LATERAL ENTRY- BASE DIPLOMA- ENTRY FOR B TECH- 2ND YEAR

Q.no	**Question**
1	If a is a complex number and b is a real number then the equation $\bar{a}z + a\bar{z} + b = 0$ represents a A) Straight line B) Parabola C) Circle D) Hyperbola
2	If $1, \omega, \omega^2$ are the cube roots of unity, then $\Delta = \begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^n & \omega^{2n} & 1 \\ \omega^{2n} & 1 & \omega^n \end{vmatrix}$ = A)1 B) ω C) ω^2 D) 0
3	The product of the 4 values of $\left(\frac{1}{2} + i\frac{\sqrt{3}}{2}\right)^{3/4}$ is 1) -1 B) 1 C) i D) -i
4	The locus of z satisfying the inequality $\log_{1/3}\lvert z+1\rvert > \log_{1/3}\lvert z-1\rvert$ is A) Re (z)>0 B)Re (z) <0 C)Im (z)>0 D)Im (z) <0
5	The number of ways of arranging 3 copies each of 4 different books in a shelf is A) $\frac{12!}{(4!)^4}$ B) $\frac{12!}{(4!)^3}$ C) $\frac{12!}{(3!)^3}$ D) $\frac{12!}{(3!)^4}$

6	15 students are to be distributed to write their examination in a room which can accommodate 5 and the rest are accommodated in another room . The number of ways that the students are distributed is A) 3000 B)3003 C)3006 D)3009
7	The coefficient of x^4 in the expansion $(1+2x+3x^2+4x^3+....)^{\frac{1}{2}}$ is A)0 B)1 C)-1 D)2
8	$c_0c_1+c_1c_2+c_2c_3+.....+c_{n-1}c_n=$ A) $\frac{(2n)!}{(n-1)!(n+1)!}$ B) $\frac{(2n)!}{(n-3)!(n+1)!}$ C) $\frac{(2n)!}{(n-2)!(n+2)!}$ D) $\frac{(2n)!}{(n-1)!(n+2)!}$
9	If A is an invertible matrix of order n, then the determinant of Adj (A) is equal to A) $\lvert A\rvert^n$ B) $\lvert A\rvert^{n+1}$ C) $\lvert A\rvert^{n-1}$ D) $\lvert A\rvert^{n+2}$
10	$\begin{vmatrix} y+z & x & x \\ y & z+x & y \\ z & z & x+y \end{vmatrix} =$ A) xyz B)2xyz C)3xyz D)4xyz

11	The equation along with the equations 12x-3y+7z=16 and2x+3y+4z=9 form a system of equations having unique solution is 1) 14x+11z=1 (B) 21y+17z = 2 C) x +y +z=2 D) 34x-33y-4
12	$Sinx+2Sin2x=3+Sin3x, 0\le x\le 2\pi$ has (A) 2 solutions in I quadrant B) One solution in II quadrant (C) No solution in any quadrant D) one solution in each quadrant
13	$Sin^{-1}\left(\frac{24}{25}\right)+Tan^{-1}\left(\frac{5}{12}\right)$= A) $Tan^{-1}\left(\frac{27}{11}\right)$ B) $Tan^{-1}\left(\frac{16}{63}\right)$ C) $Sin^{-1}\left(\frac{16}{65}\right)$ D) $Cos^{-1}\left(-\frac{36}{325}\right)$
14	Minimum value of $Sin^2\theta+Co\sec^2\theta$ is A)2 B)1 C)1/2 D)4
15	If A and B are acute angles, sinA= $\frac{1}{5\sqrt{2}}$ and TanB=1/3, then A+2B= A) $\frac{\pi}{2}$ B) $\frac{\pi}{3}$ C) $\frac{\pi}{4}$ D) $\frac{\pi}{6}$
16	Two vertices of a an equilateral triangle are ay (1,0) , (-1,0) and the third vertex is above x-axis. The equation of the Circumcircle is A) $3x^2+3y^2-2\sqrt{3}y=3$ B) $x^2+y^2-2y=1$ C) $2x^2+2y-3\sqrt{2}x=2$ D) $x^2+y^2-2x=1$

17	The equation of the line which is concurrent with the lines $4x+3y-7=0$, $8x+5y-1=0$ and having slope -1.5 is A) $3x+2y-63=0$ B) $2x-3y-2=0$ C) $8x-5y-12=0$ D) $3x+2y-2=0$
18	The area (in square units) of the Quadrilateral formed by the points (1,2),(2,-3),(-2,4)and (0,5) is A)13.5 B)15.2 C)18 D)20
19	The points A, B, C, D with position vectors 7**i**-4**j**+7**k**, **i**-6**j**+10**k**, -**i**-3**j**+4**k**, 5**i**-**j**+**k** respectively, forms a A)Square B) Rhombus C)Parallelogram but not a rhombus D) Rectangle
20	The length of orthogonal projection of a vector **i**-2**j**+**k** on vector 4**i**-4**j**+7**k** is A) 19/6 B) 19/8 C) 19(4**i**-4**j**+7**k**)/9 D) 19/9
21	$A(\bar{a}), B(\bar{b}), C(\bar{c})$ are position vectors of the vertices of a triangle ABC. The length of the perpendicular drawn from C to AB is A) $\dfrac{\left[\bar{a}\times\bar{b}+\bar{b}\times\bar{c}+\bar{c}\times\bar{a}\right]}{\lvert\bar{a}-\bar{b}\rvert}$ B) $\dfrac{\left[\bar{a}\times\bar{b}+\bar{b}\times\bar{c}+\bar{c}\times\bar{a}\right]}{\lvert\bar{b}-\bar{c}\rvert}$ C) $\dfrac{\left[\bar{a}\times\bar{b}+\bar{b}\times\bar{c}+\bar{c}\times\bar{a}\right]}{\lvert\bar{a}-\bar{c}\rvert}$ D) $\left[\bar{a}\times\bar{b}+\bar{b}\times\bar{c}+\bar{c}\times\bar{a}\right]$
22	If $y=Cos^{-1}\left[\dfrac{1-(\log x)^2}{1+(\log x)^2}\right]$,then $f^{/}(e)$ A) Does not exist B)is equal 2/e C)is equal to 1/e D)is equal to 1

23	If $y = Log\left(x+\sqrt{x^2+1}\right)$ then $y_2(1)$ = A)0 B)1 C) $\frac{-1}{2\sqrt{2}}$ D) $-2\sqrt{2}$
24	Let $f(x)=\begin{cases} \lvert x\rvert\cos\frac{1}{x}+15x^2, x\neq 0 \\ k \quad\quad\quad\quad , x=0 \end{cases}$. If f(x) is continuous at x=o ,then k= A)15 B)-15 C)0 D)6
25	At x=a ,if a function f(x) has a maximum value M($\neq 0$)then $\frac{-1}{M}$ is A) Maximum for $\frac{-1}{f(x)}$ B) Minimum for $\frac{-1}{f(x)}$ C) Maximum for $f(1/x)$ C) Minimum for $f(-1/x)$
26	If $u = y^x + x^y$,then at $x=e\;\&\;y=e$ $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}=$ 1) e B)2e C) $4e^e$ D) 1
27	If $u=\sin^{-1}\left(\frac{x^3+y^3}{x^5+y^5}\right)$, then $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}$ = 1) -2 B) -2Tanu C)-2Sinu D)-2Cosu
28	The area bounded by the curves $y=\lvert x\rvert-1$ and $y=-\lvert x\rvert+1$ is A)1 B)2 C) $2\sqrt{2}$ D)4

29	$\int \frac{3\cos x - 2\sin x}{4\sin x + 5\cos x} dx =$ A) $\frac{22}{41} Log\left\|4\sin x + 5\cos x\right\| - \frac{7}{41}x + c$ B) $\frac{22}{41} Log\left\|4\sin x + 5\cos x\right\| + \frac{7}{41}x + c$ C) $\frac{22}{41} Log\left\|3\cos x - 2\sin x\right\| + \frac{7}{41}x + c$ D) $\frac{22}{41} Log\left\|3\cos x - 2\sin x\right\| - \frac{7}{41}x + c$
30	$\int_2^3 \frac{\sqrt{x}}{\sqrt{x} + \sqrt{5 - x}} dx$ = A) ½ B)3/2 C)5/2 D)0
31	The solution of $\frac{dy}{dx} = \frac{xy}{x^2 + y^2}$ is A) $x = ce^{2x^2/y^2}$ B) $y = ce^{x^2/2y^2}$ C) $x = ce^{x/2y^2}$ D) $y = ce^{x/2y}$
32	The general solution of an ordinary differential equation represents A) a family of curves B) a curve passing through (0,0) C) arbitrary constant D) particular solution
33	If the lines having Direction ratios(2,-m,3m) and (1+m,-2m,1) include an acute angle for 1) All values of m B)-2<m<-0.5 C)m<-2 and m>-0.5 D)m=2

34	$\bar{a} = 3\bar{i} + 3\bar{j} + 3\bar{k}$ and $\bar{R} = x\bar{i} + y\bar{j} + z\bar{k}$ .The equation of the sphere having (1,3,5) and (5,3,1) as ends of the diameter is 1) $\left\|\bar{R}-\bar{a}\right\| = 4$ (B) $\left\|\bar{R}-\bar{a}\right\| = 4\sqrt{2}$ C) $\left\|\bar{R}-\bar{a}\right\| = \sqrt{2}$ D) $\left\|\bar{R}-\bar{a}\right\| = 0$
35	If the three planes represented by $a_i x + b_i y + c_i z = d_i, i = 1,2,3$ form a prism , then the number of solutions of these system of equations is (A) Infinite B) only one C) more than one but finiteD) zero
36	If 5 arithmetic means(A.M's) are inserted in between two numbers a and b, then sum of the 5 A.M's is (A) $\frac{5}{2}(a+b)$ (B) $\frac{7}{2}(a+b)$ (C) $(a+b)$ (D) $\frac{5}{2}(a-b)$
37	The algebraic sum of the deviations of a data from it's mean is (1) 0 (B) mean (C) 1 (D) Mean deviation
38	The mean of the absolute deviations of the items of the data from Mean is A)Standard deviation (B) Median C) Mean deviation D) quartile deviation
39	The probability for an unsuccessful attempts that can be made by a thief to open a number lock having 3rings in which each rings contain 6 numbers is A) 17/18 B) 728/729 C) 95/96 D) 215/216
40	A die is rolled 3 times, The probability of getting a larger number than the number obtained in previous roll each time is A)15/216 B)5/54 C)13/216 D)1/18

BASIC ELECTRICAL ENGG-

41. Carbon, as a material, is used in making
    (A) pole-shoes in a DC machine to facilitate the flow of current from or to the magnetic poles
    (B) commutator segments in a DC machine to facilitate the flow of current from or to the rotating armature winding conductors
    (C) brushes in a DC machine to facilitate the flow of current from or to the rotating armature winding conductors
    (D) armature coils in a DC machine to facilitate the flow of current from or to the rotating armature winding conductors.

42. Mica, as a material, is used between
    (A) the commutator segments of a DC machine to provide insulation
    (B) the brush and the commutator segment of a DC machine to provide mechanical lubrication to reduce friction
    (C) two armature conductors to increase conductivity
    (D) field and armature to act as a medium for heat dissipation.

43. A magnetic flux of 0.05 Weber links a coil having 5000 number of turns. The flux changes its sign in a time interval of 0.1 second. The value of induced emf in the coil during this change in flux-linkage is
    (A) 5000 V
    (B) 2500 V
    (C) 4000 V
    (D) 1000 V.

44. Iron losses in a 3 kVA single phase two winding transformer can be determined in the laboratory by performing on it
    (A) the Open Circuit Test by applying rated voltage
    (B) the Short Circuit Test by applying rated voltage
    (C) the Open Circuit Test by applying reduced voltage
    (D) the Short Circuit Test by applying reduced voltage.

45. In a DC series generator, the field winding is made up of conductors of
    (A) thin cross section and large number
    (B) thin cross section and less number
    (C) thick cross section and large number
    (D) thick cross section and less number.

46. The compensating winding in a DC machine is housed
    (A) in slots of armature
    (B) in slots of pole faces
    (C) partly in slots of armature and partly in slots of pole faces
    (D) around the interpoles.

47. In a DC machine, operating in the saturated region of magnetic field, the nature of the effect of armature reaction flux on the main field flux is
(A) magnetizing only
(B) cross-magnetizing only
(C) demagnetizing only
(D) demagnetizing and cross-magnetizing only.

48. A single phase transformer is used in a circuit along with an ammeter of 5 A rating connected in secondary side. The ammeter in the secondary side reads 2 A while the actual line current in the primary side is 80 A. The ratio of current in the secondary side to the current in the primary side will be
(A) 1:40
(B) 1:16
(C) 16:1
(D) 40:1.

49. For P_2 being the total power input to the rotor of a three-phase induction motor and 's' being its slip, its total rotor copper loss will be
(A) sP_2
(B) $P_2 = (1-s)P_2$
(C) $(s/(1-s))P_2$
(D) $P_2 = (1-s)/P_2$.

50. A DC generator driven at 1000 RPM has an open circuit voltage of 240 V. If its speed is increased to 1250 RPM, the open circuit voltage will be
(A) 200 V
(B) 240 V
(C) 260 V
(D) 300 V.

51. The mmf set up by the interpole in a DC shunt machine is proportional to
(A) armature current
(B) load current
(C) field current
(D) sum of armature current and field current.

52. The cost of the systems of wiring is maximum in case of
(A) Cleat wiring
(B) Lead sheathed wiring
(C) Conduit wiring
(D) Wood Casing Capping wiring.

53. Which of the following DC generators will be in a position to set up induced emf even in the absence of residual flux?
(A) Shunt generator

(B) Compound generator
(C) Series generator
(D) Separately excited generator.

54. The voltage regulation on full-load of an ideal DC generator is
(A) negative
(B) high positive
(C) low positive
(D) zero.

55. The load on a DC series generator is reduced to zero. Its terminal voltage will
(A) decrease
(B) increase
(C) become close to zero
(D) remain same.

56. An electric kettle draws 6 A current when connected across a single phase 220 V, 50 Hz AC supply. Assuming the electric kettle to be a purely resistive load, the real and reactive power consumed by it will be (A) 1320 W and 1320 VAR
(B) 0 W and 1320 VAR
(C) 1320 W and 0 VAR
(D) 0 W and 0 VAR respectively.

57. If the mechanical load on the shaft of a DC shunt motor is increased, its speed will
(A) reduce rapidly
(B) remain constant
(C) increase rapidly
(D) reduce slightly.

58. The unit of measurement of Electrical Energy consumed in domestic loads is
(A) Kilo-Watt-Hour (kWh)
(B) Mega-Watt-Hour (MWh)
(C) milli-Watt-Hour (mWh)
(D) Watt-second (Ws).

59. The developed torque T_d versus the armature current I_a characteristics of a DC series motor is a
(A) parabola throughout
(B) parabola from no-load to certain load and straight line thereafter
(C) straight line throughout
(D) straight line from to certain load and parabola thereafter.

60. The DC motor suitable for traction applications is
(A) shunt motor

(B) cumulative compound motor
(C) series motor
(D) differentially compound motor.

61. A 50-mH inductance carries current of 5 A which reverses in 25 milli-seconds and as a result, a voltage is induced in the inductance. The average value of this induced voltage in the inductor will be
(A) 10 V
(B) 20 V
(C) 40 V
(D) 30 V.

62. The purpose of providing a starter for a three-phase induction motor is to
(A) reduce the speed
(B) increase the speed
(C) limit the starting current to safe value
(D) reduce the flux.

63. Three resistances of 25 ohms, 10 ohms and 15 ohms are connected in series and the series combination is connected across a 250 Volt DC supply. The voltage across the 15 ohms resistor will be
(A) 50 V
(B) 90 V
(C) 80 V
(D) 75 V.

64. In house hold wiring system, a fuse wire is used to
(A) boost the circuit current to higher value during the time of need
(B) break the circuit when current flowing through it exceeds the limiting value
(C) carry the normal working current safely without heating
(D) carry the normal working current safely without heating and to break the circuit when current flowing through it exceeds the limiting value.

65. The purpose of adding little percent silicon to steel in the manufacturing of transformer core stampings is to reduce
(A) secondary copper loss
(B) primary copper loss
(C) eddy current loss
(D) hysteresis loss.

66. In the expression of waveforms $v_1 = V_m \cos(\omega t)$ and $v_2 = V_m \cos(\omega t + \pi/6)$,
(A) v_1 leads v_2 by π/6 radians in phase
(B) v_2 and v_1 are in phase
(C) v_2 lags v_1 by π/6 radians in phase
(D) v_2 leads v_1 by π/6 radians in phase.

67. The root-mean-square (rms) value of a cosine wave $y = 415 \cos(100\pi t)$ is

(A) 415
(B) 415/√3
(C) 415/2
(D) 415 /√2.

68. A resistance R of value 1 MΩ is connected in series with a capacitor C of value 5 μF. For this RC circuit, the time of 10 seconds will be equal to
(A) one time constant
(B) two time constants
(C) three time constants
(D) four time constants.

69. The purpose of using laminated core in a transformer is to reduce
(A) primary copper loss
(B) hysteresis loss
(C) eddy current loss
(D) secondary copper loss.

70. The larger portion of loss incurred in a DC motor while drawing full-load current from the DC supply is
(A) field copper loss
(B) mechanical loss
(C) iron loss
(D) armature copper loss.

71. It is desired to measure the current flowing through a resistive load in a DC network. The measuring instrument required for this is
(A) an ammeter to be connected in series with the load
(B) a voltmeter to be connected in series with the load
(C) an ammeter to be connected parallel to the load
(D) a voltmeter to be connected parallel to the load.

72. A 440/220 V single phase two winding transformer has winding leakage reactances as 2.1 ohm and 0.5 ohm on respective sides. The total leakage reactance referred to high voltage side will be
(A) 1.025 ohms
(B) 3.1 ohms
(C) 4.1 ohms
(D) 8.6 ohms.

73. At a node in a DC network, out of five branch currents present, three branch currents leave the node and two branch currents enter it. If the two branch currents entering the node are 8 A and 12 A respectively and the currents in two of the three outgoing branches are 5 A and 7 A, then value of the other outgoing current from the node will be
(A) 8A
(B) 12 A

(C) 16 A
(D) 20 A.

74. Compared to the secondary of a loaded step-down transformer, the primary has
(A) less voltage and larger current
(B) larger voltage and larger current
(C) larger voltage and less current
(D) less voltage and less current.

75. An energy meter having a meter-constant of 1200 revolutions per kilo-watt-hour (kWh) is found to make 5 revolutions in 75 seconds. The load power is
(A) 500 W
(B) 100 W
(C) 200 W
(D) 1000 W.

76. The maximum permissible values of earth resistance in case of small substation, major power station and large power station are respectively
(A) 2 ohms, 0.5 ohm and 1 ohm
(B) 1 ohm, 0.5 ohm and 2 ohms
C) 0.5 ohm, 1 ohm and 2 ohms
(D) 2 ohms, 1 ohm and 0.5 ohm.

77. The AC generators used in thermal power plants are generally of
(A) low speed type and horizontally mounted
(B) very high speed type of the order of 3000 RPM and horizontally mounted
(C) low speed type and vertically mounted
(D) very high speed type of the order of 3000 RPM and vertically mounted.

78. The type of generating power plant generally chosen to meet the base load demand is
(A) nuclear power plant
(B) hydro-electric power plant
(C) power plant using diesel generator sets
(D) none of these.

79. Three electrical loads when connected individually, one at a time, across a single phase AC source, draw individual currents of 5(0.5+j0.866) A, 5(0.5-j0.866) A and 5A respectively. The resultant current, drawn from the same supply source when all these three loads are connected in parallel at a time, will be
(A) 0 A
(B) 5 A
(C) 10 A
(D) 15 A.

80. At 75% of full load, the copper loss occurring in a single phase two winding transformer is 900 watts. At 100% full load, the copper loss will be

(A) 900 watts
(B) 1600 watts
(C) 1200 watts
(D) 1125 watts.

ENGG MECHANICS

81. A cylinder has a height, h and is standing perpendicular to the ground. The first half of the cylinder close to the ground has half the density of the upper half. The CG of the entire cylinder from ground would be at a height of :
    (a) 5h/12
    (b) 7h/12
    (c) 9h/2
    (d) 3h/12
82. A cylinder has a height, h and is standing perpendicular to the ground. If the first half of the cylinder has a density double that of the upper half then the CG from ground would have been at :
    (a) 5h/12
    (b) 7h/12
    (c) 9h/2
    (c) 3h/12
83. A solid hemisphere of radius 'a ' is lying on the ground with its flat face on the surface. The CG of the hemisphere from the ground would be at:
    (a) 5a/8
    (b) 3a/8
    (c) a/8
    (d) a/2
84. A uniform thickness hemispherical shell has a mass M and radius R. Its moment of inertia about the vertical axis passing through the center of the hemisphere would be :
    (a) $2/3MR^2$
    (b) $MR^2/2$
    (c) $MR^2/4$
    (d) $2MR^2/5$
85. A spring of spring constant 100N/m is attached with a mass of 25kg and is resting on a frictionless plane. The mass is given an initial displacement of 10cm from rest. What would be the maximum velocity of the mass?
    (a) .1m/s
    (b) .4 m/s
    (c) .2m/s
    (d) None of the above
86. A spring of spring constant 100N/m is attached with a mass of 25kg and is resting on a frictionless plane. The mass is given an initial displacement of 10cm from rest. What would be the maximum acceleration of the mass?
    (a) .2 m/s^2
    (b) .4 m/s^2
    (c) .1 m/s^2

(d) .8 m/s^2

87. A spring of spring constant 100N/m is attached with a mass of 25kg and is resting on a frictionless plane. The mass is given an initial displacement of 10cm from rest. The time period of oscillation of the mass would be
    (a) 2π s
    (b) 2 s
    (c) π s
    (d) 1 s
88. A solid cylinder of mass M is kept on a frictionless ramp of height H. It is suddenly allowed to move. The velocity of the cylinder when it reaches the bottom of the ramp would satisfy the relation:
    (a) $v^2 = gH$
    (b) $v^2 = 4gH$
    (c) $v^2 = gH/2$
    (d) $v^2 = 2gH$
89. A solid cylinder of mass M is kept on a rough ramp (having friction) of height H. It is suddenly allowed to move. The velocity of the cylinder when it reaches the bottom of the ramp would satisfy the relation :
    (a) $v^2 = 2gH$
    (b) $v^2 = 2gH/3$
    (c) $v^2 = 4gH/3$
    (d) $v^2 = gH$
90. A particle of mass M, is projected at an angle of 30^0 to the horizontal at a velocity of V m/s in air where there is no frictional loss present for the particle. The ratio of kinetic energy of the particle at the highest point of the path to that of the initial KE would be :
    (a) ½
    (b) ¼
    (c) ¾
    (d) 1
91. A particle is kept on an incline which is having friction and exactly a similar particle is kept on a similar incline having no friction. In which case the particle would reach the bottom of the incline faster?
    (a) Incline having friction
    (b) Incline with no friction
    (c) It would take same time irrespective of friction
    (d) It can not be solved
92. A small stone is thrown vertically upward at a velocity of 20m/s and while reaching the ground it was found to have a velocity of 16m/s. If the gravity is $10m/s^2$ and the air resistance is can be assumed to be uniform then what was the maximum height attended by the stone.
    (a) 5.0 m
    (b) 3.6 m
    (c) 32.8 m
    (d) 16.4 m

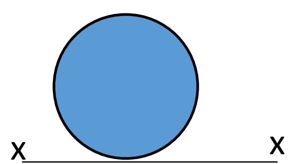
93. A spring-mass system oscillates such that the mass moves on a rough surface having coefficient of friction µ. It is compressed by a distance a, from its normal length and, on being released, it moves to a distance b from its equilibrium position. The decrease in amplitude for one-half cycle (-a to b) is:

(a) $\mu mg/K$
(b) $2\mu mg/K$
(c) $\mu g/K$
(d) $\mu mg/2K$

94. Three rods of mass m and length l are joined together to form an equilateral triangle. What would be the moment of inertia of the system about an axis passing through its center of mass and perpendicular to the plane of the triangle?

(a) $\frac{ml^2}{2}$
(b) $\frac{ml^2}{6}$
(c) $\frac{ml^2}{12}$
(d) $\frac{ml^2}{2}$

95. What is the moment of inertia of a solid sphere of mass M and radius R about an axis XX as shown in the Figure?

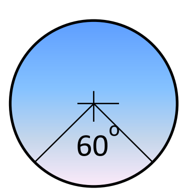


(a) $\frac{2}{5}MR^2$
(b) $\frac{9}{10}MR^2$
(c) $\frac{7}{5}MR^2$
(d) $\frac{8}{5}MR^2$

96. A uniform rod has mass m and length $2l$. Two particles of mass m each are placed at its two ends. What is the moment of inertia of the system about the center of mass of the system?

(a) $\frac{25ml^2}{12}$
(b) $\frac{4ml^2}{3}$
(c) $\frac{5ml^2}{3}$
(d) $\frac{7ml^2}{3}$

97. A uniform circular disk has a moment of inertia of 2 $kg.m^2$ about its central axis which is perpendicular to the plane of the disk. If a segment of 60^0 is cut out from the disk then the moment of the inertia of the remaining disk about the same old axis is:



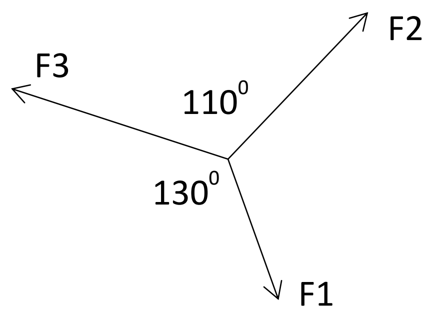
(a) *0.666 kg m^2*

(b) *2.0 kg m^2*

(c) *1.666kg m^2*

(d) *0.5 kg m^2*

98. Three co-planner forces F1, F2 and F3 are in equilibrium. If F1= 40N then how much is F2?



(a) 32.60 N
(b) 55.56 N
(c) 49.06 N
(d) -17.85 N

99. A particle of mass, 0.01kg started to move from rest to a velocity of 3i+4j m/s in a conservative force field. The work done on the particle is :
(a) 5 J
(b) 0.125 J
(c) 0.25 J
(d) Nothing can be told about it

100. A mass of 1kg when attached to a spring and left slowly vertically, extends to a distance of 0.01m. If the same mass is released suddenly then the spring would be extended by:
(a) 0.01 m
(b) 0.015 m
(c) 0.02 m
(d) None of the above

101. A particle executing SHM can be described by the equation $x = 12\sin(6t + 4)$. The time period of the particle can be: (Q 21 and 22 are linked)
(a) 12 s
(b) $\pi/2$ s
(c) $\pi/3$ s

(d) 4 s

102. A particle executing SHM can be described by the equation $x = 12\sin(6t + 4)$. The maximum velocity of the particle is :

(a) 48 units
(b) 24 units
(c) 6 units
(d) 72 units

103. A spherical mass of 3kg travels on a smooth floor with a velocity of 4m/s and hits another mass of 2kg at rest. If the smaller mass travels at a speed of 2m/s after the collision the velocity of the larger mass would be: (assume rectilinear motion)

(a) 2.666 m/s
(b) 6 m/s
(c) 3 m/s
(d) 1 m/s

104. A ball is dropped vertically downward on to solid surface from a height of *h*. If the coefficient of restitution between the ball and the surface is *e*, then to what height the ball would rise after the first bounce?

(a) h/e^2
(b) he^2
(c) he
(d) h/e

105. A solid sphere rolls on a floor without slipping. The ratio of the translational to rotational kinetic energy is:

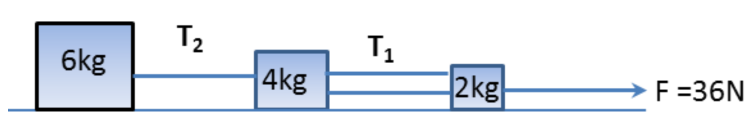
(a) 2
(b) ¼
(c) 4
(d) 5/2

106. A football (assume thin spherical shell) rolls on a floor without slipping. The ratio of the rotational to translational kinetic energy is:

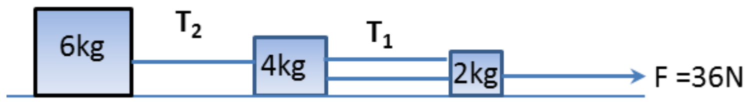
(a) 3/2
(b) 3/4
(c) 2/3
(d) 4/3

107. The figure here shows three blocks connected by a rope system. It can be assumed that the ropes from 4kg to 2kg block have same tensions. The blocks are on a frictionless horizontal surface and pulled with a force of 36N. Then the tension T2 would be:

(a) 0 N
(b) 18 N
(c) 36 N
(d) 12 N

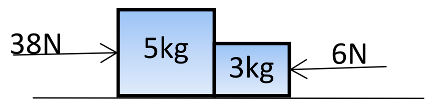


108. The figure here shows three blocks connected by a rope system. It can be assumed that the ropes from 4kg to 2kg block have same tensions. The blocks are on a frictionless horizontal surface and pulled with a force of 36N. The tension T1 would be:



(a) 3 N
(b) 12 N
(c) 6 N
(d) 15 N

109. The blocks shown in the figure are on a smooth floor. What is the contact force between the two blocks.



(a) 18 N
(b) 12 N
(c) 20 N
(d) 0 N

110. A point mass of 4kg is placed on the x axis at 3m from the origin and another of 2kg is placed 3m away from the 4kg mass on the x-axis. The center of mass of the system lies on the x-axis at x =?

(a) 4.5 m
(b) 3 m
(c) 4 m
(d) 5m

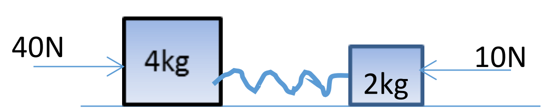
111. A mass of m1=3 kg with a velocity of 2m/s hits elastically another mass of m2=3 kg at rest. The velocity after the collision for mass m2 would be:

(a) 0 m/s
(b) 1 m/s
(c) 2 m/s
(d) Not possible to determine

112. A mass of m1=1 kg with a velocity of 2m/s hits elastically another mass of m2=3 kg at rest. Find the velocity of m2 after the collision is:

(a) 0 m/s
(b) 1.5 m/s
(c) 1.333 m/s
(d) 1 m/s

113. Two blocks are on a frictionless floor connected by a spring of spring constant k=100N/m. The blocks are applied with a force as shown in the figure. What would happen to the spring? {Problem 33 and 34 are linked}



(a) The spring remains unchanged in length
(b) The spring gets compressed
(c) The spring gets stretched
(d) The spring gets compressed and then becomes stretched

114. In problem 33 if the spring length changes then that change is :

(a) 0 m

(b) 0.2 m compression
(c) 0.2 m stretching
(d) 0.2 m compression first and then 0.2 m stretching

115. A bucket is having water in it which weighs 10 kg (weight of bucket is almost nothing). If the bucket is tied to a rope of length L and revolved around a vertical circle with the rope in one hand then what is the minimum rotational speed of the bucket so that the water does not come out of the bucket.
(a) $\sqrt{gL}$
(b) $2g/L$
(c) $\sqrt{g/L}$
(d) $\sqrt{2g/L}$

116. A mass weighing 5 kg is hanging from a vertical spring balance which is fixed on to an elevator. The elevator suddenly accelerated upward at an acceleration of $3m/s^2$. In such a situation:
(a) The spring would be stretched more
(b) The spring would be compressed a bit
(c) The spring length would remain unchanged
(d) Nothing can be told about the spring

117. On a horizontal spring balance a can is placed, which has water in it and the can is 75% filled. The weight reading shows to be 2kg on the display unit of the balance. A boy tried to put a stick in to the water without touching the can or the spring balance and the water from the can was also not spilling.
(a) The display would show now less reading
(b) The display would show more reading
(c) The reading would remain unchanged
(d) None of the above

118. A mass is hung from a digital spring balance which shows the weight to be 2kg. The entire spring balance and the mass hanging from it is allowed to fall freely from a very tall building. The display would now show:
(a) More reading
(b) Less reading
(c) No change in reading
(d) Record the weight to be zero

119. A force of 2i+3j N is working on a mass of 1kg and the mass got a displacement of 3i+4j m. The work done on the mass is:
(a) 18 J
(b) 14J
(c) 0 J
(d) 12 J

120. A force of 2i+3j N is working on a mass of 1kg and the mass got a displacement of 3i+4j m. The velocity of the mass during the application of the force changed by an amount:
(a) 1 m/s
(b) 3m/s
(c) 4m/s

(d) 6 m/s