

50. The basis vectors of a real BCC lattice and the reciprocal lattice of an FCC resemble each other:
A) In both direction and magnitude
B) In magnitude but not in direction
C) In direction but not in magnitude
D) Neither direction or magnitude

51. The Bravais lattice of------- system have $a = b \neq c$ and $\alpha = \beta = \gamma = 90^0$
A) Hexagonal B) Tetragonal
C) Trigonal D) Pentagonal

52. Time-dependent perturbation theory explains the effect of :
A) A time-dependent perturbation applied to a time-independent Hamiltonian
B) A time-independent perturbation applied to a time-independent Hamiltonian
C) A time-dependent perturbation applied to a time-dependent Hamiltonian
D) A time-independent perturbation applied to a time-dependent Hamiltonian

53. The theory that fails to explain collective phenomenon like solitons and cooper pairs is:
A) WKB approximation B) Variation method
C) Perturbation D) All of the above

54. Experiment demonstrating the observation of a single, eigenvalue of an initially unknown physical property is:
A) Crompton effect B) Double slit experiment
C) Stern-Gerlach experiment D) Photo-electric effect

55. An atom in an excited state temporarily stores energy. If the lifetime of this excited state is measured to be $1x\ 10^{-10}$ seconds, what is the minimum uncertainty in the energy of the state in eV? Use $h= 6.63 \times 10^{-34}$ Js and $\pi = 3.14$
A) 1.3×10^{-6} B) 3.3×10^{-8} C) 1.3×10^{-8} D) 3.3×10^{-6}

56. Moment of inertia of a circular wire of mass M and radius R about its diameter is:
A) $\frac{1}{2}MR^2$ B) $2MR^2$ C) $\frac{1}{4}MR^2$ D) MR^2

57. Young's Double-slit interference experiment with light established that light is:
A) A particle
B) A wave
C) Capable of both particle and wave nature
D) None of the above

58. Maxwell's classical view of electromagnetic wave is unable to explain:
A) Blackbody radiation B) Photoelectric effect
C) Both A and B D) Neither A nor B

59. The fields associated with retarded potential travel at a speed :
A) Equal to speed of light B) Two times speed of light
C) Half speed of light D) Four times speed of light

60. A diploe having a 3 cm length is operated at 1 Ghz. The radiation resistance is:
A) 7.89 Ω B) 2.49 Ω C) 1.00 Ω D) 3.49 Ω

61. The polarization current in a material is the result of
A) Spin motion of electrons
B) Orbital motion of electrons
C) Spin and orbital motion of electrons
D) None of the above

62. In a rectangular hollow wave guide, the following cannot occur:
A) TE wave B) TEM wave C) TM wave D) H wave

63. How will the potential be inside an enclosure completely surrounded by a conducting material with no charge inside the enclosure?
A) Uniform B) Non-uniform
C) Constant D) None of the above

64. The energy of an ideal dipole in an electric field E is given by;
A) $U = -p.E$ B) $U = p.E$ C) $U = -\nabla E$ D) $U = .\nabla E$

65. How many azimuthal quantum numbers will a state with the principal quantum number n=4 showing Stark effect exhibit:
A) 8 B) 17 C) 9 D) 16

66. The spectrum of He in the visible region has how many absorption lines?
A) 4 B) 8 C) 12 D) 16

67. Normal Zeeman effect is observed when a magnetic field of 2 Weber/m^2 on a material with specific charge of 3.52 x 10^{11}coloumbs/Kg. If the observed wavelength is 10000 Å what will be the separation between the lines?
A) 0.0319 Å B) 0.0373 Å C) 0.0352 Å D) 0.0475 Å

68. A system is composed of two level atoms, the excited state being 0.5 eV above the ground state. The fraction of all atoms which will be in excited state if system is in thermal equilibrium at 300 K will be:
A) 7.8 % B) 8.4 % C) 9.8 % D) 3.9 %

69. The frequency of the first line of Balmer series in hydrogen atom is f_0 Hz. Then the frequency of the line emitted by a single ionized helium atom will be:
A) 4 f_0 B) 14 f_0 C) 24 f_0 D) 34 f_0

70. The value of "Lande-g-factor" for pure orbital motion is:
A) Zero B) Infinite C) Unity D) Two

71. According to Born-oppenheimer approximation fine structure in the electronic transitions is due to:
A) Translational changes B) Vibrational and rotational changes
C) Vibrational changes D) Rotational changes

72. The lowest energy term for Ru ($4d^7 5s$)
A) $^5F_{3/2}$ B) $^5F_5$ C) $^7F_{1/2}$ D) $^7F_5$

73. What type of Raman line is produced as a result of non-symmetric vibration?
A) Depolarized B) Partially Polarized
C) Polarized D) None of the above

74. Baryon numbers for Baryons and Antibaryons has values:
A) $-1, +1$ B) $+1, +1$ C) $+1, -1$ D) $-1, -1$

75. Spin of photo in units of ($h/2\pi$) is:
A) $\frac{1}{2}$ B) 0 C) 1 D) None of these

76. The third component of isospin of a nucleus with atomic number Z and total number of Neutron N is:
A) $(N - Z)/2$ B) $(Z - N)/2$ C) $(N + Z)/2$ D) None of these

77. The Fourier transform of $e^{-|t|}$

A) $\sqrt{\frac{2}{\pi}} \times \left(\frac{1}{1+\omega^2}\right)$ B) $\sqrt{\frac{\pi}{2}} \times \left(\frac{1}{1+\omega^2}\right)$

C) $\sqrt{\frac{2}{\pi}} \times \left(\frac{1}{1-\omega^2}\right)$ D) $\sqrt{\frac{\pi}{2}} \times \left(\frac{1}{1-\omega^2}\right)$

78. $\frac{1}{2\pi i}\oint_C \frac{e^{3z}}{z^2+1} dz = .$

A) Cos 3 B) Sin 3 C) Tan 3 D) 0

79. The residue at infinity for $f(z) = \frac{z}{(z-a)(z-b)}$ is

A) 1 B) 0 C) 1/2 D) -1

80. The coefficient of x^2 in the Taylor series about x = 0 for $f(x) = e^{-x^2}$

A) $\frac{1}{4}$ B) - 1 C) - 2 D) 1

81. The scientific parameter that describes the reproducibility of a measurement is:

A) Resolution B) Sensitivity C) Precision D) Accuracy

82. In a microprocessor the interrupt with highest priority is :

A) RST 7.5 B) INTR C) TRAP D) RST 5.5

83. The following modulus counters can be constructed using four flip-flops:

A) 2, 8, 16, 32 B) 8, 16, 24, 32

C) 2, 3, 9, 16 D) 4, 8, 12, 16, 20

84. ------ is used to momentarily store binary information at the output of an encoding matrix

A) Registers B) A/D convertor

C) Flip flops D) D/A convertor

85. The ideal value of common mode rejection ratio for an op amp is

A) Unity B) Zero C) Infinity D) Not defined

86. In the construction of a LED, regarding the thickness of the layers which is correct?

A) Thickness of p-layer = Thickness of n layer

B) Thickness of p-layer > Thickness of n layer

C) Thickness of p-layer < Thickness of n layer

D) No condition for thickness

87. For a PIN photo detector the maximum absorption of light takes place in the

A) P region B) I region

C) N region D) Equal in all three layers

88. For a single junction solar cell the theoretical efficiency limit under AM 1.5 solar spectrum is:
A) 33.7 % B) 30.3 % C) 66.3 % D) 69.7 %

89. A single stage transistor amplifier with collector load R_C and emitter resistance R_E has a d.c. load of
A) R_C B) $R_C + R_E$ C) $R_C \parallel R_E$ D) $R_C - R_E$

90. CC configuration is used for impedance matching because its
A) Out impedance is very high B) Input impedance is low
C) Out impedance is very low D) Input impedance is very high

91. The purpose of a coupling capacitor in a transistor amplifier is to
A) Increase output impedance B) Protect the transistor
C) Provide bias voltage D) Pass AC and block DC

92. In a Wien-bridge oscillator, if the resistances in the positive feedback circuit are decreased, the frequency------.
A) Decreases B) Increases
C) Remains the same D) Can not predict

93. In the breakdown region, a Zener diode behaves like a -------source.
A) Ideal current B) Constant current
C) Constant voltage D) Constant resistanace

94. The constant-current region of a JFET lies between:
A) Cut off the saturation B) Pinch off and break down
C) Cut off and pinch off D) None of the above

95. 1 db corresponds to ------change in power level.
A) 50 % B) 35 % C) 26 % D) 22 %

96. The difference between fermions and bosons is that bosons' wave function is -----.
A) Differentiable B) Continuous
C) Single valued D) Symmetric

97. The sun emits maximum radiation of 0.52 micron meter. Assuming the sun to be a black body, calculate the emissive ability of the sun's surface at that temperature
A) $5.47 * 10^7$ W/m^2 B) $6.47 * 10^7$ W/m^2
C) $4.47 * 10^7$ W/m^2 D) $3.47 * 10^7$ W/m^2

98. The Fermi energy of a material is 3.45 eV. What is the zero-point energy of the material?
A) 1.02 eV B) 3.45 eV C) 2.07 eV D) 4.16 eV

99. Bose-Einstein statistics can be applied to -------.
A) Electrons B) Fermions C) Protons D) Photons

100. Which one of the following thermodynamic quantities is not a state function?
A) Gibbs free energy B) Work
C) Enthalpy D) Entropy

101. For a micro-canonical ensemble the phase density inside a small energy interval remains constant and outside such a region it is:
A) Same as inside
B) Zero
C) We cannot predict about energy outside
D) Depends on outside condition

102. Phase space is a ------ dimensional space.
A) 6 B) 3 C) 2 D) 5

103. A system suffers an increase in internal energy of 80 J and at the same time has 50 J of work done on it. What is the heat change of the system?
A) - 30J B) +130 J C) + 30 J D) - 130 J

104. A piston cylinder contains air at 600 kPa, 290 K and a volume of 0.01m^3. A constant pressure process gives 54 kJ of work out. Find the final volume of the air.
A) 0.05 m^3 B) 0.15 m^3 C) 0.01 m^3 D) 0.1 m^3

105. The Eigen value of a particle in a box of length L is ------.
A) $\sqrt{\frac{L}{2}}$ B) $\frac{2}{L}$ C) $\sqrt{\frac{2}{L}}$ D) $\frac{L}{2}$

106. A scattered wave can be considered to be a plane wave only when:
A) The scattering potential is much smaller than the particles incident kinetic energy
B) The scattering potential is larger than the particles incident kinetic energy
C) The scattering potential is equal to than the particles incident kinetic energy
D) None of the above

107. If A, B, and C represent the Pauli spin matrices then the commutator of C and A will be:
A) 2 iB B) 2C C) 2 iA D) 0

108. According to Fermi's golden rule the probability that an excited state will decay depends on the
A) Energy of excited states B) Energy of ground state
C) Density of states D) None of the above

109. Which of the following expression is correct if at t = 0, object is at origin and velocity is $v_0 = i + j$
A) $r = i(2.5t^2 + t) + j(t-1.5t^2)$ B) $r = i(2.5t^2 - t) + j(t+1.5t^2)$
C) $r = it-jt^2$ D) $r = i(t^2+t) + j(t-t^2)$

110. During inelastic collision between two bodies, which of the following quantities always remain conserved?

A) Speed of each body B) Total kinetic energy
C) Total mechanical energy D) Total linear momentum

111. The solution to the given system of equations $2X_1-9X_2=15$ and $3X_1 + 6X_2 = 16$ is:

A) $X_1 = 6, X_2 = -(1/3)$ B) $X_1 = 4, X_2 = -(1/3)$

C) $X_1 = -6, X_2 = (1/3)$ D) $X_1 = -4, X_2 = -(1/3)$

112. Rank of the matrix $\begin{bmatrix} 0 & -7 & 8 \\ 7 & 8 & -1 \\ -8 & 1 & 0 \end{bmatrix}$ is:

A) 3 B) 1 C) 2 D) 0

113. If the population mean of number of fish caught per trip to a particular fishing hole is 3.2 and the population standard deviation is 1.8, what are the mean and standard deviation of the sampling distribution for samples of size 36 trips respectively?

A) 1.8, 11.25 B) 3.2, 0.3 C) 1.8, 0.53 D) 3.2, 0.9

114. The angular momentum of a rigid body rotating about an axis passing through the origin of the local reference frame is the product of the.

A) Moment of inertia and velocity
B) Momentum and velocity
C) Inertia tensor of the object and the linear velocity
D) Inertia tensor of the object and the angular velocity

115. The mean = np and the standard deviation = $\sqrt{npq}$ for:

A) For all probability distributions
B) Normal distribution
C) Binomial distribution
D) Poissson distribution

116. The explanation for as to why a pendulum swings backwards when the car from whose ceiling it hangs accelerates forwards is explained by:

A) Pseudo force B) Special Theory of relativity
C) Genera theory of relativity D) Coriolis force

117. Action angle variables are generated by transformations using

A) Recursive generations B) Non-recursive generations
C) Time-independent generating function
D) Time dependent generating function

118. What is the value of Legendre polynomial $P_{2n+1}(0)$?

A) $2/(2n+1)$ B) 1 C) 0 D) None of these

119. $\int_0^{\infty} \frac{1}{\left(1+x^4\right)} dx =$

A) $\sqrt{3}\pi / 6$ B) $\sqrt{3}\pi / 4$ C) $\sqrt{2}\pi / 4$ D) $\sqrt{2}\pi / 6$

120. If m is an integer less than n then $\int_{-1}^{1} x^m P_n(x) dx =$

A) 1 B) 2 C) $\frac{1}{2^n}$ D) 0
