Whitehouse Education Zone

Model Test 1

1. The moment of inertia of a disc of mass M and radius about an axis, which is tangential to the circumfetence of the disc and parallel to its diameter is
   a. $\frac{5}{4} MR^2$　　　b. $\frac{2}{3} MR^2$　　　c. $\frac{3}{2} MR^2$　　　d. $\frac{4}{5} MR^2$

2. Find the torque about the origin when a force of 3J N acts on a particle whose position vector is 2K m
   a. 6l N-m　　　b. 6j N-m　　　c. -6l N-m　　　d. 6k N-m

3. Find the moment of inertial of a solid sphere about a tangent to the sphere, where mass of sphere is M and Radius is R.
   a. 5/3 MR^2　　　b. 7/5 MR^2　　　c. 3/5 MR^2　　　d. 2/7 MR^2

4. The ratio of the radio of gyration of a circular disc about a tangentail axis in theplane of the disc and of a circular ring of the same radius about a tangible axis in the plane of the ring is
   a. $1 : \sqrt{2}$　　　b. $\sqrt{5} : \sqrt{6}$　　　c. $\sqrt{2} : \sqrt{3}$　　　d. $\sqrt{2} : 1$

5. From a disc of radius R and mass M, a circular hole of diameter R, whose rim passes through the centre is cut. What is the moment of inertia of the remaining part of the disc about a perpendicular axis, passing through the centre ?
   a. 11 MR^2/32　　　b. 9 MR^2/32　　　c. 15 MR^2/32　　　d. 13 MR^2/32

6. Two circular discs of same mass and thickness are made from metals having densities d, and d_2 respectively. The ratio of their moment of inetia about the central axis will be
   a. $d_1:d_2$　　　b. $d_2:d_1$　　　c. $d_1d_2:1$　　d. $1:d_1d_2$

7. A wheel of moment of inertia 5×10^3 kg m^2 is making 20 rev/sec. The torque required to stop it in 10 sec is
   a. $2\pi \times 10^{-2}$ N-m　　　b. $\pi \times 10^{-2}$ N-m　　c. $2\pi \times 10^2$N-m　　　d. $4\pi \times 10^2$N-m

8. A thin hollow cylinder open at both ends,
   i. Slides without rotating
   ii. rolls without sliping with the same speed.
   The ratio of K.E in the two cases is :
   a. 1:1　　　b. 2:1　　　c. 4:1　　　d. 1:2

9. A solid sphere of mass M is rolling on a horizontal surface without sliding with velocity v. Its kinetic energy will be
   a. $\frac{1}{2} mv^2$　b. $\frac{7}{5} mv^2$　　　c. $\frac{7}{10} mv^2$　　　d. $\frac{1}{5} mv^2$

10. A solid sphere of mass M is rotating about its diameter and linear velocity of a point on its equator is v. Then its kinetic energy will be
    a. $\frac{1}{2} mv^2$　b. $\frac{7}{5} mv^2$　　　c. $\frac{7}{10} mv^2$　　　d. $\frac{1}{5}$ mv+2+

11. A body rolling without sliding has its rotational kinetic energy equal to 40% of total energy. Then body should be
    a. Circular disc　　　b. Hollow sphere
    c. Solid sphere　　　d. Hollow cylinder

12. A solid spherical ball rolls on a table. Ratio of rotational. K.E to the total K.E is
    a. $\frac{2}{7}$　　　b. $\frac{5}{7}$　　　c. $\frac{1}{2}$　　　d. $\frac{7}{10}$

13. A ring of radius r and mass m rotates about its axis passing through its centre and perpendicular to its plane with angular velocity ∞. its kinetic energy is :
    a. mr^2∞　b. $\frac{1}{4}$ mr^2∞^{2}　　　c. mr^2∞^{2}　　　d. $\frac{1}{2}$ mr^2∞^{2}

14. A spherical ball rolls on a table without slipping, then the fraction of its total energy associated with rotation is :
    a. $\frac{2}{5}$　　　b. $\frac{2}{7}$　　　c. $\frac{3}{5}$　　　d. $\frac{5}{7}$

15. A thin uniform circular ring is rolling down an inclined plane of inclination 30° without slipping. Its linear acceleration along the inclined plane will be.
    a. $\frac{g}{2}$　　　b. $\frac{g}{3}$　　　c. $\frac{g}{4}$　　　d. $\frac{2g}{3}$

16. Two bodies of moment of inertia l_2 and l_2 ($l_1>l_2$) have equal angular momentam. If E_1, E_2 are their kinetic energies of rotation, then
    a. $E_1 > E_2$　　　b. $E_1 = E_2$　　　c. $E_1 < E_2$　　　d. cannot be said

17. The ratio of the radii of gyration of a circular disc to that of circular ring, each of same mass and radius, around their respective axes is
    a. $\sqrt{2} : 1$　　　b. $\sqrt{2} : \sqrt{3}$　　　c. $\sqrt{3} : \sqrt{2}$　　　d. $1 : \sqrt{2}$

18. A particle performs uniform circular motion with an angular moment L . If the frequency of particle's motion is doubled and its kinetic energy is halved, the angular momentum becomes :
    a. 2L　　　b. 4L　　　c. L/2　　　d. L/4

19. A constant torque acting on a uniform circular wheel changes its angular momentum from J_0 to $4J_0$ in 4 seconds. The magnitude of the torque is :
    a. $\frac{3}{4} J_0$　　　b. $4J_0$　　　c. J_0　　　d. $12J_0$

20. The moment of inertia of a thin rod of mass mass M, length L, about an axis passing through a point $\frac{L}{4}$ from one end and perpendicular to length is
    a. $\frac{7}{48} MR^2$　　　b. $\frac{ML^2}{3}$　　　c. $\frac{ML^2}{12}$　　　d. $\frac{31}{48} MR^2$

21. The M.I of a solid cylinder of length I radius R about its geometrical axis is same as about equatorial axis, then the ratio of R and I will be
    a. $\frac{1}{\sqrt{3}}$　　　b. $\frac{1}{2}$　　　c. 3　　　d. $\sqrt{3}$

22. A uniform metallic disc of moment of inertia I_0 about its own axis is melted and a uniform ring of equal radius is then casted from it. Then M.I of the ring about its diameter will be
    a. $2l_0$　　　b. I_0　　　c. $\frac{2l_0}{2}$　　　d. $\frac{l_0}{4}$

23. A uniform metallic disc has its M.I l_0 about an axis through its rim perpendicular to the plane be

    a. $2l_0$ b. l_0 c. $\frac{l_0}{2}$ d. $\frac{l_0}{4}$

24. A uniform metallic disc has its M.I l_0 about its diameter. Then its M.I about an axis through its rim perpendicular to the plane will be

    a. $4l_0$ b. $\frac{3}{2}l_0$ c. $6l_0$ d. $\frac{5}{4}l_0$

25. Two point masses of 1 kg and 2 kg seprated by 0.5 m constitute a system. The distance of the centre of mass of the system from 1 kg mass is :

    a. 0.15 m   b. 0.25 m   c. 0.33 m   d. 0.4 m

26. A circular body of mass 2 kg of radius 1 m then of inertia about diameter is :

    a. 0.5 kg m^2 b. 4 kg m^2 c. 4 kg m^2 d. 1 kg m^2

27. Moment of inertia doesn't depend upon

    a. Mass   b. Distrbution of mass   c. Radius   d. Angular velovity

28. If 'M' and 'r' are respectively the mass of electrons and radius of the orbit in which the electron revolves about the aucleus, the moment of inertia of electrons will be :

    a. Mr^2 b. $\left(\frac{1}{2}\right) Mr^2$ c. $\left(\frac{2}{5}\right) Mr^2$ d. $\left(\frac{2}{3}\right) Mr^2$

29. When a body rolls downs an inclined plane. The total potential energy of the body changes into :

    a. Rotational K.E   b. Translational K.E   c. Both rotational and translastional K.E   d. None

30. If non internal force is applied in a body the velocity of the centre of mass :

    a. Zero   b. increases   c. Decreases   d. Remains contant

31. The product of moment of inertia and angular acceleration gives,

    a. Linear momentum   b. Angular momentum

    c. Torque   d. Force

32. A cylinder has mass 'M' a length 'l' and radius 'R' then M.I about own axis is :

    a. MR^2 b. $\frac{MR^2}{2}$ c. $\frac{MR^2}{4}$ d. $\left(\frac{R^2}{4} \quad \frac{l^2}{12}\right)$

33. Two bodies of masses m1 and m2 move in circles of radii r_1 and r_2 respectively. if they complete the circles in equal time the ratio of their angular speed $\frac{\infty_1}{\infty_2}$ is

    a. m_3/m_2 b. r_3/r_2 c. m_1r_3/m_3r_2 d. 1

34. A uniform heavy disc is rotating with a constant angular velocity about a vertical axis through its center, Some wax is dropped gently on the disc near to the edge. The angular velocity of the disc.

    a. Decreases   b. Becomes Zero   c. increase   d. Does not change

35. A uniform metal disc of radius R lies in XY - plane and rotates with uniform angular velocity ∞ about the Z - axis, the total induced EMF between the center and the rim of the disc is equal to :

    a. ∞BR b. $\frac{1}{2} \infty BR$ c. $\frac{1}{2} \infty BR^2$ d. $\frac{1}{2} \infty B^2 R$

36. Two masses of 1 kg and 2 kg are 9 m a part and make two body system. Their centre of mass from 1 kg mass will be at

    a. 6 m   b. 4 m   c. 3 m   d. 2 m

37. A uniform disc is rotating at a constant speed about a vertical axis through its centre. Some wax is gently dropped on the disc, the angular velocity of the disc

    a. doesn't change   b. increases   c. decreases   d. becomes zero

38. A circular disc of mass m and radius r is rotating about its axis with uniform speed of v. What is its kinetic energy ?

    a. mv^2 b. $\frac{1}{2} mv^2$ c. $\frac{1}{4} mv^2$ d. $\frac{1}{8} mv^2$

39. When the size of the earth is reduced to half, mass ramaining same, the time period of the earth rotation will be :

    a. 6 hours   b. 24 hours   c. 12 hours   d. 48 hours

40. A rotating disc has .... kinetic energy, if mass is M & velocity is V

    a. MV^2 b. $1/2 \, MV^2$ c. $3/4 \, MV^2$ d. $MV^2/4$

41. A fly wheel of mass 10 kg and radius 50 cm is rotating with constant angular speed of ∞ with its kinetic energy 20 Joule, The angular speed of flywheel is

    a. 4 rad/s   b. 2 rad/s   c. 10 rad/s   d. 4 rad/s

42. The body applied with constant torque changes the angular momentum l_0 to final angular momentum $4l_0$ in 3 sec.

    a. $3l_0$ b. l_0 c. $4l_0$ d. $2l_0$

43. Kinetic energy of a body is given by $1/2 \, mv^2$. Which one of the following expressions is correct for the kinetic energy of the rigid body where i and ∞ represents the moment of intertia and angular velocity of the rigid body ?

    a. $(1/2) \, l \infty^2$ b. $(1/2) \, l^2 \infty$ c. $(1/2) \, (I \infty)^2$ d. $(1/2)(l \infty)^2$

44. If a body starts from rest with angular acceleration $\propto = 6 \, t^2$. What is time taken to complete 10 revolution ?

    a. 0   b. 2.14   c. 2.8   d. 3.6

45. If there is a change of angular momentum from 2 J to 4 J in 4 sec . Then the torque is

    a. 0.25 J   b. 0.5 J   c. 1 J   d. 2 J

46. When torque acting upon a system is zero. Which of the following will be constant ?

    a. Force   b. Lineat momentum   c. Angular momentum   d. Linear impulse

47. A shell at rest explodes. The centre of mass of the fragments

    a. Moves along the parabolic path   b. Moves along the straight line

    c. Move along an elliptical path   d. remains at rest

48. The moment of inertia of a disc of mass M and radius R about and axis which is tangent to the circumference of the disc and parellel to its diameter is :

    a. $\frac{5}{4} MR^2$ b. $\frac{3}{2} MR^2$ c. $\frac{4}{5} MR^2$ d. $\frac{2}{3} MR^2$

49. A particle of mass m and radius of gyration k is rotating with and angular acceleration $\propto$ The torque acting on it is

    a. $mk^2 \propto$ b. $mk^2/\propto$ c. $m\propto/k^2$ d. $1/4 \, mk^2 \propto^2$

50. The ratio of the angular speeds of minute based and hour hand of a clock is
    a. 60:1　　　b. 36:1　　　c. 24:1　　　d. 12:1
51. The centre of gravity of a body
    a. Lies always outside the body
    b. May lie whether outside or on the surface the body
    c. Lies inside the body
    d. Lies on the surface of the body
52. Radius of Gyration of and uniform rod about and axis through its middle is
    a. $L/(3)^{1/2}$　　　b. $L/(8)^{1/2}$　　　c. $L/(12)^{1/2}$　　　d. $Ll(2)^{1/2}$
53. Let l_1 and l_2 be the moments of inertia of two bodies of identical geometrical shape, the first made of almunuim and the second of iron
    a. $l_1 < l_2$　b. $l_1 = l_1$　　　c. $l_1 > l_1$　　　d. information is insufficient to derive the relation between l_1 and l_2
54. Three point masses each of mass m are placed at the corners of an equilateral triangle of side l. Then moment of inertia of system about an axis along one side of the triangle is
    a. $3ml^2$　　　b. ml^2　　　c. $3/4\ ml^2$　　　d. $3/2\ ml^2$
55. When an explosive shell travelling in a parabolic path under the effect of gravity explodes, the centre of mass of the fragments will move
    a. Vertically upwards and then verically down wards
    b. Horizontally and then follow the parabolic path
    c. along the original paranolic path
    d. along a hyperbolic path
56. Radio of the angular velocity of the earth about its axis and the hour hand of a clock is
    a. 12:11　b. 11:12　c. 1:2　　　d. 2:1
57. If the radius of the earth's orbit is made one fourth the duration of year will become
    a. 1/2 times　　　b. 1/4 times　　　c. 1/8 times　　　d. 1/16 times
58. The moment of inertia of a circular ring of mass M and radius R about its diameter is
    a. MR^2　　　b. $\frac{MR^2}{2}$　　　c. $\frac{2}{3}MR^2$　　　d. $\frac{3}{2}MR^2$
59. Major constituent of Marsh gas is
    a. C_2H_2　　　b. CH_4　　　c. H_2S　　　d. CO
60. A compound on ozonolysis forms two molecules of HCHO, the compound is
    a. C_2H_4　　　b. C_2H_2　　　c. C_2H_0　　　d. C_0H_0
61. Alkanes are represented by genral formula.
    a. C_nH_{2n}　　　b. C_nH_{2n+2}　　　c. C_nH_{2n-l}　　　d. C_nH_{n+1}
62. The no. of isomer of C_6H_{14}
    a. 6　　　b. 7　　　c. 5　　　d. 4
63. Propane on strong heating will yield
    a. 2 molecules of CH_4　　　b. Ethane and methane
    c. Methane and etheane　　d. Methane and ethene
64. .... is obtained when ethyl chloride is heard in presence of alcoholic
    a. Butane　　　b. Ethyne　　　c. Aeetylene　　　d. Ethylene

65. Soda lime is used extensively in decarnoxylaties reaction to obtain alkanes. Soda lime is
    a. NaOH　　　b. naOH and Cao　c. CaO　　　d. $Na_2CO_{3\backslash}$
66. Which one of the following cannot be prepared by wurts reaction ?
    a. C_2H_o　　　b. CH_4　　　c. C_3H_5　　　d. C_4H_{10}
67. Methyl bromide when heated with zinc is closed tube produces
    a. Methane　　　b. Ethane　　　c. Ethylene　　　d. Methanol
68. Wurtz reation using bromoetheane yields
    a. 2- bromobutane　　　b. n-butane　　　c. i3o-butane　　　d. ethane
69. Successive alkanes differ by
    a. CH_2　　　b. CH_4　　　c. CH_5　　　d. C_2H_3
70. The shape of methane molecule is
    a. Linear　　　b. trigonal planar　c. square planar　　d. tetrahedral
71. Pure methane can be produced by
    a. Wurtz reation　b. Kilbe's electrolytic method
    c. Soda - lime decarboxylation　　　d. Reduction with H_2
72. Both methane and ethane may be obtained in one step reation from
    a. C_2H_4　　　b. CH_3l　　　c. $CH_3\ OH$　　　d. C_2H_5OH
73. During the preparation of ethane by Kolbe's electrolytic method using inert electrodes the PH of the electrolyle
    a. increases progressively as the reaction proceeds
    b. decreases progressively as the reation Procceds
    c. remains constant throughout the reaction
    d. May decrease if the concentration ofthe electrolyte is not very high
74. Which of the following methods is most appropriate for the manufacture of methane ?
    b. Kolbe's electrolytic method　　　c. soda - lime decarboxylation
    d. Reduction with H_2
75. Both mathane and ethane may be obtained in on step reaction from
    a. C_2H_4　　　b. CH_3l　　　c. CH_3OH　　　d. C_2H_5OH
76. During the preparation of ethane by Kolbe's electrolytic method using inert electrodes the PH of the electrolyte
    a. increase progressively as the reaction proseeds
    b. decreases progressively as the reation proceeds
    c. remains constant throughout the reaction
    d. may decrease of the concentration of the electrolyte is not very high
77. Which of the following method is most appropriate for the manufacture of methane ?
    a. By reduction of CH_2Cl_2　　　b. Wurts reation
    c. Liquefaction of naturalgas　　　d. None of the above
78. Which of the following liberates methane gas on teatment with water ?
    a. Silicon carbide　　　b. Calcium carbide
    c. Aluminium carbide　　　d. Iiron carbide
79. Wurts reaction using bromoethane yield
    a. 2-bromobutane　　　b. η- butane　　　c. iso- butane　　　d. ethane

80. Amongst the following hydrocarbons, the one having lowest bollong point is
   a. . η - Hexane   b. . η-Pertane   c. Isopentane   d. Neopentane

81. Photochemical chlorination of alkane is initiated by a process of
   a. Pyrolysis   b. Substitution   c. Homolysis   d. Pexoxidation

82. Halogenation of alkanes is an example of
   a. Electrophilic substitution   b. nucleophilic substitution
   c. free-radical subtitution d. Oxidation

83. Carbon black, which is used in making printer's ink is obrained by the secomposition of
   a. acetylene   b. benzene   c. carbon tetrachloride
   d. mathane

84. Marsh gas mainly contains
   a. C_2H_2 b. CH_4 c. H_2S d. CO

85. Household gaseous fuel (LPG) mainly contains
   a. CH_4 b. C_2H_2 c. C_2H_4 d. C_4H_{10}

86. General formula for alkenes is
   a. C_nH_{2n} b. C_nH_{2n+2} c. $C_{2n}H_{2n}$ d. C_nH_{2n-2}

87. Which of the following ions is most stable ?
   a. $CH_3\overset{+}{\underset{C}{}}H_2$ b. $(CH_3)_2CH$ c. $(CH_3)_3\overset{+}{\underset{C}{}}$ d. $C_6H_5\overset{+}{\underset{C}{}}H_2$

88. Which of the following has the highest nucleophilicity ?
   a. F $-$ b. OH $-$ c. $CH_3 -$ d. $NH_2 -$

89. Which of the following apecies is a nucleophile ?
   a. NO_2 b. : CX_2 c. NH_2- d. CH_3

90. Which one of the following series contian electrophiles only ?
   a. H_2O, SO_3, H_3O b. $NH_3, H_2O, AlCl_3$ c. $AlCl_3, SO_3, NO_2$
   d. H_2O, Cl, NH_3

91. The bond that undergoes heterolytic cleavage most readily is
   a. C - C   b. C - O   c. C- H   d. O $-$ H

92. Nucleophilieiity order is correctly represented by
   a. $CH_3 < NH_2 < Ho < F$ b. $CH_3 = NH_2 > HO = F$
   c. $CH_3 > NH_2 > HO > F$ d. $NH_2 > F > HO > CH_3$

93. Which of the following is not a nucleophile ?
   a. H_2O b. CH_3OH c. H_2 d. NH_3

94. For the reaction of phenol with $CHCl_3$ in presence of KOH, the electrophite is
   a. $^+CHCl_2$ b. : CCl_2 c. $CHCl_2$ d. CCl_4

95. Which behaves both as a nucleophile as well as electrophile ?
   a. CH_3NH_2 b. CH_3Cl c. CH_3CN d. CH_3OH

96. Allyl cyanide contains .....σ and .....π bonds respectively
   a. 5 and 7   b. 9 and 3   c. 3 and 4   d. 9 and 9

97. The number of σ and π- bonds in but -l-en-3-yne are
   a. 5 σ and 5π b. 7 σ and 3π c. 8 σ and 2π d. 6 σ and 4π

98. Toluene contains
   a. 15 σ and 3π b. 6 σ and 3π - bond
   c. 9 σ and 3π- bonds   d. 9 σ and 6π – bonds

99. In a row of certain A is ranked 9th from left end and B is ranked 10th from right end .If C is exactly in between A and B .What could be the minimum number of students in this row?
   a) 9   b) 10   c) 19   d) 13

100. In an examination consisting 80 questions. Shankar answered 75% of the first 60 questions correctly. What percentage of the remaining 20 question did he need to answer correctly to get 80 % marks in the entire question?
   a) 90% b) 98% c) 58% d) 95%

The END