1. If z is a complex number and if $\left|z-\frac{8}{z}\right|=2$, then the greatest value of |z| is

(A) 2 (B) 3 (C) 4 (D) $\sqrt{5}+4$

2. The principal argument/amplitude of the complex number $\frac{1+2i}{1-3i}$ is

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$ (C) π (D) $\frac{3\pi}{4}$

3. One solution of $(-1)^{\frac{1}{3}}$ is

(A) 1 (B) $\frac{1}{2}-\frac{i\sqrt{3}}{2}$ (C) $-\frac{1}{2}+\frac{i\sqrt{3}}{2}$ (D) $-\frac{1}{2}-\frac{i\sqrt{3}}{2}$

4. The number of even numbers can be formed by using all the digits $1,2,3,4,5,6$ is

(A) 180 (B) 360 (C) 240 (D) 720

5. The remainder when 2^{2001} is divided by 17 is

(A) 2 (B) 3 (C) 1 (D) 8

6. The sum to $(n+1)$ terms of the series $\frac{C_0}{2}-\frac{C_1}{3}+\frac{C_2}{4}-\frac{C_3}{5}+\cdots\cdots$ is

(A) $\frac{1}{n+1}$ (B) $\frac{1}{n+2}$ (C) $\frac{1}{(n+1)(n+1)}$ (D) None of these

7. If $\sin\alpha=\sin\beta$ and $\cos\alpha=\cos\beta$, then which of the following is true

(A) $\sin\frac{1}{2}(\alpha-\beta)=0$ (B) $\sin\frac{1}{2}(\alpha+\beta)=0$

(C) $\cos\frac{1}{2}(\alpha+\beta)=0$ (D) $\cos\frac{1}{2}(\alpha-\beta)=0$

8. If the area of the triangle ΔABC is given by $\Delta = a^2-(b-c)^2$ then, $\cot\left(\frac{A}{2}\right)$ is

(A) -1 (B) 0 (C) 4 (D) 2

9. The value of $\tan^{-1}1+\sin^{-1}\left(\frac{1}{4}\right)+\cos^{-1}\left(-\frac{1}{4}\right)$ is

(A) $\frac{\pi}{4}$ (B) 0 (C) $\frac{3\pi}{4}$ (D) $\frac{5\pi}{12}$

10. The number of solution of the equation $\sqrt{3}\cos x+\sin x=3$ on $[0,2\pi]$ is

(A) *one* (B) *two* (C) *four* (D) *zero*

11. $\tan^{-1}\left(\sqrt{5}\right)-\cot^{-1}\left(-\sqrt{5}\right)$ is equal to

(A) $-\frac{\pi}{2}$ (B) π (C) 0 (D) $2\sqrt{5}$

12. If the system of equations $ax+y+z=0, x+by+z=0$ and $x+y+cz=0$ $(a,b,c\neq 1)$ has a non-zero solution then the value of $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}$ is

(A) -1 (B) 0 (C) 1 (D) None of these

13. The system of equations $x+y+z=6, x+2y+3z=14$ and $2x+5y+\alpha z=10$ $(\alpha\in\square)$ has a solution if

(A) $\alpha \neq 8$ (B) $\alpha \neq 4$ (C) $\alpha \neq 2$ (D) None of these

14. If $A = \begin{bmatrix} 3 & 2 & -2 \\ 0 & 1 & 1 \end{bmatrix}$ then AA^T is (here A^T, transpose of A)

(A) symmetric matrix (B) skew-symmetric matrix

(C) zero matrix (D) None of these

15. If $\begin{vmatrix} b+c & c & b \\ a & c+a & a \\ b & a & a+b \end{vmatrix} = \alpha\, abc$, then α is equal to

(A) 1 (B) 2 (C) 3 (D) 4

16. The system of equations $x+y+z=6, x+2y+3z=14$ and $2x+5y+\alpha z=\beta\ (\alpha,\beta \in \mathbb{R})$ is consistent if

(A) $\alpha=8, \beta=4$ (B) $\alpha=4, \beta=16$

(C) $\alpha=8, \beta=36$ (D) None of these

17. The vectors $\lambda\hat{i}+\hat{j}+2\hat{k}, \hat{i}+\lambda\hat{j}-\hat{k}$ and $2\hat{i}-\hat{j}+\lambda\hat{k}$ are coplanar if

(A) $\lambda=2$ (B) $\lambda=-2$ (C) $\lambda=0$ (D) $\lambda=\sqrt{2}$

18. A vector $\vec{a}$ can be written as

(A) $(\vec{a}.\hat{i})\hat{i}+(\vec{a}.\hat{j})\hat{j}+(\vec{a}.\hat{k})\hat{k}$ (B) $\vec{a}.\vec{a}(\hat{i}+\hat{j}+\hat{k})$

(C) $(\vec{a}.\hat{j})\hat{i}+(\vec{a}.\hat{k})\hat{j}+(\vec{a}.\hat{i})\hat{k}$ (D) None of these

19. If $\vec{X} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{Z} = \hat{k} - \hat{j}$ are given vectors, then a vector $\vec{Y}$ satisfying $\vec{X} \times \vec{Y} = \vec{Z}$ and $\vec{X}.\vec{Y} = 3$ is

(A) $\frac{5}{3}\hat{i} + \frac{2}{3}\hat{j} + \frac{2}{3}\hat{k}$ (B) $\frac{1}{3}\hat{i} + \frac{4}{3}\hat{j} + \frac{4}{3}\hat{k}$

(C) $-\frac{5}{3}\hat{i} + \frac{2}{3}\hat{j} + \frac{2}{3}\hat{k}$ (D) $-\frac{1}{3}\hat{i} + \frac{4}{3}\hat{j} + \frac{4}{3}\hat{k}$

20. The area of the parallelogram having diagonals $\vec{x} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{y} = \hat{i} - 3\hat{j} + 4\hat{k}$ is

(A) 4 (B) $2\sqrt{3}$ (C) $4\sqrt{3}$ (D) None of these

21. The probability of obtaining an odd prime number on each

die, when a pair of dice is rolled is

(A) 0 (B) $\frac{2}{3}$ (C) $\frac{1}{18}$ (D) $\frac{1}{36}$

22. The variance of the following data $6,8,10,12,14,16,18,20,22,24$ is

(A) 15 (B) 24 (C) 33 (D) None of these

23. The solution of the equation $\frac{dy}{dx} = \cos(y-x)$ is

(A) $y + \cot\left(\frac{x-y}{2}\right) = c$ (B) $\cot\left(\frac{x-y}{2}\right) = c$

(C) $x + \tan\left(\frac{x-y}{2}\right) = c$ (D) None of these

24. The solution satisfying the differential equation $\frac{dy}{dx} = y\tan x$, $y(0)=1$ is

(A) $y = \ln x$ (B) $y = \cot x$ (C) $y = \sec x$ (D) None of these

25. If the projection of a line on the axes are $2,3,6$, then the length of the line is

(A) 11 (B) 6 (C) 7 (D) None of these

26. The angle between the planes $3x+4y-5z=9$ and $2x+6y+6z=7$ is

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{4}$ (D) None of these

27. The equation of the sphere which passes through point $(1,-1,1)$ and the circle $z=0$, $x^2+y^2=4$ is

(A) $x^2+y^2+z^2+z=4$ (B) $x^2+y^2+z^2+y=4$

(C) $x^2+y^2+z^2+x=4$ (D) $x^2+y^2+z^2=4$

28. The ratio in which the line $x-y-2=0$ divides the line joining $(3,-1)$ and $(8,9)$ is

(A) $1:4$ (B) $2:3$ (C) $3:2$ (D) None of these

29. The distance between the lines $4x-3y+5=0$ and $3y-4x-10=0$ is

(A) 2 (B) 1 (C) 3 (D) 5

30. The equation of the circle passing through the points $(4,1)$ and $(6,5)$ and whose centre is on the line $4x+y=16$ is

(A) $x^2-6x+y^2-8y+15=0$

(B) $x^2+6x+y^2-8y+15=0$

(C) $x^2-6x+y^2+8y+15=0$

(D) $x^2-6x+y^2-8y-15=0$

31. The three lines $3x+4y+6=0, 2x+\sqrt{6}y+4=0$ and $4x+7y+8=0$ are

(A) sides of a triangle

(B) concurrent

(C) parallel

(D) None of these

32. The area of the triangle with vertices $(3,2),(-5,-7)$ and $(5,4)$ is

(A) 2

(B) 0

(C) 4

(D) 1

33. The domain of the function $f(x)=\sqrt{x+1}+\sqrt{4-x}$ is

(A) $\mathbb{R}\setminus\{-1\}$

(B) $\mathbb{R}\setminus\{4\}$

(C) $[1,4]$

(D) None of these

34. $\lim_{x\to1}\sin\left(\frac{1}{x-1}\right)$

(A) 0

(B) 1

(C) $\frac{1}{2}$

(D) Does not exist

35. The function $f(x)=\begin{cases} x^2 & if\ \ x\ is\ rational \\ -x^2\ if & x\ is\ irrational \end{cases}$

is continuous at

(A) $x=2$ (B) $x=-2$ (C) $x=0$ (D) $x\in \mathbb{R}\setminus\{0\}$

36. The function $y=\sin^{-1}(\cos x)$ is differentiable for all points where

(A) $\sin x>0$ (B) $\cos x>0$ (C) $\cos x=0$ (D) $\sin x=0$

37. The value of $\frac{dy}{dx}$ at the point $(0,1)$ of the implicit function $e^y+xy=2e$ is

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

38. $x\frac{\partial}{\partial x}\tan^{-1}\left(\frac{y}{x}\right)+y\frac{\partial}{\partial y}\tan^{-1}\left(\frac{y}{x}\right)$ is equal to

(A) 0 (B) $x+y$ (C) $\tan^{-1}\frac{x}{y}$ (D) $\tan^{-1}\frac{y}{x}$

39. The area bounded by the curve $y=|1-x|$ at $x=0$, and $x=2$ is

(A) 0 (B) 1 (C) $\frac{1}{2}$ (D) None of these

40. The value of the integral $\int\frac{dx}{1+e^x}$ is

(A) $x-\ln\left(e^{-x}+1\right)+c$

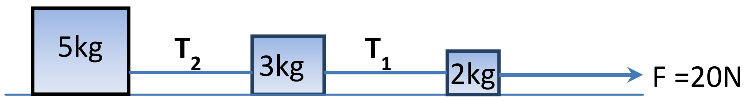
(B) $x-\ln\left(e^{x}+1\right)+c$

(C) $x+\ln\left(e^{-x}+1\right)+c$

(D) $x+\ln\left(e^{x}+1\right)+c$

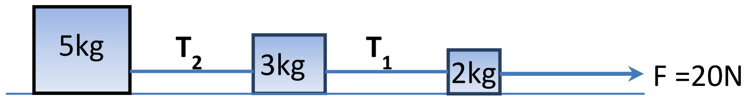
41. A cylinder of diameter 0.2m is resting on a rough floor. A force of 2N is applied to the top of the cylinder. What is torque about the point of contact?
    (a) 2N-m
    (b) 0.4N-m
    (c) 0.2 N-m
    (d) 0 N-m
42. An isosceles triangle of height 1m is standing on the x-y co-ordinate system with the middle point of its base on the origin and the tip vortex on the y axis. The y-coordinate of the center of the gravity of the triangle is located at y= ?
    (a) 0.66m
    (b) 0.50m
    (c) 0.25m
    (d) 0.33m
43. The units of moment of inertia of a solid body can be:
    (a) $kg.m^2$
    (b) $kg.m$
    (c) $N.m^2$
    (d) $N.m$
44. The diameter of a screw is 5mm add the lead of the screw thread (pitch) is 1mm. What is the mechanical advantage of the screw?
    (a) 3.141
    (b) 9.42
    (c) 12.56
    (d) 15.71

45. Two shafts are neither parallel nor intersecting. If we intend to transmit power between the two then which type of gear is mostly preferred?
    (a) Straight bevel
    (b) Worm and worm
    (c) Double helical herringbone
    (d) Crossed helical
46. Two spur gears have pitch circle diameters of 10cm and 2cm. The larger gear has a rotational speed of 200RPM. Then what is the rotational speed of the smaller one?
    (a) 200RPM
    (b) 500RPM
    (c) 1000RPM
    (d) 400RPM
47. Two wires A and B have same dimensions (area and length same) and are stretched by the same amount of force. Young's modulus of A is thrice that of B. The relation $\frac{\Delta l_B}{\Delta l_A}$ would be equal to :
    (a) 1
    (b) 1/3
    (c) 3
    (d) 3/2
48. The figure shows three blocks connected by two light and inextensible strings placed on a smooth horizontal surface acted upon by a force of 20N. The tension T_2 in the string is:



(a) 10N
(b) 12N
(c) 6N
(d) 20N

49. The figure shows three blocks connected by two light and inextensible strings placed on a smooth horizontal surface acted upon by a force of 20N. The tension T_1 in the string is:



(a) 10N
(b) 16N
(c) 6N
(d) 4N

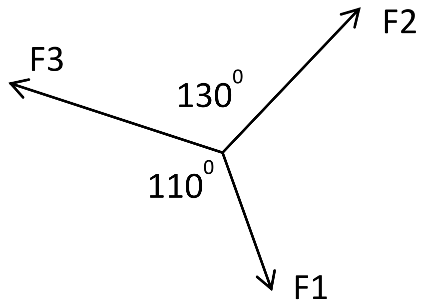
50. A uniform cube of side *a* and mass *m* rests on a rough horizontal plane surface. A horizontal force *F* is applied normal to one face at a point that is directly above the center of the face at a height of *a/2* above the center. The minimum value of F for which the cube begins to topple about an edge without slipping is:
(a) mg/4
(b) 2mg
(c) 2mg/3
(d) mg/2

51. A uniform rod has mass *m* and length *L*. 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) $\frac{7ml^2}{12}$
(b) $\frac{ml^2}{3}$
(c) $\frac{5ml^2}{3}$
(d) $\frac{7ml^2}{3}$

52. What is the moment of inertia of a solid sphere of mass M and radius R about an axis which is a tangent to the sphere.
(a) $\frac{2}{5}MR^2$
(b) $\frac{9}{10}MR^2$
(c) $\frac{7}{5}MR^2$

(d) $\frac{8}{5}MR^2$

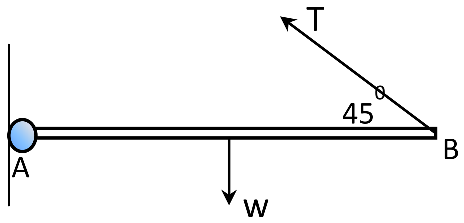
53. If I_1 is the moment of inertia of a thin rod about an axis perpendicular to its length and passing through the center of mass and I_2 the moment of inertia of the ring formed by the same rod about an axis passing through the center of the mass of the ring and perpendicular to the plane of the ring. Then the ratio I_2/I_1 is:
   (a) $12/\pi^2$
   (b) $6/\pi^2$
   (c) $3/2\pi^2$
   (d) $3/\pi^2$
54. The position of a particle executing SHM can be described by $x = 10\sin\left(2\pi t + \frac{\pi}{6}\right)$ in SI units. The time period of the particle is:
   (a) 4s
   (b) 2s
   (c) 1s
   (d) 3.141s
55. The position of a particle executing SHM can be described by $x = 10\sin\left(2\pi t + \frac{\pi}{6}\right)$ in SI units. The maximum velocity of the particle is:
   (a) $20\pi\ m/s$
   (b) $4\pi\ m/s$
   (c) $2\pi\ m/s$
   (d) $5\pi\ m/s$
56. A ball is thrown vertically upward with a velocity of 10 m/s. It returns to the ground with a velocity of 8 m/s. If g =10 m/s^2 , then the maximum height attained by the ball is nearly: (Assume air resistance to be uniform)
   (a) 3.2m
   (b) 4.1m
   (c) 6.4 m
   (d) 5.0m
57. Three co-planner forces F1, F2 and F3 are in equilibrium. If F1=40N then how much is F2?



(a) 10.23N
(b) 12.25 N
(c) 24.51N

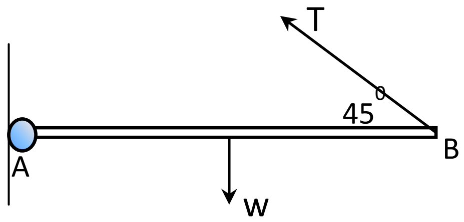
(d) 49.06 N

58. A uniform rod AB of weight W is hinged to a fixed point at A. It is held in horizontal position by a string, one end of which is attached to B as shown. The tension in the string in terms of W is:



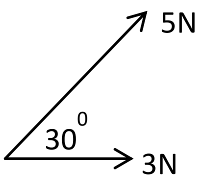
(a) $T = W/\sqrt{2}$
(b) T =2W
(c) T=3W/$\sqrt{2}$
(d) None of the above

59. A uniform rod AB of weight W is hinged to a fixed point at A. It is held in horizontal position by a string, one end of which is attached to B as shown. The reaction at A can be R_x and R_y which can be written in terms of W. The expression for R_y in terms of W is:



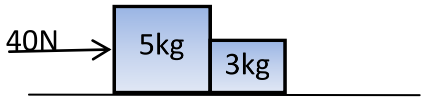
(a) $R_y = \sqrt{3}W/2$
(b) $R_y = W$
(c) $R_y = W/4$
(d) $R_y = W/2$

60. The Figure shows two concurrent forces acting at a point. The force vector can be written as:



(a) 3i + 5j
(b) 7.33 i + 2.5j
(c) 3i + 2.5j
(d) None of the above

61. Two blocks of mass 5kg and 3kg are placed side by side on a smooth floor. A horizontal force of 40N is acting on the 5kg block. The normal reaction between the two blocks is:



(a) 40N
(b) 25N
(c) 15N
(d) 12N

62. A spring-mass system (m=1kg, k=10N/m, g=10 m/s^2) oscillates such that the mass moves on a rough surface having coefficient of friction μ=.2. 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) $0.2m$
   (b) $0.4m$
   (c) $0.0\ m$
   (d) $0.1m$

63. A particle of mass 0.1kg travels along a space curve with velocity 2i+4k m/s. After some time its velocity becomes 6i+10j m/s due to the action of a conservative force. The work done on the particle during this interval of time is:
   (a) 2.9J
   (b) 6.8J
   (c) 0.58J
   (d) 5.8J

64. A point mass of 1kg travels on a smooth floor at a velocity of 2m/s and hits another point mass of 2kg on the same smooth floor. After hitting the smaller mass travels in the same direction at a speed of 0.5m/s and the second mass also travels in the direction of the smaller mass. The velocity of the second mass (or the larger mass) is:
(a) 0.75m/s
(b) 1.5 m/s
(c) 1m/s
(d) None of the above

65. Moment of inertia of a rod of mass M, and length L, about an axis through one of its end is:
(a) $\frac{ML^2}{12}$
(b) $\frac{ML^2}{3}$
(c) $\frac{ML^2}{2}$
(d) ML^2

66. A ball is dropped vertically down on to a solid surface from a height of h. If the coefficient of restitution between the ball and surface is 0.5 then after bounce to what height the ball will rise?
(a) h/2
(b) h/4

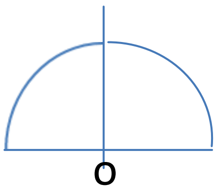
(c) h
(d) none of the above

67. A cylinder is sliding down a frictionless ramp of height 'h'. At the end of the ramp the velocity of the cylinder is:
(a) $2gh$
(b) $\sqrt{gh}$
(c) $\sqrt{2gh}$
(d) None

68. A cylinder sliding down the ramp is having friction then the velocity of the cylinder at the end of the ramp is:
(a) $\sqrt{2gh/3}$
(b) $\sqrt{4gh/3}$
(c) $\sqrt{3gh/4}$
(d) $\sqrt{2gh}$

69. Sphere 'A' rolls down an inclined plane having friction and another sphere 'B' comes down the same inclined plane with no friction at the same time. The time to reach the end of the inclined plane can be compared as:
(a) A reaches faster than B
(b) B reaches faster than A
(c) Both reach at the same time
(d) None is true

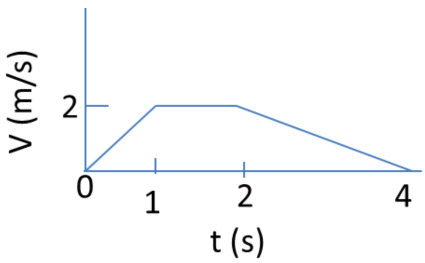
70. A semi circular disk has a mass M, and radius R. Its moment of inertia about a perpendicular axis through 'O' is :



(a) MR^2
(b) $\frac{3MR^2}{4}$
(c) $\frac{MR^2}{2}$
(d) $\frac{2MR^2}{3}$

71. A 2kg mass is kept at origin 'O' and a 3kg mass 1m away from it on the x axis. The center of mass of the system from the origin is at:
(a) 40cm
(b) 20cm
(c) 50cm
(d) 60cm

72. Picture here shows the velocity of a particle during its travel. The acceleration in the first second and the deceleration in the last phase of travel is respectively:



(a) $2\frac{m}{s^2}, 1\frac{m}{s^2}$
(b) $2\frac{m}{s^2}, 2\frac{m}{s^2}$

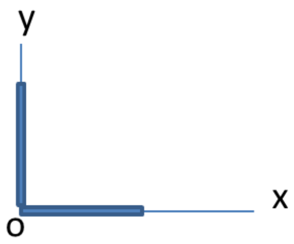
(c) $1\frac{m}{s^2}, 1\frac{m}{s^2}$
(d) None of the above

73. The rotational speed of the second hand of a clock is:
(a) $\frac{\pi}{15}\frac{rad}{s}$
(b) $\frac{2\pi}{15}\frac{rad}{s}$
(c) $\frac{\pi}{60}\frac{rad}{s}$
(d) $\frac{\pi}{30}\frac{rad}{s}$

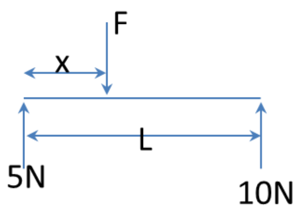
74. A spring with a k= 2 N/m, is attached to a wall and a block of mass 1kg is pushed towards the spring at a velocity of 2m/s. The floor is frictionless. How much the spring would be compressed?
(a) 2m
(b) $\sqrt{2}\,m$
(c) 1m
(d) 0.5 m

75. A spherical ball moves on a floor without slipping. The ratio of translational to rotational kinetic energy is:
(a) 1
(b) 3/2
(c) 2/5
(d) 5/2

76. Two sticks of mass M and length L, are kept on the x and y axis with two of their ends at the origin. Their x center of mass is at x =?
(a) L/2
(b) L/3
(c) L/4
(d) L



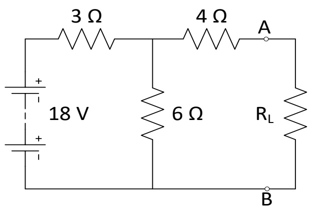
77. A rod of length L, is acted upon by the force system as shown. How much should be 'x', for equilibrium?
(a) 2L/3
(b) L/2
(c) L/3
(d) 4L/3



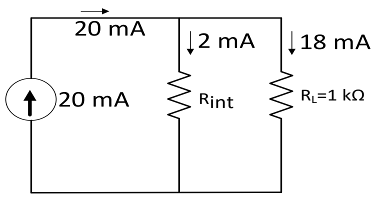
78. A ball of mass 1kg is projected up at an angle of 30^o with the horizontal at a velocity of 10m/s. The kinetic energy of the ball at the highest point on the path is:
(a) 25J
(b) 75J
(c) 37.5 J
(d) 12.5J

79. Gear A has 20teeth and 'B' has 30 teeth. If the angular velocity of 'A' is 30RPM then that of 'B' is:
   (a) 10RPM
   (b) 15RPM
   (c) 30RPM
   (d) 20RPM
80. Ball 'A' is of mass 1kg and moves o the 'x' axis at 5m/s in positive 'x' direction. Ball 'B' has mass 2 kg and is stationary on the 'x' axis. 'A' hits 'B' and comes to rest. What would be the velocity of 'B'?
   (a) 2.5m/s
   (b) 5m/s
   (c) 1m/s
   (d) 0 m/s

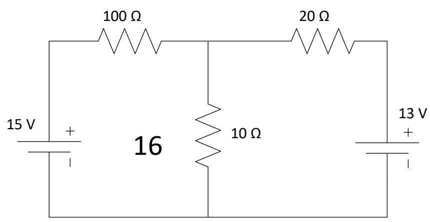
81. Two identical cells connected in series send 10 A through 5Ω resistor. When they are connected in parallel, they send 8 A through the same resistor. The internal resistance of each cell is
   (a) zero (b) 2.5Ω (c) 10 Ω (d) 1 Ω
82. The open circuit voltage at the terminals of load R_L is 30 V. Under the condition of maximum power transfer, the load voltage will be ....
   (a) 30 V (b) 10 V (c) 5 V (d) 15 V
83. The open circuit voltage at the terminals AB in the below figure is............
   (a) 12 V
   (b) 6 V
   (c) 15 V
   (d) 9.5 V



84. The resistor values in Wye network that is equivalent to a delta containing three 12 kΩ resistor is...........
   (a) 2 kΩ each (b) 4 kΩ each (c) 8 kΩ each (d) 6 kΩ each
85. When a load of 1 kΩ is connected across a 20 mA current source, it is found that only 18 mA flows in the load. What is the internal resistance of the source?
   (a) 3 kΩ
   (b) 6 kΩ
   (c) 18 kΩ
   (d) 9 kΩ



86. Using superposition theorem,current in 10 Ω resistor is.........
   (a) 200 mA ↓
   (b) about 500 mA ↓
   (c) 24 mA ↑



(d) 208 mA

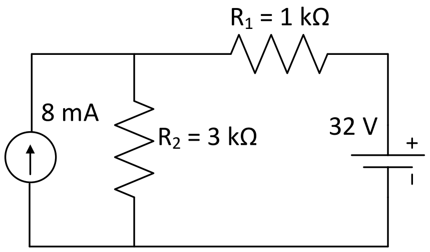
87. Find the current through R_1

(a) 1 mA ←

(b) 2 mA ←

(c) 1.5 mA →

(d) 2.5 mA ←



88. If R_1 and R_2 respectively the filament resistances of 200 W bulb and 100 W bulb designed to operate at the same voltage, then

(a) $R_1 = 2\ R_2$ (b) $4R_1 = R_2$ (c) $R_1 = 4\ R_2$ (d) $2R_1 = R_2$

89. Two lamps of 100 W and 200 W rated for 220 V are placed in series and a 440 V applied across them. Then,

(a) only 100 W lamp will be damaged

(b) only 200 W lamp will be damaged

(c) both lamps will be damaged

(d) no lamp will be damaged

90. Three capacitors of capacitance 3 μF, 9 μF and 18 μF are connected once in series and another time in parallel. The ratio of equivalent capacitances in the two cases (C_s/C_p) will be

(a) 1 : 15 (b) 1 : 3 (c) 1 : 9 (d) 1 : 12

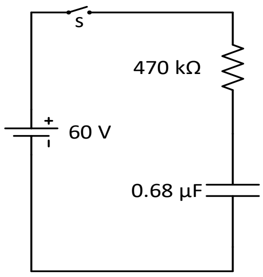
91. For the circuit shown in the below figure, the value of voltage across the capacitor 0.2 s after the switch is closed

(a) 15.8 V

(b) 21.2 V

(c) 60 V

(d) 27.9 V



92. An ammeter of range 1 A has a resistance of 0.9 Ω. To extend the range to 10 A, the value of shunt resistance required is

(a) 0.9 Ω (b) 0.3 Ω (c) 0.01 Ω (d) 0.1 Ω

93. A voltmeter has a resistance of 100 Ω and measure 10 V. How can it be used to measure 50 V

(a) 40 Ω in series (b) 400 Ω in series (c) 800 Ω in series (d) 1600 Ω in series

94. A conductor of length 1 m carrying current of 1 A is placed parallel to a magnetic field of 1 Wb/m^2. The magnetic force acting on the conductor is

(a) zero (b) 1 N (c) 0.5 N (d) 2.5 N

95. An air-cored coil carries steady current. If air-core is replaced by a ferromagnetic material, the flux density in the core will

(a) remain same (b) decrease (c) increase (d) none of the above

96. What is the magnetic field intensity in a material whose relative permeability is 1 when the flux density is 0.005 T ?

(a) 250 AT/m (b) 452 AT/m (c) 3980 AT/m (d) 1715 AT/m

97. An alternating current of frequency f is flowing in a circuit containing an ideal choke coil. If V_m and I_m represent the peak values of voltage and current respectively, the average power supplied by the source is

(a) $0.5\ V_m\ I_m$ (b) $0.5\ I^2_m \times 2\pi fL$ (c) zero (d) $0.5\ V^2_m \times 2\pi fL$

98. An air cored choke coil and an electric bulb are connected in series with a.c. mains. On introducing soft iron bar in the coil, the intensity of light will

(a) fluctuate
(b) remain unchanged
(c) increase
(d) decrease

99. A coil has an inductance of 0.7 H and is joined in series with a resistance of 220Ω. When an alternating voltage of 220 V, 50 Hz is applied to it, the wattless component of current is

(a) 1.5 A (b) 0.7 A (c) 7 A (d) 0.5 A

100. A capacitor of capacitance C, a coil of inductance L and resistance R and a lamp are placed in series with an alternating voltage V. The frequency is varied from a low to high value. The brightness of the lamp will be maximum when

(a) $X_L >> X_C$ (b) $X_L << X_C$ (c) $X_L = X_C$ (d) none of the above

101. A circuit has admittance of 0.1 S and conductance of 0.08 S. The power factor of the circuit is...............

(a) 0.1 (b) 0.8 (c) 0.08 (d) none of the above

102. The phase voltage in a 3-phase circuit is $90\angle{-50^o}$ V and corresponding phase current is $2.5\angle{-10^o}$ A. The power factor is

(a) 0.766 (b) 0.85 (c) 0.623 (d) 0.45

103. Three 50 Ω resistors are connected in star across 400V, 3-phase supply. If one of the resistors is disconnected, then, line current will be........

(a) 8 A (b) 4 A (c) $8\sqrt{3}$ A (d) $8/\sqrt{3}$A

104. A 6-pole lap-wound generator has 300 conductors; the emf induced per conductor being 5V. The generated voltage of the generator is................

(a) 60 V (b) 1500 V (c) 360 V (d) 250 V

105. If P is the number of poles of a generator and N is the armature speed in r.p.m., then frequency f of the magnetic reversals is

(a) $f = \frac{PN}{120}$ (b) $f = \frac{PN}{60}$ (c) $f = \frac{PN}{240}$ (d) $f = \frac{PN}{30}$

106. The amount of back emf of a shunt motor will increase when.............

(a) the load is increased
(b) the field is weakened
(c) the field is strengthened
(d) none of the above

107. The running speed of a d.c. series motor is basically determined by............

(a) field excitation
(b) load
(c) armature resistance
(d) none of the above

108. The stator of a 3-phase induction motor produces .... magnetic field.

(a) steady (b) rotating (c) alternating (d) none of the above

109. The speed of a squirrel cage induction motor is changed by.............

(a) pole changing(b) rheostatic control (c) cascade control (d) none

110. The iron core is used to .... of the transformer.

(a) increase the weight
(b) provide tight magnetic coupling
(c) reduce core losses
(d) none of the above

111. If a transformer core has air gaps, then..............

(a) reluctance of the magnetic path is reduced
(b) hysteresis loss is decreased
(c) magnetising current is greatly increased
(d) eddy current is increased

112. The thermal efficiency and electrical efficiency of a steam power station are 30 % and 92 % respectively. The overall efficiency of the station is...............

(a) 55.8 % (b) 27.6 %(c) 62.8 % (d) 45 %

113. A capacitor of 0.1 μF is charged from a 100 V battery through a series resistance of 1000 Ω. The charge received by the capacitor in a period of one time constant is

(a) 6.32 μC
(b) 3.16 μC
(c) 12.64 μC
(d) 0 μC

114. If a coil of 150 turns is linked with a flux of 10 mWb when carrying a current of 10 A, the inductance of the coil must be

(a) 15 H
(b) 1.5 H
(c) 0.15 H
(d) 15 mH

115. Permanent magnet moving coil ammeters have uniform scales because

(a) they are spring-controlled
(b) eddy current damping
(c) controlling torque proportional to current
(d) deflecting torque proportional to current

116. The rms value of a half wave rectifier current is 100 A, its value for full wave rectifier would be ……… A.

(a) 200 A
(b) 141.4 A
(c) 100 A
(d) 282.8 A

117. A 1 μF capacitor is connected across a 100 V, 50 Hz supply. The rms value of current drawn from the source is

(a) 0.31 A
(b) 3.14 A
(c) 1.14 A

(d) 2.28 A

118. The input of an ac circuit having pf of 0.8 lagging is 20 kVA. The power drawn by the circuit is ….. kW.

(a) 8
(b) 12
(c) 16
(d) 20

119. The power factor of a series R-L-C circuit with resistance 10 Ω, inductive reactance 10Ω and capacitive reactance 20 Ω is

(a) 0.7 lagging
(b) 0.7 leading
(c) 0.1 lagging
(d) 0.1 leading

120. Three impedances of 10 Ω, -j10 Ω and j10 Ω are connected in parallel across 100 V, 50 Hz supply. The supply current to the combination is

(a) 30 A
(b) 20 A
(c) 10 A
(d) 0 A