EAMCET MODEL GRAND TEST

ENGINEERING

INSTRUCTIONS TO CANDIDATES

1. *The Question Paper consists of 160 questions, So from Mathematics and 40 each from Physics and Chemistry.*
2. *Each question carries one mark. No negative marking for wrong answers.*
3. *Maximum time to answer this test is 3 hours.*
4. *Use Ball - Point Pen while entering the Hall - Ticket Number and filling in Part - A of the First page.*
5. *Candidates have to write suitable answers on the Answer Sheet only.*
6. *Use H.B. Pencil only to darken the circle on OMR Answer Sheet.*
7. *Over-writing or blackening of more than one circle will not count for marks.*
8. *If you wish to change your answer, erase the already darkened circle completely and then darken the appropriate circle.*
9. *Do any rough work and scratch work on the Test Paper itself.*
10. *Calculators, watches with calculators, pagers and cellular phones will not be allowed into the Examination Hall.*
11. *Candidates are prohibited from carrying any sheet of paper to the Examination Hall except the Hall-Ticket.*
12. *Candidates have to return the Answer Sheets and the Question Papers at the time of leaving the Examination Hall.*
13. *Candidates will be to leave the Examination Hall only in the last half-an-hour before the close of the Test.*
14. *This Model grand test contains 19 pages.*

MATHEMATICS

1. Suppose α, β, γ are the roots of $x^3 + x^2 + x + 2 = 0$. If f(x) = 0 is a cubic polynomial equation whose roots are $\alpha + \beta - 2\gamma,\ \beta + \gamma - 2\alpha,\ \gamma + \alpha - 2\beta$ then f(x) = 0 is

   1) $x^3 + 6x^2 + 6x - 47 = 0$ 2) $x^3 - 6x^2 + 6x - 47 = 0$ 3) $x^3 + 6x - 47 = 0$ 4) $x^3 - 6x + 47 = 0$

2. The continued product of the four values of $\left(1 - i\sqrt{3}\right)^{3/4}$ is

   1) $2^{1/4}$ 2) $2^{3/4}$ 3) 2^3 4) $2^{1/3}$

3. If n(A) = 3, n(B) = 5, then number of one-one functions from A to B

   1) ${}^5P_3$ 2) ${}^5C_3$ 3) 5! 4) 3!

4. If $(1 + \tan 2\alpha)(1 + \tan 3\alpha) = 2$ where $\alpha \in \left(0, \frac{\pi}{6}\right)$ then α =

   1) $\frac{\pi}{20}$ 2) $\frac{\pi}{30}$ 3) $\frac{\pi}{40}$ 4) $\frac{\pi}{60}$

5. The value of $\tan^6\frac{\pi}{12} - 15\tan^4\frac{\pi}{12} + 15\tan^2\frac{\pi}{12} =$

   1) 1 2) 2 3) 3 4) 4

6. If α, β are the roots of the equation $x^2 + 2x + 4 = 0$ then the value of $\alpha^5 + \beta^5$ =

   1) 32 2) –32 3) 16 4) –16

7. Let α, β be the roots of $2x^2 - 5x + 2 = 0$, if $a_n = \alpha^n + \beta^n$ for $n \geq 1$ then $4(a_{10} + a_8) = k.a_9$ then k =

   1) 5 2) 10 3) 4 4) 20

8. The transformed equation of $x^4 + 8x^3 + x - 5 = 0$ by eliminating second term is

   1) $x^4 - 24x^2 + 65x - 55 = 0$ 2) $x^4 + 24x^2 + 65x + 55 = 0$

   3) $x^4 - 24x^2 - 65x + 55 = 0$ 4) $x^4 + 24x^2 + 65x - 55 = 0$

9. $1 + \frac{1}{1+2} + \frac{1}{1+2+3} + \ldots\ldots$ 50 terms =

   1) $\frac{50}{51}$ 2) $\frac{101}{51}$ 3) $\frac{100}{51}$ 4) $\frac{98}{50}$

10. The value of $\sum_{r=1}^{12} r^2 \left(\frac{{}^{12}C_r}{{}^{12}C_{r-1}}\right) =$

    1) 364 2) 680 3) 288 4) 2184

11. The sum of the series $1 + \frac{2}{3}\left(\frac{1}{8}\right) + \frac{2.5}{3.6}\left(\frac{1}{8}\right)^2 + \frac{2.5.8}{3.6.9}\left(\frac{1}{8}\right)^3 + \ldots\ldots\ldots\ldots =$

    1) $\frac{4}{\sqrt[3]{49}}$ 2) $\frac{\sqrt[3]{49}}{4}$ 3) $\frac{4}{\sqrt[3]{81}}$ 4) $\frac{\sqrt[3]{81}}{4}$

12. Let 'A' be a non-singular matrix such that $A^{-1} = \begin{pmatrix} 1 & 1 & 1 \\ 2 & 3 & 4 \\ 10 & 10 & 9 \end{pmatrix}$. Then the value of det (adj 2A) + det 2A =

1) 64 2) 56 3) 48 4) 32

13. If A is a skew - symmetric matrix and 'n' is odd positive integer, then A^n is

1) a symmetric matrix 2) skew - symmetric matrix
3) diagonal matrix 4) scalar matrix

14. If B is an idempotent matrix and $A = I - B$ then $AB =$

1) I 2) 0 3) –I 4) B

15. The minimum value of $|z - 2 + 3i| + |4i + 3 - z|$ is

1) $\sqrt{5}$ 2) 5 3) $2\sqrt{5}$ 4) $5\sqrt{2}$

16. If $z = \lambda + 3 + i\sqrt{5 - \lambda^2}$, where λ is a parameter, then the locus of z is

1) a striaght line 2) a circle 3) an ellipse 4) a hyperbola

17. Let f(x) = $a\,x^{2011} + b\,x^{2009} + c\sin 3x + 10$ where a, b, c are non-zero constants. If f(–2017)=20 then f(2017) is equal to

1) 20 2) 10 3) 0 4) –20

18. If $\cos\alpha + \cos\beta + \cos\gamma = 0 = \sin\alpha + \sin\beta + \sin\gamma$ then $\cos(2\alpha - \beta - \gamma) + \cos(2\beta - \gamma - \alpha) + \cos(2\gamma - \alpha - \beta) = \ldots$

1) 0 2) 1 3) 2 4) 3

19. The odds, that a book will be reviewed favourably by three independent critics are 5 to 2 ; 4 to 3 and 3 to 4 respectively. The probability that majority of the critics will be favourable is

1) $\frac{207}{343}$ 2) $\frac{209}{343}$ 3) $\frac{205}{343}$ 4) $\frac{202}{3403}$

20. If b and c are chosen at random from the set {1, 2, 3, ... 10} with replacement, then the probability that $x^2 + bx + c = 0$ has real roots is

1) 0.52 2) 0.48 3) 0.58 4) 0.62

21. In a test an examinee either guesses or copies or knows the answer to a multiple choice question with four choices. The probability that he makes guess is $\frac{1}{3}$ and the probability that he copies the answer is $\frac{1}{6}$. The probability that his answer is correct, given that he copied it is $\frac{1}{8}$. Then the probability that he knew the answer to the question, given that he correctly answered it is

1) $\frac{25}{29}$ 2) $\frac{24}{29}$ 3) $\frac{15}{29}$ 4) $\frac{14}{29}$

22. Three dice are rolled 4 times, the probability of getting sum 17 exactly 3 times is

1) $\frac{4\times 71}{(72)^4}$ 2) $\frac{71}{(72)^4}$ 3) $\frac{(71)^3}{(72)^4}$ 4) $\frac{1}{(72)^4}$

23. A lot of 100 bulbs from a manufacturing process is known to contain 10 defective and 90 non defective bulbs. If a sample of 8 bulbs are selected at random, then the probability that the sample contains exactly 3 defective bulbs.

1) $\frac{36\times 9^5}{10^8}$ 2) $\frac{46\times 9^5}{10^8}$ 3) $\frac{56\times 9^5}{10^8}$ 4) $\frac{56\times 9^3}{10^8}$

24. If the period of the function $f(x)=2\sin\frac{\pi x}{4}+3\cos\frac{\pi x}{3}$ is 'n' then the number of zeros at the end of n!

1) 2 2) 4 3) 6 4) 8

25. Mean of the numbers 1, 2, 3, ... n with respective frequecies $1^2+1, 2^2+2, 3^2+3, ..., n^2+n$ is

1) $\frac{3n+2}{2}$ 2) $\frac{3n+1}{4}$ 4) $\frac{2n+1}{3}$ 4) $\frac{3n(n+1)}{2(2n+1)}$

26. If mode $= k(\textbf{median})+l(\textbf{mean})$ then $k+l=$

1) 1 2) 5 3) 6 4) 0

27. Sum of all the four digited numbers that can be formed with the digits 3,2,3,4 is

1) 49996 2) 59996 3) 39996 4) 69996

28. Domain of $f(x)=\frac{\sqrt{x^2-4}}{\cos^{-1}(2-x)}$ is

1) [2, 3) 2) [2, 3] 3) $(-\infty,-2)\cup[2,\infty)$ 4) [1, 3]

29. The number of solutions of the equation tanx +secx =2cosx lying in the internal $[0, 2\pi]$ is

1) 0 2) 1 3) 2 4) 3

30. If $\frac{1}{2}\sin^{-1}\left[\frac{3\sin 2\theta}{5+4\cos 2\theta}\right]=\tan^{-1}x$ then $x=$

1) $\tan 3\theta$ 2) $3\tan\theta$ 3) $\frac{1}{3}\tan\theta$ 4) $3\cot\theta$

31. If $u=\log_e\left(\tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right)\right)$ then cosh u =

1) $\cos\theta$ 2) $\sec\theta$ 3) $\sin\theta$ 4) $\cos ec\theta$

32. In a triangle if $r = r_1 - r_2 - r_3$ then the triangle is

1) Scalene 2) Isosceles 3) righ angled 4) equilateral

33. If the sides of a triangle are in A.P. and the greatest angle exceeds the least angle by 90° then the sine of the third angle is

1) $\frac{\sqrt{5}}{2}$ 2) $\frac{\sqrt{5}}{4}$ 3) $\frac{\sqrt{7}}{2}$ 4) $\frac{\sqrt{7}}{4}$

34. If in a ΔABC, $\frac{2\cos A}{a}+\frac{\cos B}{b}+\frac{2\cos C}{c}=\frac{a}{bc}+\frac{b}{ca}$ *then* $\angle A=$

1) 45^0 2) 60^0 3) 75^0 4) 90^0

35. A line passing through the point 'A' with position vector $3\bar{i}+\bar{j}-\bar{k}$ and parallel to the vector $2\bar{i}-\bar{j}+2\bar{k}$. If P is a point on this line such that the distance AP is 15, then position vector of P is

1) $13\bar{i}-4\bar{j}+9\bar{k}\,(or)\,-7\bar{i}+6\bar{j}-11\bar{k}$ 2) $13\bar{i}-4\bar{j}+9\bar{k}\,(or)\,7\bar{i}+6\bar{j}-11\bar{k}$

3) $-13\bar{i}+4\bar{j}+9\bar{k}\,(or)\,7\bar{i}-6\bar{j}-11\bar{k}$ 4) $-13\bar{i}-4\bar{j}+9\bar{k}\,(or)\,7\bar{i}+6\bar{j}+11\bar{k}$

36. ABCD is a parallelogram and E is the mid point of AB. The line DE meets the diagonal AC in M. then DM : ME =

1) 2 : 3 2) 3 : 2 3) 1 : 2 4) 2 : 1

37. The point of intersection of the line passing through $2\bar{i}+3\bar{j}-\bar{k},3\bar{i}+4\bar{j}-2\bar{k}$ and the line passing through $\bar{i}-2\bar{j}+3\bar{k},\bar{i}-6\bar{j}+6\bar{k}$ is

1) $\bar{i}+\bar{j}+\bar{k}$ 2) $\bar{i}+2\bar{j}$ 3) $\bar{j}+2\bar{k}$ 4) $2\bar{i}+\bar{j}$

38. The vector $\bar{a},\bar{b},\bar{c}$ satisfying the condition $\bar{a}+\bar{b}+2\bar{c}=\bar{0}$. If $|\bar{a}|=1,|\bar{b}|=4,|\bar{c}|=2$ then $\bar{a}.\bar{b}+\bar{b}.\bar{c}+\bar{c}.\bar{a}$ is equals to

1) $\frac{-7}{2}$ 2) $\frac{17}{2}$ 3) $\frac{-17}{2}$ 4) $\frac{7}{2}$

39. If $|\bar{a}|=|\bar{b}|=2$ and $\bar{\alpha}=\bar{a}-\bar{b},\bar{\beta}=\bar{a}+\bar{b}$ then $|\bar{\alpha}\times\bar{\beta}|=$

1) $2\sqrt{16-(\bar{a}.\bar{b})^2}$ 2) $2\sqrt{4-(\bar{a}.\bar{b})^2}$ 3) $\sqrt{16-(\bar{a}.\bar{b})^2}$ 4) $\sqrt{4-(\bar{a}.\bar{b})^2}$

40. The volume of the tetrahedram with vertices (–1, 0, 1) (2, –1, 0) (3, 2, 5) (1, 2, 1) is

1) 4 2) 8 3) 6 4) 12

41. The perimeter of a triangle is 20 and the points (–2, –3) and (–2, 3) are two of the vertices of it. The locus of the third vertex is

1) $\frac{(x-2)^2}{40}+\frac{y^2}{49}=1$ 2) $\frac{(x+2)^2}{40}+\frac{y^2}{49}=1$ 3) $\frac{(x+2)^2}{49}+\frac{y^2}{40}=1$ 4) $\frac{(x-2)^2}{49}-\frac{y^2}{40}=1$

42. Statement:(I) The integrating factor of differnetial equation

$$1+(x\tan y-\sec y)\frac{dy}{dx}=0 \text{ is } \sec y$$

Statement:II The integrating factor of differential equation

$$x(x-1)\frac{dy}{dx}-y=x^2(x-1)^2 \text{ is } \frac{x-1}{x}$$

Which of the above are correct :

1) only I 2) only II 3) Both I and II 4) Neither I nor II

43. Equation of the line dividing the line segment joining the points (1, 1) and (2, 4) in the ratio 1:2 internally and having slope 11 is

1) 33x + 3y – 38 = 0 2) 33x – 3y – 38 = 0 3) 33x –3y + 38 = 0 4) 33x +3y + 38 = 0

44. The parametric equations of a straight line are given by $x=-2+\frac{r}{\sqrt{10}}$ and $y=1+\frac{3r}{\sqrt{10}}$. Then the sum of the intercepts of the line on the axes is

1) $\frac{7}{3}$ 2) $\frac{1}{3}$ 3) 14 4) $\frac{14}{3}$

45. In a ΔABC, the equation of the perpendicular bisector of AC is 3x –2y + 8 = 0. If the coordinates of the points A and B are (1, –1) and (3, 1) respectively, Then the circumcentre of the ΔABC is

1) $\left(\frac{4}{5},\frac{14}{5}\right)$ 2) $\left(\frac{-4}{5},\frac{14}{5}\right)$ 3) $\left(\frac{4}{5},\frac{-14}{5}\right)$ 4) $\left(\frac{-4}{5},\frac{-14}{5}\right)$

46. If the slope of one of the lines represented by $ax^2-6xy+y^2=0$ is the square of the other, then the value of a is

1) –27 or 8 2) –3 or 2 3) –64 or 27 4) –4 or 3

47. If the straight lines joining the origin and the points of intersection of the curve $5x^2+12xy+6y^2+4x-2y+3=0$ and x + ky = 1 are equally inclined to coordinate axes then K =

1) 1 2) –1 3) 2 4) –2

48. If $A(2,-1,4), B(0,1,5), C(4,3,5), D(6,4,3)$ then the projection of $\overline{AB}$ on $\overline{CD}$ is

1) $\frac{4}{3}$ 2) $\frac{3}{4}$ 3) $-\frac{4}{3}$ 4) $-\frac{3}{4}$

49. If the direction cosines of a line 'L' are (ab, b, b) and the angle between line 'L' and x-axis is $\frac{\pi}{3}$ then a pair of possible values for a, b are

1) 2, 5 2) 3, 4 3) $\sqrt{\frac{2}{3}},\sqrt{\frac{3}{8}}$ 4) $\sqrt{\frac{8}{3}},\sqrt{\frac{2}{3}}$

50. The equation of the plane through $(1,2,-3)\&(2,-2,1)$ and parallel to $x-$axis is ____

1) $y-z+1=0$ 2) $y-z-5=0$ 3) $2y+z-1=0$ 4) $y+z+1=0$

51. $\underset{x\to\pi}{Lt}\dfrac{\sqrt{2+\cos x}-1}{(\pi-x)^2}=$

1) 0 2) $\frac{1}{2}$ 3) $\frac{1}{4}$ 4) $\frac{1}{8}$

52. Let K be a non zero real number, If f(x) = $\begin{cases} \dfrac{(e^x-1)^2}{\sin\left(\frac{x}{k}\right)\log\left(1+\frac{x}{4}\right)}, & if \quad x\neq 0 \\ 12 & if \quad x=0 \end{cases}$

is a continuous function then the value of K is

1) 1 2) 2 3) 3 4) 4

53. If $x^2y^3=(x+y)^n$ and $\frac{dy}{dx}=\frac{y}{x}$ then $n=$

1) 2 2) 3 3) 5 4) 6

54. If $\sqrt{\frac{x}{y}}+\sqrt{\frac{y}{x}}=6$ then $\frac{dy}{dx}=$

1) $\frac{17x-y}{x-17y}$ 2) $\frac{17y-x}{2x-17y}$ 3) $\frac{17y-x}{y-17x}$ 4) $\frac{17x+y}{x+17y}$

55. If $x=\cos\theta, y=\sin 5\theta$ then $(1-x^2)\frac{d^2y}{dx^2}-x\frac{dy}{dx}=$

1) –5y 2) 5y 3) 25y 4) –25y

56. In triangle ABC, b, c values are given and the error in A is δA, then $\delta a=$

1) $bc\sin A.\delta A$ 2) $\frac{2\Delta\delta A}{a}$ 3) $\frac{\Delta}{2a}.\delta A$ 4) $\frac{2a}{\delta A}$

57. If the tangent at $\theta=\frac{\pi}{4}$ to the curve $x=a\cos^3\theta,\ y=a\sin^3\theta$ meets the x and y axes in A and B then the area of ΔOAB is

1) a^2 2) $\frac{a^2}{2}$ 3) $\frac{a^2}{4}$ 4) $\frac{a^2}{8}$

58. The sum of two non zero numbers is 4. Then the minimum value of the sum of their reciprocals is

1) 0 2) 1 3) $\frac{1}{4}$ 4) $\frac{1}{2}$

59. The value of 'C' in lagrange's mean value theorem for $f(x) = x(x-2)^2$ in [0, 2] is

1) 0 2) 2 3) $\frac{2}{3}$ 4) $\frac{3}{2}$

60. The equation of a circle which has a tangent $3x + 4y = 6$ and two noramls given by $(x-1)(y-2)=0$ is

1) $x^2 + y^2 - 4x - 2y + 4 = 0$ 2) $x^2 + y^2 - 2x - 4y + 4 = 0$
3) $x^2 + y^2 - 2x - 4y + 5 = 0$ 4) $(x-3)^2 + (y-2)^2 = 25$

61. Polars of the point (x_1, y_1) with respect to a circle $x^2 + y^2 - 2kx + c^2 = 0$ always passes through the fixed point is

1) $\left(x_1, \frac{x^2 - c^2}{y_1}\right)$ 2) $(x_1, x^2 - c^2)$ 3) $\left(\frac{x_1^2 - c^2}{y_1}, -x_1\right)$ 4) $\left(-x_1, \frac{x_1^2 - c^2}{y_1}\right)$

62. The lengths of the common tangents of the circles $x^2 + y^2 + 4x = 0$ and $x^2 + y^2 - 6x = 0$ is

1) $2\sqrt{3}, 0$ 2) $2\sqrt{6}, 0$ 3) $2\sqrt{3}, \sqrt{3}$ 4) $\sqrt{3}, 3\sqrt{3}$

63. The circle with centre (1, 2) cuts the circle $x^2 + y^2 + 14x - 16y + 77 = 0$ orthogonally then its radius is

1) 4 2) 8 3) 3 4) 2

64. By eliminating parameters A and α in $x = A\cos(pt + \alpha)$, the differential equation obtained is

1) $\frac{d^2x}{dt^2} = x$ 2) $\frac{d^2x}{dt^2} = p^2x$ 3) $\frac{d^2x}{dt^2} + p^2x = 0$ 4) $\frac{d^2x}{dt^2} = t$

65. If the lengths of the two segments of a focal chord intercepted by its axis are 3 and 5 then the length of latusrectum of the parabola will be

1) $\frac{15}{8}$ 2) $\frac{15}{4}$ 3) $\frac{15}{2}$ 4) 15

66. Three normals are drawn from the point (c, 0) to the parabola $y^2 = x$, one normal is the x-axis. If the other two normals are perpendicular to each other then 'C' =

1) 1 2) $\frac{1}{2}$ 3) $\frac{3}{4}$ 4) $\frac{2}{3}$

67. If $\frac{3x+2}{(x+1)(2x^2+3)} = \frac{A}{x+1} + \frac{Bx+C}{2x^2+3}$ then A + C – B =

1) 0 2) 3 3) 2 4) 5

68. If $\sqrt{3}bx + ay = 2ab$ is a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ then eccentric angle θ is

1) $\frac{\pi}{4}$ 2) $\frac{\pi}{6}$ 3) $\frac{\pi}{2}$ 4) $\frac{\pi}{5}$

69. The angle between the asymptotes of the hyperbola $\frac{x^2}{16}-\frac{y^2}{9}=1$ is

1) $\tan^{-1}\left(\frac{24}{7}\right)$ 2) $\tan^{-1}\left(\frac{3}{4}\right)$ 3) $\tan^{-1}\left(\frac{4}{3}\right)$ 4) $\tan^{-1}\left(\frac{7}{24}\right)$

70. $\int\frac{x^3}{\sqrt{1+x^2}}dx=a\,(1+x^2)^{3/2}+b\sqrt{1+x^2}+c$ then

1) $a=\frac{1}{3},\ b=1$ 2) $a=\frac{-1}{3},\ b=1$ 3) $a=\frac{-1}{3},\ b=-1$ 4) $a=\frac{1}{3},\ b=-1$

71. $\int\frac{\sin x}{\sin^2 x+4\cos^2 x}\,dx=$

1) $\frac{1}{\sqrt{3}}Tan^{-1}\left(\frac{1}{\sqrt{3}\sin x}\right)+c$ 2) $\frac{1}{\sqrt{3}}Tan^{-1}\left(\frac{1}{\sqrt{3}\cos x}\right)+c$

3) $\frac{1}{\sqrt{3}}Tan^{-1}\left(\frac{1}{\sqrt{3}\sec x}\right)+c$ 4) $\frac{1}{\sqrt{3}}Tan^{-1}\left(\frac{1}{\sqrt{3}Tanx}\right)+c$

72. $\int\frac{x^2-1}{x^3\sqrt{2x^4-2x^2+1}}\,dx=$

1) $\frac{\sqrt{2x^4-2x^2+1}}{x^2}+c$ 2) $\frac{\sqrt{2x^4-2x^2+1}}{x^3}+c$ 3) $\frac{\sqrt{2x^4-2x^2+1}}{x}+c$ 4) $\frac{\sqrt{2x^4-2x^2+1}}{2x^2}+c$

73. $\int e^x\left(\log x+\frac{1}{x^2}\right)dx=$

1) $e^x\log x+c$ 2) $e^x\left(\log x-\frac{1}{x}\right)+c$ 3) $e^x\left(\log x-\frac{1}{x^2}\right)$ 4) $\frac{e^x}{x^2}+c$

74. $\int_0^a\frac{dx}{x+\sqrt{a^2-x^2}}=$

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{6}$ 4) π

75. $\int_{-1}^{1}\left(\frac{x^7-3x^5+7x^3-x}{\cos^2 x}+\cos^{-1}x\right)dx=$

1) 0 2) $\frac{\pi}{2}$ 3) π 4) 2π

76. The area of the region bounded by the curve $y=2x-x^2$ and the line $y=x$ is

1) $\frac{1}{6}$ 2) $\frac{1}{4}$ 3) $\frac{1}{2}$ 4) $\frac{1}{3}$

77. The solution of the differential equation $x^2\frac{dy}{dx}-xy=1+\cos\left(\frac{y}{x}\right)$ is

1) $Tan\left(\frac{y}{x}\right)=c+\frac{1}{x}$ 2) $Tan\left(\frac{y}{2x}\right)=c-\frac{1}{2x^2}$ 3) $\cos\left(\frac{y}{x}\right)=1+\frac{c}{x}$ 4) $x^2=(c+x^2)\tan\left(\frac{y}{2x}\right)$

78. The equation of the circle described on the common chord of the circles $x^2 + y^2 + 2x = 0$, $x^2 + y^2 + 2y = 0$ as diameter is

1) $x^2 + y^2 + 2x + 2y = 0$ 2) $x^2 + y^2 - 2x - 2y = 0$

3) $x^2 + y^2 + x + y = 0$ 4) $x^2 + y^2 - x - y = 0$

79. A point (2, 2) undergoes reflection in the x-axis and then the coordinate axes are rotated through an angle of $\frac{\pi}{4}$ in anticlockwise direction. The final position of the point in the new coordinate system is.

1) $(0, -2\sqrt{2})$ 2) $(0, 2\sqrt{2})$ 3) $(2\sqrt{2}, 0)$ 4) $(-2\sqrt{2}, 0)$

80. The eccentricity of the ellipse given by the locus of the point P(x, y) satisfying the equation $\sqrt{(x-2)^2 + (y-1)^2} + \sqrt{(x+2)^2 + (y-1)^2} = 8$ is

1) $\frac{1}{8}$ 2) $\frac{1}{4}$ 3) $\frac{1}{2}$ 4) $\frac{1}{\sqrt{2}}$

PHYSICS

81. At what temperature is the r.m.s velocity of a hydrogen molecule equal to that of an oxygen molecule at 47^0c ?

1) 80 K 2) - 73K 3) 3 K 4) 20 K

82. A closed hollow insulated cylinder is filled with a gas at 0^0C, and also contains an insulated piston of negligible weight and thickenss at the middle point. The gas on one side of the piston is heated to 100^0C. If the piston moves 5cm, the length of the cylinder containing the gas at 100^0C is

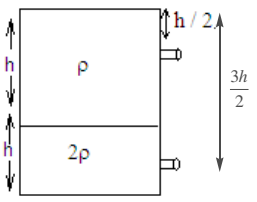
1) 13.65cm 2) 27.3 cm 3) 64.6cm 4) 37.3 cm

83. A light rod of length 75 cm is suspended from the ceiling horizontally by means of two vertical wires of equal length tied to its ends. One of the wires of equal length tied to its ends. One of the wire is made of steel of cross section 0.2cm^2, and the other is brass of cross section 0.4cm^2. The position along the rod at which a weight may be hung to produce equal stress $\left(y_{steel} = 20\times10^{10}\,\text{N/m}^2, y_{brass} = 10\times10^{10}\,\text{N/m}^2\right)$

1) 50 cm from steel wire 2) 25 cm from steel wire

3) 33.3 cm from steel wire 4) 13.3 cm from steel wire

84. A tank is filled with two immiscible liquids of densities 2ρ and ρ each of height 'h' two holes are made to the side wall at $\frac{h}{2}$ and $\frac{3h}{2}$ from upper surface of the liquid, the find the ratio of efflux velocity of the liquids through the holes



1) 1 : 1 2) 1 : 2 3) $1:\sqrt{2}$ 4) 2 : 3

85. Drops of liquid of density 'd' floats half immersed in a liquid of density 'ρ'. If the surface tension of the liquid is 'T', then the radius of the drop will be

1) $\sqrt{\frac{3T}{g(3d-\rho)}}$ 2) $\sqrt{\frac{6T}{g(2d-\rho)}}$ 3) $\sqrt{\frac{3T}{g(2d-\rho)}}$ 4) $\sqrt{\frac{3T}{g(4d-3\rho)}}$

86. When a wave traverses through a medium the displacement of a particle located at 'x' at a time 't' is given by $y = a\sin(bt-cx)$, where a, b, c are constants of the wave. Which of the following is a quantitiy with dimensions

1) $\frac{y}{a}$ 2) bt 3) cx 4) $\frac{b}{c}$

87. A sphere of coefficient of linear expansion α mass 'm', and radius 'r' is spinning about an axis through its diameter with an angular velocity ω. When it is heated such that its temperature increases by 'Δt' the angular velocity becomes

1) $\omega(1+\alpha\Delta t)^2$ 2) $\omega(1+\alpha\Delta t)$ 3) $\frac{\omega}{(1+2\alpha\Delta t)}$ 4) $\omega\alpha\Delta t$

88. Three samples of the same gas A, B & C $\left(\gamma=\frac{3}{2}\right)$ have initially equal volume. Now the volume of each sample is doubled. The process is adiabatic for A, isobaric for 'B' and isothermal for 'C'. If the final pressures are equal for all the three samples, find the ratio of their initial pressures

1) 1 : 1 : 1 2) $2\sqrt{2}:1:2$ 3) $2:1:2$ 4) $\sqrt{2}:1:2$

89. An ideal gas under goes a quasi-static, reversible process in which its molar heat capacity 'C' remains constant. If during this process the releation of pressure 'P' and volume 'V' is given by PV^n = constant, then 'n' is given by (Here C_P and C_V are molar specific heat at constant pressure and volume respectively)

1) $n=\frac{C-C_V}{C-C_P}$ 2) $n=\frac{C_P}{C_V}$ 3) $n=\frac{C-C_P}{C-C_V}$ 4) $n=\frac{C_P-C}{C-C_V}$

90. A pendulum consist of a wooden bob of mass 'm' and , length 'ℓ'. A bullet of mass 'm_1' is fired towards the pendulum with a speed 'υ_1'. The bullet emerges out of the bob with a speed $\frac{\upsilon_1}{3}$, and the bob just complete the vertical circle. The value of 'υ_1' is

1) $\left(\frac{m}{m_1}\right)\sqrt{5g\ell}$ 2) $\frac{m}{m_1}\sqrt{\frac{g}{\ell}}$ 3) $\frac{2}{3}\left(\frac{m}{m_1}\right)\sqrt{5g\ell}$ 4) $\frac{3}{2}\left(\frac{m}{m_1}\right)\sqrt{5g\ell}$

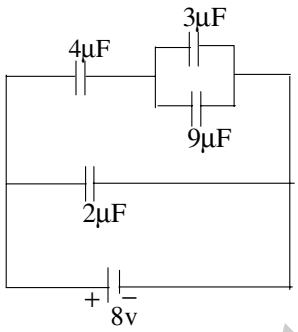
91. Four charges equal to -Q are placed at the four corners of a square and a charge 'q' is placed at its centre. If the system is in equilibrium the value of 'q' is

1) $\frac{-Q}{4}(1+2\sqrt{2})$ 2) $\frac{Q}{4}(1+2\sqrt{2})$ 3) $\frac{-Q}{2}(1+2\sqrt{2})$ 4) $\frac{Q}{2}(1+2\sqrt{2})$

92. Two metal spheres of radii in the ratio 4 : 3 are kept in contact and a charge is given to them. Next they are separated wide apart so that there is no electric influence of one on another. Find the ratio of charges on them

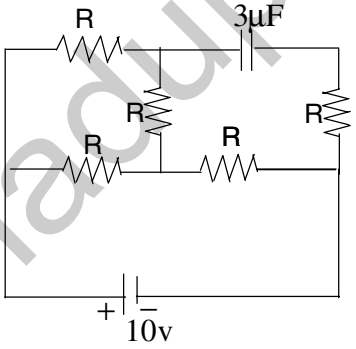
1) 4 : 3 2) 3 : 4 3) 1 : 4 4) 3 : 2

93. A combination of capacitors is set up as shown in figure. The magnitude of the electric field, due to a point charge Q' (having a charge equal to the sum of the charges on the $4\mu F$ and $9\mu F$ capacitors) at a point distance 30m from it, would equal



1) 480 N/C 2) 240 N/C 3) 360 N/C 4) 420 N/C

94. In the circuit shown, the cell is ideal with emf = 10V, each resistance is 2Ω. The potential difference across the capacitor is __



1) 6V 2) 10 V 3) 8V 4) zero

95. The temperature coefficient of resistivity of material is 0.0004/k, when the temperature of the m ateiral is increased by 50^0C, its resistivity increases by $2\times10^{-8}\Omega-m$,. The initial resistivity of the material in ohm-metre is

1) 50×10^{-8} 2) 90×10^{-8} 3) 100×10^{-8} 4) 200×10^{-8}

96. A particle is projected with a velocity of $10\sqrt{2}\,ms^{-1}$ at an angle of 45^0 with the horizontal. Find the interval between the moments when its speed is $\sqrt{125}\ ms^{-1}$ ($g=10ms^{-2}$)

1) 2 s 2) 3 s 3) 4 s 4) 1 s

97. The electric field of a plane electromagnetic wave varies with time of amplitude $2Vm^{-1}$ propagating along z-axis. The average energy density of the magnetic field is (in $J\,m^{-3}$)

1) 13.29×10^{-12} 2) 8.86×10^{-12} 3) 17.72×10^{-12} 4) 4.43×10^{-12}

98. A coil in the shape of an equilateral triangle of side 'ℓ' is suspended betwen the pole pieces at a permanent magnet such that 'B' is in plane of the coil, if due to current 'i' in the triangle a torque 'τ' acts on it, the side 'ℓ' of the traingle is

1) $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)$ 2) $2\left(\frac{\tau}{\sqrt{3}Bi}\right)^{1/2}$ 3) $\frac{2}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)^{1/2}$ 4) $\frac{1}{\sqrt{3}}\left(\frac{\tau}{Bi}\right)$

99. An air-cored solenoid is of length 0.3m, area of cross section $1.2\times10^{-3}\,m^2$ and has 2500 turns. Around its central section, a coil of 350 turns is wound. The solenoid and the coil ore electrically insulated from each other. Calculate the emf induced in the coil if the initial current of 3A in the solenoid is reversed in 0.25 sec

1) 10 v 2) 5v 3) 0.22v 4) 0.1056v

100. A step up transformer operates on a 230 V line and a load current of 2 ampere. The ratio of the primary and secondary windings is 1 : 25. What is the current in the primary?

1) 25 A 2) 20 A 3) 50 A 4) 100 A

101. The length of a cylinder is measured with a meter rod having least count 0.1 cm. Its diameter is measured with vernier callipers having least count 0.01 cm. Given the length is 5.0 cm and radius is 2.00 cm. The percentage error in the calculated value of its volume will be

1) 2% 2) 1% 3) 4% 4) 3%

102. A body of mass m is raised to a height h above the surface of the earth of mass M and radius R until its gravitational potential energy increases by $\frac{1}{3}mgR$. The value of 'h' is

1) $\frac{R}{3}$ 2) $\frac{R}{2}$ 3) $\frac{mR}{m+M}$ 4) $\frac{mR}{M}$

103. A block of mass M placed on a rough incined plane of inclination $\theta = 30^0$ can just be prevented from sliding down by applying a force F_1 up the plane and it can be just made to slide up the plane by applying a force F_2 up the plane. If the coefficient of friction between the block and the inclined plane is $\frac{1}{2\sqrt{3}}$, the relation between F_1 *and* F_2 is

1) $F_2 = 4F_1$ 2) $F_2 = 3F_1$ 3) $F_2 = 2F_1$ 4) $F_1 = F_2$

104. A 500 kg boat has an initial speed of $10\,ms^{-1}$ as it passes under a bridge. At that instant a 50kg man jumps straight down into the boat from the bridge. The speed of the boat after the man and boat attain a common speed.

1) $\frac{100}{11}ms^{-1}$ 2) $\frac{10}{11}ms^{-1}$ 3) $\frac{50}{11}ms^{-1}$ 4) $\frac{5}{11}ms^{-1}$

105. Magnetic field at the centre of a circular loop of area 'A' is B. The magnetic moment of the loop will be

1) $\frac{BA^2}{\mu_0\pi}$ 2) $\frac{BA^{3/2}}{\mu_0\pi}$ 3) $\frac{BA^{3/2}}{\mu_0\pi^{1/2}}$ 4) $\frac{2BA^{3/2}}{\mu_0\pi^{1/2}}$

106. The period of oscillation of particle in S.H.M. is 12 seconds. Minimum time in which its velocity changes from maximum value to half the maximum value is

1) 6 sec 2) 2 sec 3) 3 sec 4) 1 sec

107. A homogenous disc with a radius 0.2m and mass 5kg rotates around an axis passing through its centre perpendicular to its plane. The angular velocity of rotation of the disc as a furnction of time is given by the formula $\omega = 2 + 6t$. The tangential force applied to the rim of the disc is

1) 1 N 2) 3 N 3) 4 N 4) 2 N

108. Two blocks of masses 10kg and 30 kg are placed along a vertical line. The first block is raised through a height of 7cm. By what distance should the second mass be moved to raise the centre of mass by 1 cm ?

1) 1 cm downward 2) 1 cm upward 3) 2 cm downward 4) 2 cm upward

109. The velocity of a particle is $V = V_0 + gt + ft$. If its position is x=0 at t=0, then its displacement after unit time (t =1) is ?

1) $V_0 + 2g + 3f$ 2) $V_0 + g + f$ 3) $V_0 + \frac{g}{2} + \frac{f}{3}$ 4) $V_0 + \frac{g}{2} + f$

110. The width of the river is $2\sqrt{3}$ Km. A boat is rowed in a direction perpendicular to the banks of river. If the drift of the boat due to river flow is 2km, the displacement of the boat is

1) 3 Km 2) 4 Km 3) 6 Km 4) 5 Km

111. In a two slits experiment with mono chromatic light fringes are obtained on a screen placed at some distance from the slits. If the screen is moved by $5\times10^{-2} m$ towards the slits, the change in the fringe width is $3\times10^{-5} m$. If seperation between the slits is $10^{-3} m$ the wavelength of light used is

1) $6000A^0$ 2) $4500A^0$ 3) $3000A^0$ 4) $5000A^0$

112. Match the following

List - I	List - II
a) p-n junction diode	e) Transmission of electric power
b) Transitor	f) Rectifier
c) Zener diode	g) Amplifier
d) Transformer	h) Voltage regulator (stabilizer)

1) a - f, b - g, c - e, d - h 2) a - f, b - e, c - h, d - g

3) a - f, b - g, c - h, d - e 4) a - f, b - h, c - e, d - g

113. A transverse wave propagation on a stretched string of linear density $5\times10^{-4} kg/m$ is represented by equation y = 0.2 sin (1.5x + 60t) where 'x' is in meters and 't' is in seconds. The tension in string (in newtons) is

1) 0.24 2) 0.48 3) 1.20 4) 1.80

114. Assertion (A) : Blue colour of sky is on account of scattering of sunlight
Reason (R) : The intensity of scattered light varies inversely as the fourth power of wavelength of light
1) Both 'A' and 'R' are true and 'R' is the correct explaination of 'A'
2) Both 'A' and 'R' are true and 'R' is not the correct explaination of 'A'
3) 'A' is true 'R' is false
4) 'A' ios false and 'R' is false

115. A ray of light is incident normally on one of the faces of a prism of apex angle 30^0 and refractive index $\sqrt{2}$. The angle of deviation of the ray is
1) 0^0 2) 12.5^0 3) 15^0 4) 22.5^0

116. The power of a AM transmitter is 100W. If the modulation Index is 0.5 and the transmission having single side band, the percentage of useful power is
1) 1.2 W 2) 2.2 W 3) 22 W 4) 11 W

117. A radio isotope has half life of 5 years. The fraction of the atoms of this material that would decay in 15 years will be
1) 7/8 2) 5/8 3) 2/3 4) 1

118. Ratio of frequencies of long wavelength limits of the Balmer and Lyman series in hydrogen spectrum is
1) 27 : 5 2) 5 : 27 3) 4 : 12 4) 1 : 4

119. Two stationary sources A and B produces sounds of same frequency. A person running from A to B hears 6 beats/sec. If the frequency of each source increases by 100 Hz then 8 beats/sec are heard. Then the original frequency of each source is
1) 150 Hz 2) 100 Hz 3) 300 Hz 4) 200 Hz

120. When a metal surface 2mm thick is illuminated with light of wavelength λ, the stopping potential is V_0. When the same surface is illuminated by light of wavelength 3λ, the stopping potential is $V_0/5$. The threshold wave length for metal surface is
1) 5λ 2) 8λ 3) 10λ 4) 6λ

CHEMISTRY

121. In sulphur estimation, 0.157gm of an organic compound gave 0.4813 gm of barium sulphate, then the percentage of sulphur in the compound is
1) 56% 2) 42.10% 3) 34.04% 4) 17.46%

122. $E^0_{1/2Cl_2|Cl^-} = +1.36V$. The single electrode potential of Pt, Cl_2 (1 atm) |Cl^- (0.1M) is
1) -1.36V 2) +1.16V 3) +1.42V 4) -1.53V

123. The IP_1, IP_2IP_3,IP_4 of an element A(at wt x) are 6,10,16 and 45 ev respectively. The molecular weight of the oxide of the element A is
1) x+48 2) 2x+48 3) 3x+48 4) x+32

124. The solubility of $Al(OH)_3$ is s mole / litre, the solubility product is
1) s^3 2) $27s^4$ 3) $4s^3$ 4) s^2

125. The volume strength of 3.57M solution of H_2O_2 is

1) 30 vol 2) 20 vol 3) 25 vol 4) 40 vol

126. Hydrocarbon (X) C_4H_8 on reductive ozonolysis gives product (Y) which responds to iodoform reaction Hydrocarbon (X) is

1) But-2 ene 2) But-1-ene 3) Butane 4) cyclo butane

127. The magnetic moment of Cr^{+3} is similar to that of

1) Fe^{+2} 2) Fe^{+3} 3) Co^{+3} 4) Co^{+2}

128. Vapour pressure of a solution containing heptane as a solvent is 5% less than that of the solvent. The molality of the solution is

1) 2m 2) 1.5 m 3) 0.5m 4) 0.2m

129. The half life period and the initial concentration for a reaction are as follows

Half life (sec)	420	210	840
Initial pressure (mm of Hg)	350	700	175

The order of the reaction is

1) zero 2) one 3) two 4) three

130. In which of the following pairs, the two species are isostructural

1) NO_3^- and SO_3^{2-} 2) BF_3 and NF_3 3) BrO_3^- and XeO_3 4) SF_4 and XeF_4

131. The protective colloid having higher gold number

1) Gum Arabic 2) Gelatine 3) Potato starch 4) Haemoglobin

132. Which one of the following benefication process is used for the mineral $Al_2O_3 2H_2O$ with red impurity

1) Froth flotation 2) Leaching

3) Liquation 4) Magnetic separation

133. Which of the following complex involves sp^3d^2 hybridization

1) $[FeF_6]^{3-}$ 2) $[Fe(CN)_6]^{3-}$ 3) $[Cr(NH_3)_6]^{3+}$ 4) $[Co(NH_{3.})_6]^{3+}$

134. The BOD values of four samples A,B,C and D are 9 PPM, 10PPM, 100PPM and 400PPM respectively. The least polluted sample is

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

135. Equanil is

1) artificial sweetener 2) antihistamine 3) tranquilizer 4) antifertility drug

136. During dehydration of alcohols by treatment with conc. H_2SO_4 the first step is

1) formation of ester 2) protonation of alcohol molecule

3) formation of carbocation 4) Elimination of water

137. List –I

I) $RCOCl \rightarrow R-CHO$

II) $C_6H_5NH_2 \rightarrow C_6H_5NC$

III) $CH_3CHO \rightarrow CH_3CH(OH)CH_2CHO$

IV) $CH_3COONa_{(aq)} \rightarrow C_2H_6$

V) $C_6H_5OH \rightarrow C_6H_4(OH)CHO$

List – II

A) Aldol condensation

B) Reimer – Tiemann reaction

C) carbylamine reaction

D) Rosenmund's reaction

E) Kolbe's electrolysis

The correct match is

	I	II	III	IV	V
1)	D	C	A	E	B
3)	A	B	C	D	E

	I	II	III	IV	V
2)	D	A	C	B	E
4)	C	A	B	E	D

138. Which of the following order is true regarding acidic nature of –COOH

1) $p^{Ka}(HCOOH) > p^{Ka}(CH_3COOH) > p^{Ka}(CH_3CH_2COOH)$

2) $p^{Ka}(HCOOH) > p^{Ka}(CH_3COOH) < p^{Ka}(CH_3CH_2COOH)$

3) $p^{Ka}(HCOOH) = p^{Ka}(CH_3COOH) > p^{Ka}(CH_3CH_2COOH)$

4) $p^{Ka}(HCOOH) < p^{Ka}(CH_3COOH) < p^{Ka}(CH_3CH_2COOH)$

139. Pickout the strongest reducing agent among the following oxyacids of phosphorous

1) Hypo phosphorous acid
2) Phosphorous acid
3) Hypo phosphoric acid
4) Phosphoric acid

140. Chlorine reacts with excess of ammonia to form

1) $NCl_3 + HCl$
2) $N_2 + HCl$
3) $N_2 + NH_4Cl$
4) $N_2 + NCl_3$

141. In which of the following cases, the reaction is spontaneous at all temperatures

1) $\Delta H > 0; \Delta S > 0$
2) $\Delta H < 0; \Delta S > 0$
3) $\Delta H < 0; \Delta S < 0$
4) $\Delta H > 0; \Delta S < 0$

142. Wave length associated with a golf ball weighing 200 gm and moving at a speed of 5m/hr is of the order

1) $10^{-10}m$
2) $10^{-20}m$
3) $10^{-30}m$
4) $10^{-40}m$

143. Sucrose in water is dextrorotatory, $[\alpha]_D = +66.4°$ when boiled with dil. HCl, the solution becomes leavo rotatory, $[\alpha]_D = -39.9°$. In this process the sucrose breaks into

1) L-glucose + D -fructose
2) L-glucose +L-fructose
3) D- glucose +D-fructose
4) D-glucose+L-fructose

144. The Ionisation energy of He^+ is $19.6\times10^{-18} Jatom^{-1}$. The energy of first stationary state (n=1) of L_i^{+2} is

1) $4.41\times10^{-16} Jatom^{-1}$
2) $-4.41\times10^{-17} Jatom^{-1}$
3) $-2.2\times10^{-15} Jatom^{-1}$
4) $8.82\times10^{-17} Jatom^{-1}$

145. Which of the following hydrogen bonds is strongest

1) O-H..... N 2) F-H..... F 3) O-H.....O 4) O-H.....F

146. Some statements are given below. The correct statements.

a) Among Lanthanides La^{+3} ion has the small size

b) In Misch metal along traces of Iron around 5% Al are present

c) All actinides have 5f electrons

d) Lanthanides liberates H_2 with dilute mineral acids

1) All are correct 2) Only d are correct

3) Only a,b,c are correct 4) Only b and d are correct

147. Nylon – 6,6 is which type of polymer?

1) Polyamide 2) Polyester 3) addition 4) Bio polymer

148. The ratio of masses of oxygen and Nitrogen in a particular gaseous mixture is 1:4, the ratio of number of molecules is

1) 3:16 2) 1:4 3) 7:32 4) 1:8

149. The ionic mobility of alkali metal ions in aqueous solution is maximum for

1) K^+ 2) Rb^+ 3) Li^+ 4) Na^+

150. At 2.2K following gas can form super fluid

1) He 2) Ne 3) Ar 4) Xe

151. Which of the following statement is correct

i) Boron shows diagonal relationship with aluminium

ii) Borax dissolves in water to give an acidic solution

iii) Diborane reacts with NH_3 to give $\left[BH_2(NH_3)_4\right]^+\left[BH_2\right]^-$

1) i 2) ii 3) iii 4) all

152. Compound formed in positive test for nitrogen with Lassaign solution of an organic compound is

1) $Fe_4\left[Fe(CN)_6\right]_3$ 2) $Na_4\left[Fe(CN)_5 NOS\right]$

3) $Fe(CN)_3$ 4) $Na_3\left[Fe(CN)_6\right]$

153. Which of the following is metallic and ferromagnetic

1) MnO_2 2) TiO_2 3) CrO_2 4) VO_2

154. What is the pH of the NaOH solution when 0.04 gm of it dissolved in water and made to 100 ml solution?

1) 2 2) 1 3) 13 4) 12

155. O_3 acts as bleaching agent due to

1) reducing nature 2) dehydration 3) oxidising nature 4) acidic nature

156. Major organic compound formed by reaction 1,1,1-trichloromethane with silver powder is

1) 2-Butene 2) Acetylene 3) Ethene 4) 2-Butyne

157. Ethyl isocyanide on hydrolysis in acidic medium generate

1) Propanoic acid and ammonium salt 2) Ethanoic acid and ammonium salt

3) Methylamine and ethanoic acid 4) ethylamine salt and methanoic acid

158. Which of the following base is not present in DNA

1) Thymine 2) Uracil 3) Adenine 4) Cytosine

159. Dipole – Dipole interaction energy between rotating molecules is proportional to [r is the distance between polar molecules]

1) $\frac{1}{r^2}$ 2) $\frac{1}{r^3}$ 3) $\frac{1}{r^6}$ 4) $\frac{1}{r}$

160. A gas 'X' is dissolved in water at '2' bar pressure. Its mole fraction is 0.02 in solution. The mole fraction of water when the pressure of gas is doubled at the same temperature is

1) 0.04 2) 0.98 3) 0.96 4) 0.02

EAMCET MODEL GRAND TEST

KEY

MATHEMATICS

1) **3**	2) **3**	3) **2**	4) **1**	5) **1**	6) **2**	7) **2**	8) **1**	9) **3**	10) **1**
11) **1**	12) **2**	13) **2**	14) **2**	15) **4**	16) **2**	17) **3**	18) **4**	19) **2**	20) **4**
21) **2**	22) **1**	23) **3**	24) **2**	25) **2**	26) **1**	27) **3**	28) **1**	29) **3**	30) **3**
31) **2**	32) **3**	33) **4**	34) **4**	35) **1**	36) **4**	37) **2**	38) **3**	39) **1**	40) **3**
41) **2**	42) **1**	43) **2**	44) **4**	45) **2**	46) **1**	47) **2**	48) **3**	49) **3**	50) **4**
51) **3**	52) **3**	53) **3**	54) **3**	55) **4**	56) **2**	57) **3**	58) **2**	59) **3**	60) **2**
61) **4**	62) **2**	63) **2**	64) **3**	65) **3**	66) **3**	67) **3**	68) **2**	69) **1**	70) **4**
71) **2**	72) **4**	73) **2**	74) **2**	75) **3**	76) **1**	77) **2**	78) **3**	79) **1**	80) **3**

PHYSICS

81) **4**	82) **4**	83) **1**	84) **3**	85) **3**	86) **4**	87) **3**	88) **2**	89) **3**	90) **4**
91) **2**	92) **1**	93) **4**	94) **3**	95) **3**	96) **4**	97) **2**	98) **2**	99) **4**	100) **3**
101) **4**	102) **2**	103) **2**	104) **1**	105) **4**	106) **2**	107) **2**	108) **1**	109) **3**	110) **2**
111) **1**	112) **3**	113) **2**	114) **1**	115) **3**	116) **4**	117) **1**	118) **1**	119) **3**	120) **4**

CHEMISTRY

121) **2**	122) **3**	123) **2**	124) **2**	125) **4**	126) **1**	127) **4**	128) **3**	129) **3**	130) **3**
131) **3**	132) **2**	133) **1**	134) **1**	135) **2**	136) **2**	137) **1**	138) **4**	139) **1**	140) **3**
141) **2**	142) **3**	143) **3**	144) **2**	145) **2**	146) **2**	147) **1**	148) **3**	149) **2**	150) **1**
151) **3**	152) **1**	153) **3**	154) **4**	155) **3**	156) **4**	157) **4**	158) **2**	159) **3**	160) **3**

EAMCET MODEL GRAND TEST

SOLUTIONS

Mathematics

1. $y = \alpha + \beta - 2\gamma$

   $y = -1 - \gamma - 2\gamma \quad (\because\ \alpha + \beta + \gamma = 1$

   $\frac{y+1}{-3} = \gamma$ sub in $x^3 + x^2 + x + 2 = 0$ and simplifly

2. $(-1)^{n-1}(a+ib)^m$

3. n(A) = r; n(B) = n, then number of one-one functions = ${}^{n}P_{r} = {}^{5}P_{3}$

4. $2\alpha + 3\alpha = \frac{\pi}{4} \Rightarrow \alpha = \frac{\pi}{20}$

5. w.k.t. $\tan\frac{\pi}{4} = 1 \Rightarrow \tan 3\left(\frac{\pi}{12}\right) = 1 \Rightarrow \frac{3\tan\frac{\pi}{12} - \tan^3\frac{\pi}{12}}{1 - 3\tan^2\frac{\pi}{12}} = 1$

   cross multiply and squaring on both sides and simplity

6. $\alpha = 2\omega, \beta = 2\omega^2$

7. α, β are roots of $ax^2 + bx + c = 0$ and $S_n = \alpha^n + \beta^n$ then $a s_n + b s_{n-1} + c s_{n-2} = 0$

8. $f(x-2) = 0$

9. $T_n = \frac{1}{\frac{n(n+1)}{2}} = \frac{2}{n(n+1)} = 2\left(\frac{1}{n} - \frac{1}{n+1}\right)$

   put n = 1, 2, ... 50 and add them

10. $\sum_{r=1}^{n} r^2 \left(\frac{{}^{n}c_r}{{}^{n}c_{r-1}}\right) = \frac{n(n+1)(n+2)}{6}$

    put n = 12

11. p = 2 : q = 3 $\quad \frac{x}{q} = \frac{1}{24} \Rightarrow x = \frac{1}{8} \quad \therefore \text{sum} = \left(1 - \frac{1}{8}\right)^{-2/3} = \frac{4}{\sqrt[3]{49}}$

12. $|A^{-1}| = -1 \therefore |A| = \frac{1}{|A^{-1}|} = -1$

    $\therefore\ |Adj\ 2A| + |2A| = |2A|^2 + 2^3|A|$

    $= \left(2^3|A|\right)^2 + 2^3|A|$

    sub |A| value and simplify

13. $(A^n)^T = (\underbrace{A.A....A}_{n\,times})^T = A^T.A^T.....A^T = (-A).(-A)....(-A) = (-1)^n.A^n = -A^n (\because\ n\ is\ odd)$

14. $AB = B - B^2 = 0$

15. $|Z_1| + |Z_2| \geq |Z_1 + Z_2|$

$|Z - 2 + 3i| + |4i + 3 - Z| \geq |7i + 1| = \sqrt{50} = 5\sqrt{2}$

16. $x = \lambda + 3\ ;\ \ y = \sqrt{5 - \lambda^2}$

Eliminate λ

17. f(2017) + f(–2017) = 20 $\therefore$ f (2017) = 0

18. Substituting α, β, γ values

19. $P(A \cap B \cap \overline{C}) + P(A \cap \overline{B} \cap C) + P(\overline{A} \cap B \cap C) + P(A \cap B \cap C)$

$= \frac{5}{7}.\frac{4}{7}.\frac{4}{7} + \frac{5}{7}.\frac{3}{7}.\frac{3}{7} + \frac{2}{7}.\frac{4}{7}.\frac{3}{7} + \frac{5}{7}.\frac{4}{7}.\frac{3}{7}$

20. $b^2 - 4c \geq 0 \Rightarrow b^2 \geq 4c, n(s) = 10 \times 10 = 100, n(A) = 62\ ,\ P(A) = 0.62$

21. G = Guessses C= Copies K = Knows : A = Answer is correct

$P(G) = \frac{1}{3}, P(C) = \frac{1}{6}, P(K) = 1 - \left(\frac{1}{3} + \frac{1}{6}\right) = \frac{1}{2}$

$P(A/C) = \frac{1}{8}, P(A/G) = \frac{1}{4}, P(A/K) = 1$

apply Baye's theorem and find $P(K/A)$

22. $P = \frac{3}{216} = \frac{1}{72}, Q = \frac{71}{72}, n = 4$

$P(X = 3) = {}^4C_3 \frac{71}{72}\left(\frac{1}{72}\right)^3$

23. $p = \frac{1}{10}, q = \frac{9}{10} and\ n = 8$

By using Binomial distribution find P(x = 3)

24. n = 24

Exponent of 2 in 24! $= \left[\frac{24}{2}\right] + \left[\frac{24}{4}\right] + \left[\frac{24}{8}\right] + \left[\frac{24}{16}\right] = 12 + 6 + 3 + 1 = 22$

Exponent of 5 in 24! $= \left[\frac{24}{5}\right] = 4$

number of zeros = Minimum of $\{22, 4\} = 4$

25. $\dfrac{\sum x_i f_i}{\sum f_i} = \dfrac{\sum r(r^2+r)}{\sum (r^2+r)} = \dfrac{\sum r^3 + \sum r^2}{\sum r^2 + \sum r}$

26. Here $k = 3, l = -2$

27. $(1111)(36) = 39996$

28. $x^2 - 4 \geq 0 \Rightarrow (x-2)(x+2) \geq 0 \Rightarrow x \in (-\infty, -2] \cup [2, \infty) = A$

$-1 \leq 2 - x < 1 \Rightarrow 1 < x \leq 3 \Rightarrow x \in (1, 3] = B$

Domain = $A \cap B = [2, 3]$

29. $\dfrac{\sin x}{\cos x} + \dfrac{1}{\cos x} = 2\cos x \Rightarrow 2\sin^2 x + \sin x - 1 = 0$

$(\sin x + 1)(2\sin x - 1) = 0$

$\sin x = \dfrac{1}{2}; \sin x = -1$

$x = 30^0, 150^0; x = \dfrac{3\pi}{2} (not\ a\ solution)$

30. Verification $x = \dfrac{1}{3}\tan\theta$

31. $e^u = \tan\left(\dfrac{\pi}{4} + \dfrac{\theta}{2}\right)$

$\cosh u = \dfrac{e^u + e^{-u}}{2} = \dfrac{\tan\left(\dfrac{\pi}{4} + \dfrac{\theta}{2}\right) + \tan\left(\dfrac{\pi}{4} - \dfrac{\theta}{2}\right)}{2} = \sec\theta$

32. $r_2 + r_3 + r - r_1 = 0 \Rightarrow 4R\cos A = 0 \Rightarrow \cos A = 0 \Rightarrow \angle A = 90^0$

33. Use tangent rule, sine rule.

34. Use cosine rule write cosA, cosB, cosC and simplify

35. $\overline{OP} = \bar{a} + t\bar{b}$ then find $|\overline{AP}|$ and equate to 15. We get 't'.

36. Take 'A' as origin, find the P.V of E. Solve the lines AC and DE to get P.V of M then find $\overrightarrow{DM}, \overrightarrow{ME}$

37. Verification in $\dfrac{x-2}{1} = \dfrac{y-3}{1} = \dfrac{z+1}{-1}$ and $\dfrac{x-1}{0} = \dfrac{y+2}{-4} = \dfrac{z-3}{3}$

38. $\bar{a} + \bar{b} + \bar{c} = -\bar{c}$ S.O.B.

39. $|\bar{\alpha} \times \bar{\beta}| = |(\bar{a} - \bar{b}) \times (\bar{a} + \bar{b})| = |2(\bar{a} \times \bar{b})| = 2\sqrt{a^2 b^2 - (\bar{a}.\bar{b})^2}$

40. $\left|\frac{1}{6}\left[\overrightarrow{AB}\ \overrightarrow{AC}\ \overrightarrow{AD}\right]\right|$

41. PA + PB + AB = 20
PA + PB = 14

Let A = S (–2, 3), B = S^1 (–2, –3)

SS^1 = 2be = 6 $\quad$ $sp + S^1 p = 2b$

be = 3 $\quad$ $2b = 14 \Rightarrow b = 7$

$a^2 = b^2 (1 - e^2) = 40$

Centre = Mid pt of S, S^1 = (–2, 0)

Locus of third vertex is $\frac{(x+2)^2}{40} + \frac{y^2}{49} = 1$

42. 1st option

43. Point $= \left(\frac{2+2}{3}, \frac{4+2}{3}\right) = \left(\frac{4}{3}, 2\right)$

slope m = 11

equation of line is $y - 2 = 11\left(x - \frac{4}{3}\right)$

$\Rightarrow 33x - 3y - 38 = 0$

44. Camparing with $x = x_1 + r\cos\theta$

$y = y_1 + r\sin\theta$

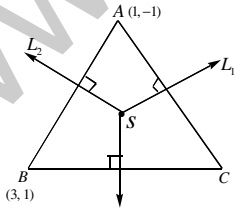
$(x_1\ y_1) = (-2,\ 1)$ $\quad \tan\theta = 3$

m=3

equation of line is y – 1 = 3 (x+2)

3x – y + 7 = 0

$a + b = \frac{-7}{3} + 7 = \frac{14}{3}$

45. 

equation of

L_1 is 3x – 2y + 8 = 0 -------(1)

equation L_2 is x + y = 2 -------(2)

S = P.I. of (1), (2) = $\left(\frac{-4}{5}, \frac{14}{5}\right)$

46. $ab^2 + a^2b + 8h^3 = 6abh$

47. $5x^2 + 12xy + 6y^2 + 4x - 2y + 3 = 0$ ---------- (1)

$x + ky = 1$ ---------- (2)

Hamoginised (1) with (2)

$5x^2 + 12xy + 6y^2 + (4x - 2y)(x + ky) + 3(x + ky)^2 = 0$

$\therefore$ pair of lines are equally inclined to the axes then coe xy = 0

$\Rightarrow (12 + 4k - 2) + 6k = 0 \Rightarrow k = -1$

48. $l(x_2 - x_1) + m(y_2 - y_1) + n(z_2 - z_1)$

49. D. C's of a line L (ab, b, b)

D. C's of x-axis : (1, 0, 0)

$\cos\frac{\pi}{3} = ab$ $\quad l^2 + m^2 + n^2 = 1$

$\therefore ab = \frac{1}{2}$ $\quad \frac{1}{4} + b^2 + b^2 = 1$

$\therefore \quad b = \sqrt{\frac{3}{8}}$ $\quad \therefore a = \sqrt{\frac{2}{3}}$

50. Required plane is $\frac{y}{b} + \frac{z}{c} = 1$

51. $\underset{x \to \pi}{Lt} \frac{\sqrt{2 + \cos x} - 1}{(\pi - x)^2}$ put $\pi - x = t$

$= \underset{t \to 0}{Lt} \frac{\sqrt{2 - \cos t} - 1}{t^2}$ $\quad x = \pi - t$

Rationalisive Nr $= \underset{t \to 0}{Lt} \frac{1 - \cos t}{t^2(\sqrt{2 - \cos t} + 1)} = \frac{1}{2}\frac{1}{(1+1)} = \frac{1}{4}$

52. $\therefore$ f(0) $= \underset{x \to 0}{Lt} f(x)$

$12 = \underset{x \to 0}{Lt} \frac{(e^x - 1)^2}{\sin\left(\frac{x}{k}\right)\log\left(1 + \frac{x}{4}\right)}$

Nr and Dr divided by x^2

$12 = \underset{x \to 0}{Lt} \frac{1}{\frac{1}{k}\left(\frac{\log\left(1 + \frac{x}{4}\right)}{x}\right)}$

by L. H. Rule $\Rightarrow 12 = 4K \Rightarrow K = 3$

53. $x^m y^n = (x+y)^{m+n}$ then $\frac{dy}{dx} = \frac{y}{x}$

54. $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 6 \Rightarrow x + y = 6\sqrt{xy}$

$(x+y)^2 = 36xy \Rightarrow x^2 - 34xy + y^2 = 0$

$\frac{dy}{dx} = \frac{-(2x-34y)}{-34x+2y} = \frac{17y-x}{y-17x}$

55. $x = \cos\theta,\ y = \sin 5\theta$

$y_1 = \frac{5\cos 5\theta}{-\sin\theta} \Rightarrow (\sin^2\theta) y_1^2 = 25\cos^2 5\theta$

$\Rightarrow (1-x^2) y_1^2 = 25(1-y^2)$

$\Rightarrow (1-x^2) 2 y_1 y_2 + y_1^2 (-2x) = 25(-2yy_1)$

$\Rightarrow (1-x^2) y_2 - xy_1 = -25y$

56. $2bc\cos A = b^2 + c^2 - a^2 \Rightarrow 2bc(-\sin A)\delta A = 0 + 0 - 2a\delta a$

$\Rightarrow 2\Delta\delta A = a\delta a$

57. $x = a\cos^3\theta,\ y = a\sin^3\theta$

$at\ \theta = \pi/4 \quad P = \left(\frac{a}{2\sqrt{2}}, \frac{a}{2\sqrt{2}}\right)$

slope $m = \frac{dy}{dx} = -1$ Tangent at p is $y - \frac{a}{2\sqrt{2}} = -1\left(x - \frac{a}{2\sqrt{2}}\right)$

$\Rightarrow x + y = \frac{a}{\sqrt{2}}$ area of $\Delta OAB = \frac{\frac{a^2}{2}}{2|1\times 1|} = \frac{a^2}{4}$

58. Let x, y be two non zero numbers

$\Rightarrow x + y = 4$

Let $P = \frac{1}{x} + \frac{1}{y} = \frac{x+y}{xy} = \frac{4}{x(4-x)}$

for maximum $\Rightarrow \frac{dp}{dx} = 0 \Rightarrow x = 2$

max.value = $\frac{4}{2(4-2)} = 1$

59. $f(x) = x(x-2)^2$,$[0, 2]$

$f^1(x) = (x-2)(3x-2)$

by LMVT, $f^1(c) = \dfrac{f(2)-f(0)}{2-0}$

$(c-2(3c-2) = 0 \Rightarrow c = \dfrac{2}{3}, c \neq 2$

60. Centre = $(1, 2)$

$3x + 4y = 6$ is tangent to the circle $\Rightarrow r = d$

$r = \dfrac{|3+8-6|}{9+16} = 1$

$\therefore \quad (x-1)^2 + (y-2)^2 = 1$

$x^2 + y^2 - 2x - 4y + 4 = 0$

61. Polar of $P(x_1\ y_1)$ is $S_1 = 0$

$\Rightarrow xx_1 + yy_1 - K(x + x_1) + c^2 = 0$

$\Rightarrow (xx_1 + yy_1 + c^2) - K(x + x_1) = 0$

$\Rightarrow L_1 + \lambda L_2 = 0$

$\therefore L_1 \equiv xx_1 + yy_1 + c^2 = 0$

$L_2 \equiv x + x_1 = 0$ P.I $= \left(-x_1 \dfrac{x_1^2 - c^2}{y_1}\right)$

62. Length of DCT & TCT $\sqrt{d^2 - (r_1 - r_2)^2}$ & $\sqrt{d^2 - (r_1 + r_2)^2}$

$d =$ distance between centres

63. Use $d^2 = r_1^2 + r_2^2$

64. $x = A\cos(pt + \alpha)$

$\dfrac{dx}{dt} = -AP\sin(pt + \alpha)$

$\dfrac{d^2x}{dt^2} = -AP^2\cos(pt + \alpha)$

$\dfrac{d^2x}{dt^2} = -p^2x$

65. Use $\dfrac{1}{SP} + \dfrac{1}{SQ} = \dfrac{1}{a}$

$LL^1 = 4a$

66. $y^2 = x,\ a = \frac{1}{4}$

equation of normal having slope m is $y = mx - 2am - am^3$

passes through (c, 0)

$\Rightarrow m^3 + 2m - 4cm = 0$

$m = 0,\ m^2 + 2 - 4c = 0$

$m_1 m_2 = -1 \ \Rightarrow\ 2 - 4c = -1 \ \Rightarrow c = \frac{3}{4}$

67. $3x+2 = A(2x^2+3) + (x+1)(Bx+c)$

comparing both sides coe's of x^3, x^2, x and constant

$\therefore A = \frac{-1}{5},\ B = \frac{2}{5},\ C = \frac{13}{5}$

A + C – B =

68. $\sqrt{3}bx + ay = 2ab$

$\frac{\sqrt{3}}{2}\frac{x}{a} + \frac{y}{b}.\frac{1}{2} = 1$

$\frac{x}{a}\cos\left(\frac{\pi}{6}\right) + \frac{y}{b}\sin\left(\frac{\pi}{6}\right) = 1 \quad \Rightarrow \therefore \theta = \pi/6$

69. $2\tan^{-1}\left(\frac{b}{a}\right) = 2\tan^{-1}\left(\frac{3}{4}\right)$

70. $\int \frac{x^3}{\sqrt{1+x^2}}\,dx$

$= \int (t^2 - 1)\,dt$ put $1 + x^2 = t^2$

xdx = tdt

$= \frac{t^3}{3} - t + c = \frac{1}{3}(1+x^2)^{3/2} - \sqrt{1+x^2} + c$

$a = \frac{1}{3},\ b = -1$

71. $\int \frac{\sin x}{\sin^2 x + 4\cos^2 x}\,dx$

Nr and Dr divided by $\cos^2 x$

$$= \int \frac{\sec x \tan x}{\tan^2 x + 4}\, dx \qquad \text{put } \sec x = t$$

$$= \int \frac{\sec x \tan x}{\sec^2 x + 3}\, dx \qquad \sec x \tan x\, dx = dt$$

$$= \int \frac{dt}{t^2 + (\sqrt{3})^2} = \frac{1}{\sqrt{3}} \tan^{-1}\left(\frac{t}{\sqrt{3}}\right) + c$$

$$= \frac{1}{\sqrt{3}} \tan^{-1}\left(\frac{1}{\sqrt{3}\cos x}\right) + c$$

72. $$\int \frac{x^2 - 1}{x^3 \sqrt{2x^4 - 2x^2 + 1}}\, dx = \int \frac{x^2 - 1}{x^5 \sqrt{2 - \frac{2}{x^2} + \frac{1}{x^4}}}\, dx$$

$$= \int \frac{\frac{1}{x^3} - \frac{1}{x^5}}{\sqrt{2 - \frac{2}{x^2} + \frac{1}{x^4}}}\, dx \qquad \text{put} \quad 2 - \frac{2}{x^2} + \frac{1}{x^5} = t \quad = \frac{1}{4}\int \frac{1}{\sqrt{t}}\, dt$$

$$= \frac{1}{4}\int \frac{1}{\sqrt{t}}\, dt \quad = \frac{1}{2}\sqrt{t} + c = \frac{1}{2}\sqrt{2 - \frac{2}{x^2} + \frac{1}{x^4}} + c$$

73. $$\int e^x \left(\log x + \frac{1}{x^2}\right) dx = \int e^x \left[\log x - \frac{1}{x} + \frac{1}{x} + \frac{1}{x^2}\right] dx$$

$$= e^x \left(\log x - \frac{1}{x}\right) + c$$

74. Put $x = a \sin\theta$

$$I = \int_0^{\pi/2} \frac{\cos\theta}{\sin\theta + \cos\theta}\, d\theta = \frac{\pi}{4}$$

75. $$\int_{-1}^{1} \left(\frac{x^7 - 3x^5 + 7x^3 - x}{\cos^2 x} + \cos^{-1} x\right) dx$$

$$= 0 + \int_{-1}^{1} \cos^{-1} x\, dx \quad (\text{first function is odd})$$

Let $\quad I = \int_{-1}^{1} \cos^{-1} x\, dx \implies I = \int_{-1}^{1} \cos^{-1}(-x)\, dx$

$$I = \int_{-1}^{1} \pi - \cos^{-1} x\, dx \qquad \Rightarrow \quad I = 2\pi - I \quad \Rightarrow \qquad I = \pi$$

76. Area = $\frac{\Delta^{3/2}}{6a^2}$

77. $x^2\frac{dy}{dx} - xy = 1+\cos(y/x)$ put $\frac{y}{x} = v$

$v + x\frac{dv}{dx} - v = \frac{1}{x^2}(1+\cos v)$ $\int\frac{dv}{1+\cos v} = \int\frac{1}{x^3}\,dx$

$\Rightarrow \tan\frac{v}{2} = \frac{-1}{2x^2} + c \Rightarrow \tan\left(\frac{y}{2x}\right) = \frac{-1}{2x^2} + C$

78. $S + \lambda L = 0$, L = S – S^1 = 0

$x^2 + y^2 + 2x + \lambda(x-y) = 0$

centre = $\left(\frac{-(2+\lambda)}{2}, \frac{\lambda}{2}\right)$

$\therefore$ L is diameter of Req. circle

$\Rightarrow$ centre lieson L = 0

$\Rightarrow \lambda = -1$

$\Rightarrow$ $x^2 + y^2 + x + y = 0$

79. Reflection of (2, 2) in x-axis is (2, –2) = (x, y)

use $X = x\cos\theta + y\sin\theta$

$Y = -x\sin\theta + y\cos\theta$

80. SP + S^{1}P = 8

where S = (2, 1) S_1 = (–2, 1)

$e = \frac{SS^1}{sp + s^1p} = \frac{4}{8} = \frac{1}{2}$

Physics

81. $(V_{rms})H_2 = (V_{rms})O_2$

$\sqrt{\frac{T_1}{m_1}} = \sqrt{\frac{T_2}{M_2}}$

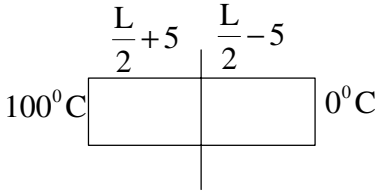
$\sqrt{\frac{T_1}{2}} = \sqrt{\frac{273+47}{32}}$

$\sqrt{\frac{T_1}{2}} = \sqrt{\frac{320}{32}}$

S.O.B.S

$\frac{T_1}{2} = 10 \therefore T_1 = 20k$

82.

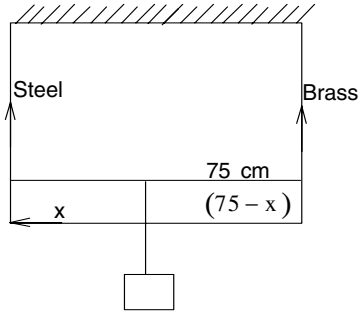


A/C to Charle's Law, $\frac{V_1}{T_1}=\frac{V_2}{T_2}$

$\frac{L+5}{375}=\frac{L-5}{273}; L=64.6cm$

At $100^0C, \frac{L}{2}+5=\frac{64.6}{2}+5=37.3cm$

83. From same stress



$\frac{T_1}{A_1}=\frac{T_2}{A_2}=\frac{T_1}{0.2}=\frac{T_2}{0.4}\Rightarrow T_2=2T_1$

$T_1x=T_1(75-x)$ $\qquad$ $T_1x=2T_1(75-x)$

$x+2x=150$

$3x=150$

$\therefore x=50cm$ from steel wire

84. A/C to Bernoullis theorem $\frac{T.E}{V}=K;$ i.e., $P+\rho gh+\frac{Pv^2}{2}=K$

$P_0+2\rho gh+\rho gh+0=P_0+2\rho gh+\rho g\frac{h}{2}+\frac{1}{2}\rho v_1^2$

$\frac{\rho gh}{2}=\frac{1}{2}\pi v_1^2=\sqrt{gh}$ ..... (1)

$P_0+2\rho gh+\rho gh+0=P_0+2\rho gh=\frac{h}{2}+\frac{1}{2}\times 2\rho\times v_2^2$

$2\rho gh=\rho v_2^2$

$\therefore v_2=\sqrt{2gh}$ ..... (2)

$\therefore v_1:v_2=\sqrt{gh}:\sqrt{2gh}=1:\sqrt{2}$

85. A/C to Laws of forces S.U.F = S.D.F.,

$$F_B + F_T = F_0$$

$$\frac{1}{2}\times\frac{4}{3}\pi t^3\rho g + 2\pi rT = \frac{4}{3}\rho r^3 dg$$

$$\frac{1}{3}r^2\rho g + T = \frac{2}{3}r^3 dg$$

$$T = \frac{2}{3}r^2 dg = \frac{1}{3}r^2\rho g = \frac{r^2 g}{3}(2d-\rho)$$

$$\frac{3T}{g(2d-\rho)} = r^2;\ \therefore r = \sqrt{\frac{3T}{g(2d-\rho)}}$$

86. $$\frac{y}{a} = \frac{\text{Displacement}}{\text{Amplitude}} = \frac{L}{L} = \text{No dimensions}$$

bt - No dimensions, since angle has no dimensions

Cx $\rightarrow$ No dimenions, since angle has no dimensions

A/C to Principle of homogeneity

$$bt = cx \Rightarrow \frac{b}{c} = \frac{x}{t} = \frac{L}{T} = \left[LT^{-1}\right] \rightarrow \text{velocity}$$

87. A/C to L.C.A. M, $l_1\omega_1 = l_2\omega_2$

but $l_2 = l_1\left[1+2\alpha\Delta t\right]$

$$l_1\omega = l_1(1+2\alpha\Delta t)\omega_2$$

$$\therefore \omega_2 = \frac{\omega}{(1+2\alpha\Delta t)}$$

88. For 'A' $P_1V_1^2 = P_2V_2\gamma$

$$\frac{P_1}{P_2} = \left(\frac{V_2}{V_1}\right)^{\gamma} = \left(\frac{2V}{V}\right)^{3/2} = 2\sqrt{2}\ \Big|\ \begin{matrix}\text{for 'B', } P_1 = P_2 = P \\ \text{for 'C' } P_1V_1 = P_2V_2\end{matrix}$$

$$\frac{P_1}{P_2} = \frac{2V}{V} = 2$$

$$P_{1A} : P_{1B} = P_{1C} = 2\sqrt{2} : 1 : 2$$

89. $$C = C_V + \frac{R}{(1-n)}$$

$$C - C_V = \frac{R}{(1-n)}$$

$$(1-n) = \frac{R}{C-C_V}$$

$$n = 1\frac{R}{C-C_V} = \frac{C-C_V-R}{C-C_V} = \frac{C-C_P}{C-C_V}\left(\because C_P - C_V = R\right)$$

90. For completing a vertical circle, velocity of the bob $\upsilon = \sqrt{5g\ell}$

A/C to L.C.L.M.,

$$m\upsilon = m_1\left(\upsilon_1 - \frac{\upsilon_1}{3}\right) = m_1\left(\frac{2\upsilon_1}{3}\right)$$

$$\therefore \upsilon = \frac{m_1}{m}\left(\frac{2\upsilon_1}{3}\right)(\text{or})\frac{2}{3}\left(\frac{m_1}{m}\right)\upsilon_1$$

From (1) & (2) $\frac{2}{3}\left(\frac{m_1}{m}\right)\therefore \upsilon_1 = \sqrt{5g\ell}$

$$\therefore \upsilon_1 = \frac{3}{2}\left(\frac{m}{m_1}\right)\sqrt{5g\ell}$$

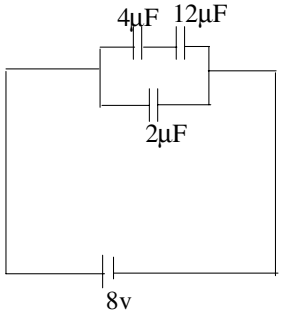
91. Charge at the centre 'q' $= \frac{+Q}{4}\left(1+2\sqrt{2}\right)$

92. Charge $Q = CV = \left(4\pi\varepsilon_0 R\right)V$

Since they are in contact, potential 'V' is same $q\alpha V$

$$\therefore q_1 : q_2 = R_1 : R_2 = 4:3$$

93.

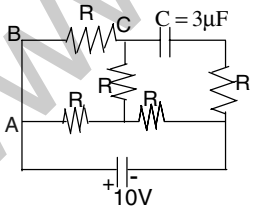


Charge on $4\mu F = 24\mu C$

Charge on $p\mu F = 18\mu C$

$$E = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2} = \frac{9\times10^9\times42\times10^{-6}}{30\times30} = 420\,N/C$$

94.



$$1 \rightarrow R_1 = R + R = 2R \qquad 2 \rightarrow R_2 = \frac{2R\times R}{3R} = \frac{2R}{3} \qquad 3 \rightarrow R_3 = \frac{2R}{3R} = \frac{2R}{3} + R = \frac{5R}{3}$$

$$1 = \frac{V}{R_3} = \frac{10\times3}{5R} = \frac{10\times3}{5\times2} = 3A$$

$$V = \frac{1R}{3} + IR = \frac{3\times2}{3} + 3\times2 = 8V$$

95. $\alpha = \dfrac{R_t - R_0}{R_0 t} = R_0 = \dfrac{(R_t - R_0)}{dt} = \dfrac{2\times10^{-8}}{4\times10^{-4}\times50} = 10^{-6}$ on $100\times10^{-8}\Omega - m$

96. $V_x = u_x = 10$

$V_y = ?$

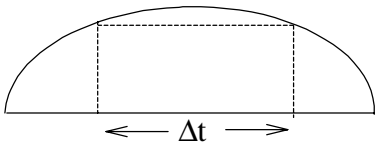
$V^2 = V_x^2 + V_y^2$

$125 = 10^2 + V_y^2$

$V_y = 5$

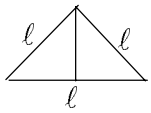
$\Delta t = \dfrac{2V_y}{g} = \dfrac{2\times5}{10}$

$= 1$ sec



97. $E_0 = 2\ \dfrac{1}{2}\in_0 \dfrac{E_0^2}{2} = \dfrac{1}{2}\dfrac{B^2}{2\mu_0}$

$\dfrac{1}{\cancel{4}}\times8.85\times10^{-12}\times\cancel{4} = 8.85\times10^{-12}$

98. 

$h = \sqrt{\dfrac{\ell^2 - \ell^2}{4}} = \dfrac{\sqrt{3}\ell}{2}$

$\tau = mB = NiAB = 1\times i\times\dfrac{1}{2}\times\ell\times\dfrac{\sqrt{3}\ell}{2}\times B$

$\tau = \dfrac{\sqrt{3}}{4}Bi\ell^2$

$\ell^2 = \dfrac{4\tau}{\sqrt{3}Bi};\therefore \ell = 2\left(\dfrac{\tau}{\sqrt{3}Bi}\right)^{1/2}$

99. $M = \dfrac{\mu_0 N_1 N_2 A}{\ell} = \dfrac{4\pi\times10^{-7}\times2500\times350\times1.2\times10^{-3}}{0.3} = 4.4\times10^{-3}M$

$e = m\dfrac{di}{dt}$

$e = 4.4\times10^{-3}\times\dfrac{3-(-3)}{0.25} = \dfrac{4.4\times10^{-3}\times6\times100}{0.25\times10} = 0.1056V$

100. $\frac{N_P}{N_S}=\frac{I_S}{I_P}=I_P=\frac{N_S I_S}{N_P}=\frac{25}{1}\times 2$

$\therefore I_P=50A$

101. Volume of the cylinder $V=\pi r^2 L$

$\frac{\Delta V}{V}\times 100=2\frac{\Delta r}{r}\times 100+\frac{\Delta L}{L}\times 100$

$=\frac{2\times 0.01}{2.00}\times 100+\frac{0.1}{5.0}\times 100$

$= 1 + 2 \qquad = 3\%$

102. P.E on the surface of the earth $+\frac{-GMm}{R}$

P.E at a height 'h'

above the surface of the earth $=\frac{-GMm}{R+h}$

$\because$ increase in the $P.E=\frac{-GMm}{R+h}-\left(\frac{-GMm}{R}\right)$

$\frac{GMmh}{R(R+h)}$

$=\frac{mgRh}{(R+h)}\left(\because g=\frac{Gm}{R^2}\right)$

As $=\frac{mgRh}{(R+h)}=\frac{1}{3}mgR$ (Given)

solving we get $h=\frac{R}{2}$

103. $F_1=Mg(\sin\theta-\mu\cos\theta)$ $\qquad$ $F_2=Mg(\sin\theta+\mu\cos\theta)$

$F_1+F_2=2mg\sin\theta$ $\qquad$ $F_2-F_1=2\mu mg\cos\theta$

$\frac{F_2+F_1}{F_2-F_1}=\frac{\tan\theta}{\mu}$ $\qquad$ $=\frac{\tan 30^0}{1/2\sqrt{3}}$

$\frac{F_2+F_1}{F_2-F_1}=2$

$3F_1=F_2$

104. $500\times 10=V(500+50)$

$V=\frac{500\times 10}{550}$

$V=\frac{100}{11}ms^{-1}$

105. $B_C = \frac{\mu_0 i}{2r}; i = \frac{2rB}{\mu_0}; A = \pi r^2 \therefore M = NiA$

$\therefore M = \frac{2BA^{3/2}}{40\pi^{1/2}} r = \frac{A^{1/2}}{\pi^{1/2}} = \frac{1 \times 2rB}{\mu_0} \times A = \frac{2B \times A^{1/2}}{\mu_0 \times \pi^{1/2}} \times A$

106. $V = A\omega\cos\omega t$

$\frac{A\omega}{2} = A\omega\cos\frac{2\pi}{T} \times t$

$\cos^{-1}\frac{1}{2} = \frac{2\pi}{12} \times t$

$\frac{\pi}{3} = \frac{2\pi}{12} \times t$

$t = 2$ sec

107. $\omega = 2 + 6t$

$\frac{d\omega}{dt} = 6$

$\alpha = 6\,\text{rad}\,s^{-2}$

$\tau = I\alpha = F \times r$

$\frac{mr^2}{2} \times \propto = F \times r$

$F = \frac{mr\alpha}{2}$

$= \frac{5 \times 0.2 \times 6}{2} = 3N$

108. Shift in c.m $= \frac{m_1\Delta x_1 + m_2\Delta x_2}{m_1 + m_2}$

$1 = \frac{10 \times 7 + 30 \times x_2}{m_1 + m_2}$

$40 = 70 + 30x_2$

$\therefore$ 1cm downward

109. $V = V_0 + gt + ft^2$

$\frac{dx}{dt} = V_0 + gt + ft^2$

$\int_0^1 dx = \int_0^1 \left(V_0 + gt + ft^2\right)dt$

$x = V_0 + \frac{g}{2} + \frac{f}{3}$

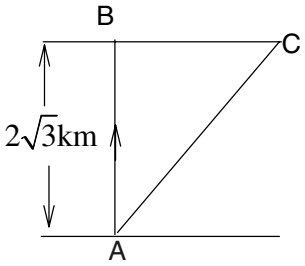
110. The width of the river = $2\sqrt{3}$km

$(BC)_{drift} = 2km$

displacement=AC

$\therefore AC = \sqrt{\left(2\sqrt{3}\right)^2 + 2^2}$

$= 4$ km



111. $\beta^1 - \beta = \frac{\lambda}{d}\left(D' - D\right)$

$3\times10^{-5} = \frac{\lambda}{10^{-3}}\times5\times10^{-2}$

$\lambda = 6\times10^{-7}$

$= 6000A^0$

112. Conceptual

113. $V = \frac{\omega}{k} = \frac{60}{1.5} = 40ms^{-1}$

$V = \sqrt{\frac{T}{\mu}}$

$T = 40\times40\times3\times10^{-4}$

$= 0.48N$

114. Light scattering

115. $i_1 = r_1 = 0$

$r_1 + r_2 = A$

$r_2 = 30 - 0$

$= 30^0$

$\mu = \frac{\sin i_2}{\sin r_2}$

$\sqrt{2} = \frac{\sin i_2}{\sin 30^0}$

$\sin i_2 = \frac{1}{\sqrt{2}}$

$i_2 = 45^0$

$$d = i_1 + i_2 - A$$

$$= 0 + 45^0 - 30^0$$

$$= 15^0$$

116. $$\frac{P_s}{P_r} = \frac{m_a^2}{2 + m_a^2}$$

$$\frac{P_s}{100} = \frac{(0.5)^2}{2 + (0.5)^2}$$

$$= \frac{0.25}{2.25}$$

$$P_s = \frac{100}{9} \approx 11W$$

117. $$t = n \times t_{1/2}$$

$$15 = n \times 5$$

$n = 3$ half lives

fraction undecayed $\frac{N}{N_0} = \left(\frac{1}{2}\right)^n$

fraction decayed $\Rightarrow 1 - \frac{1}{8} = \frac{7}{8}$

118. $$\frac{\upsilon_B}{\upsilon_L} = \frac{\left[\frac{1}{2^2} - \frac{1}{3^2}\right]}{\left[\frac{1}{1^2} - \frac{1}{2^2}\right]}$$

$$= \frac{5/36}{3/4}$$

$$= \frac{5}{27}$$

$$\left[\upsilon = \frac{c}{\lambda}\right]$$

119. Number of beats $s = \frac{2V_s}{V} \times n$

$$\frac{\Delta n_1}{\Delta n_2} = \frac{n_1}{n_2}$$

$$\frac{6}{8} = \frac{n}{100 + n}$$

$$n = 300Hz$$

120. K.E = E-W

$$\frac{eV_0}{eV_0/5} = \frac{hc\left[\frac{1}{\lambda} - \frac{1}{\lambda_0}\right]}{hc\left[\frac{1}{3\lambda} - \frac{1}{\lambda_0}\right]}$$

$$5 = \frac{(\lambda_0 - \lambda)3}{\lambda_0 - 3\lambda}$$

$$5\lambda_0 - 15\lambda = 3\lambda_0 - 3\lambda$$

$$2\lambda_0 = 12\lambda$$

$$\lambda_0 = 6\lambda$$

Chemistry

121. $\%\ S = \frac{32}{232} \times \frac{0.4813(wt\ BaSO_4)}{0.157(wt\,0.c)} \times 100 = 42.10\%$

122. $E = E^0 - \frac{0.059}{n}\log C$

$C = 10^{-1}\quad n = 1\quad E^0 = 1.36V\quad E = 1.42V$

123. Large dif in I.P value, indicates no of valence electrons. 3 valence e= $M_2O_3\quad 2x + (3\times 16)$

124. $Al(OH)_3\quad S(3S)^3\quad 27S$

125. 10 vol. strength —— 0.893M
?—— 3.57M

126. $-\overset{|}{\underset{|}{C}}-\overset{|}{\underset{|}{C}}=\overset{|}{\underset{|}{C}}-\overset{|}{\underset{|}{C}}-+O_3 \xrightarrow{H_2O/Zn} 2H_3C-\overset{O}{\overset{\|}{C}}-H$ Aldehyde with CH_3 at α position givs +ve haloform reaction.

127. Three unpaired electrons

128. i) $\frac{P_0 - P_S}{P_0} = X_1; \frac{100-95}{100} = X; \frac{5}{100} = X_1\quad X_1 = 0.05$

ii) $m = \frac{1000.X_1}{X_2.M_2}$ X_1 = mole fraction of solute X_2 = mole fraction of solvent

$= \frac{1000\times 0.05}{0.95\times 100} = 0.52$ M_2 = mol wt of solvent (C_7H_{16}) m=molality

129. 2^0 order $t_{½}\ \alpha \frac{1}{a}$ a=initial conc

130. 

131. Potato starch

132. Bauxite by leaching

133. Outer orbital complex

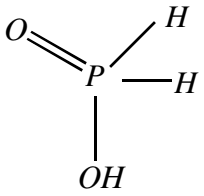
134. BOD increases pollution

135. Antihistamine

136. Protonation

137. Conceptual

138. $pK_a \alpha \frac{1}{K_a}$

139. H_3PO_2  If H directly bonded to central atom, more reducing nature

140. Conceptual

141. Conceptual

142. $\lambda = \frac{h}{mv}$ $5m \text{---------} 3600\sec$

$?\text{---------} 1se$

$$= \frac{6.625\times10^{-34}\times3600}{0.2kg\times5}$$

143. The aqueous solution of sucrose is dextrorotatory having $[\alpha]_D = 66.4°$. On hydrolysis with dilute acids or enzyme invertase, cane sugar (sucrose) gives equimolar mixture of $D-(+)-$ glucose and D-(-) -fructose

$$\underset{\text{Cane sugar}}{C_{12}H_{22}O_{11}} + H_2O \xrightarrow{HCl} \underset{\text{D-glucose}}{C_6H_{12}O_6}$$

$[\alpha]_D = 66.4°$ $\quad [\alpha]_D = +52.5$

$+C_6H_{12}O_6$

$D-fructose$

$[\alpha]_D = -92.4°$

So, sucrose is dextrorotatory but after hydrolysis gives dextrorotatory glucose and laevoratatory fructose. D-(-)-fructose has a greater specific rotation than D-(+)-glucose. Therefore, the resultant solution is laevoratatory in nature with specific rotation of $-39.9°$.

144. $\frac{E_1}{E_2}=\frac{z_1^2}{n_1^2}\times\frac{n_2^2}{z_2^2}$

145. Stronger with fluorine atoms involved

146. H_2 is liberated with Ln and mineral acids

147. Polyomide

148. $\frac{1}{32}:\frac{4}{28}$ $7:32$

149. Bigger size smaller hydration enthalpy and more mobility

150. He at 2.2°C flows up onto a vessel

151. Diborane diammonate is formed by B_2H_6 with NH_3

152. Prusssion blue

153. CrO_2 is a magnetic tape material

154. $M=\frac{0.04}{40}\times\frac{1000}{100}=0.01M\left(H^+\right)=10^{-2}$

$POH=2, pH=12$

155. $O_3\rightarrow O_2+(O)$. Oxidation ability

156. Acetylene froms Chloroform

157. $C_2H_5NC\rightarrow C_2H_5NH_2$ + HCOOH

158. Uracil is absent in DNA

159. Proportional to r^{-6}

160. $P=K_h.x$

$\frac{P_1}{P_2}=\frac{x_1}{x_2}$ M.F of

$H_2O=1-0.04=0.96$

$\frac{2}{4}=\frac{0.02}{X_2}$

$X_2=0.04$