SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

JR MPC WEEK-1 | **JEE MAINS MODEL** | **Date: 10-05-2020**

Time: 3 Hours | **Max Marks : 300**

MATHS

SYLLABUS: ***Partial Fractions, Quadratic Equations on Ex : 3.1, Indefinite Integral Upto Ex : 3.2***

1. **If** $\frac{1-x+6x^2}{x-x^3}=\frac{A}{x}+\frac{B}{1-x}+\frac{C}{1+x}$ **then A=**

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

2. $\frac{x^2+1}{(x^2+4)(x-2)}=\frac{Ax+B}{x^2+4}+\frac{C}{x-2}\Rightarrow A+B-C=$

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

3. $\frac{x^2-1}{x(x^2+1)}=$

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

4. **If** $\frac{(x-1)^2}{x^3+x}=\frac{A}{x}+\frac{Bx+C}{x^2+1}$ **then** $Sin^{-1}\left(\frac{A}{C}\right)=$

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

5. **The number of partial fractions of** $\frac{x^3-3x^2+3x}{(x-1)^5}$ **is**

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

6. **If the remainder of the polynomial f(x) when divided by** $x-1, x-2$ **are 2,3 then the remainder of f(x) when divided by** $(x-1)(x-2)$ **is**

1) 0 2) 2x+1 3) x-1 4) x+1

7. **The coefficient of** x^n **in the power series expansion of** $\frac{x}{(x-2)(x-3)}$ **is**

1) 3^n+2^n 2) $\frac{3^n+2^n}{9^n}$ 3) $\frac{3^n+2^n}{6^n}$ 4) $\frac{3^n-2^n}{6^n}$

8. **The equation of the smallest degree with real coefficients having** $1+i$ **as one of the roots is**

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

9. **If** α,β **are the roots of** $ax^2+bx+c=0$ **then** $\left(\frac{\alpha}{\beta}-\frac{\beta}{\alpha}\right)^2=$

1) $\frac{b^2(b^2-4ac)}{a^2c^2}$ 2) $\frac{b^2(b^2-4ac)}{a^2}$ 3) $\frac{b^2(b^2+4ac)}{a^2}$ 4) $\frac{b^2(b^2+4ac)}{c^2}$

10. **If** α,β **are the roots of** $3x^2+5x-7=0$ **then** $\frac{1}{(3\alpha+5)^2}+\frac{1}{(3\beta+5)^2}=$

1) $\frac{-17}{21}$ 2) $\frac{67}{21}$ 3) $\frac{67}{441}$ 4) $\frac{76}{441}$

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

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

12. $\int \frac{\sec x+\tan x}{\sec x-\tan x}dx =$

1) $2(\tan x+\sec x)-x+c$ 2) $\tan x+\sec x+x+c$

3) $2(\tan x+\sec x)+c$ 4) $2(\tan x+\sec x)+x+c$

13. $\int \frac{1}{\left(Sin^{-1}x\right)^2\sqrt{1-x^2}}dx =$

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

14. $\int \cos 7x\cos 3x\ dx =$

1) $\frac{\sin 10x}{4}-\frac{\sin 8x}{6}+c$ 2) $\frac{1}{40}(2\sin 10x+5\sin 4x)+c$

3) $\frac{1}{40}(2\cos 10x+5\cos 4x)+c$ 4) $(2\cos 10x+5\cos 4x)+c$

15. $\int \frac{x^2-1}{\left(x^4+3x^2+1\right)Tan^{-1}\left(\frac{x^2+1}{x}\right)}dx =$

1) $\log\left|Tan^{-1}\left(\frac{x-1}{x}\right)\right|+c$ 2) $\log\left|Tan^{-1}\left(x+\frac{1}{x}\right)\right|+c$

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

16. $\int \frac{1}{x\log x(\log(\log x))}dx =$

1) $\log|\log(\log x)|+c$ 2) $l\log|\log x|+c$

3) $-l\log|\log x|+c$ 4) $-l\log|\log(\log x)|+c$

17. $\int \frac{e^x(1+x)}{\sin^2\left(xe^x\right)}dx =$

1) $\tan\left(xe^x\right)+c$ 2) $-\cot\left(xe^x\right)+c$ 3) $\sin\left(xe^x\right)+c$ 4) $\cos\left(xe^x\right)+c$

18. $\int \frac{1}{\sin(x-a)\sin(x-b)}dx = A\log\left|\frac{\sin(x-b)}{\sin(x-a)}\right|+c$ **then A =**

1) $\sin(a-b)$ 2) $\sin(b-a)$ 3) $\cos ec(b-a)$ 4) $\cos ec(a-b)$

19. **If** $\int \frac{1-x}{1-\sqrt[4]{x}}dx = x+ax^{3/2}+bx^{5/4}+cx^{7/4}+k$ **then** $\frac{1}{a}+\frac{1}{b}+\frac{1}{c} =$

1) $\frac{2}{9}$ 2) $\frac{9}{2}$ 3) $\frac{214}{105}$ 4) $\frac{105}{214}$

20. $\int x\sqrt{\frac{1-x^2}{1+x^2}}dx =$

1) $\frac{1}{2}Sin^{-1}\left(x^2\right)+\sqrt{1-x^2}+c$ 2) $\frac{1}{2}Sin^{-1}\left(x^2\right)-\sqrt{1-x^4}+c$

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

SECTION-II
(Numerical Value Answer Type)

21. **If** $\frac{x^3+x^2+1}{\left(x^2+2\right)\left(x^2+3\right)}=\frac{Ax+B}{x^2+2}+\frac{Cx+D}{x^2+3}$ **then** $A+B+C+D=$

22. **If** $\frac{x^2+5}{\left(x^2+2\right)^2}=\frac{1}{x^2+2}+\frac{k}{\left(x^2+2\right)^2}$ **then k =**

23. **For the equation** $x^2-x(a-2)-(a+1)=0$ **if the sum of the squares of the roots is least the a =**

24. **If** $\int\frac{dx}{\sqrt{\sin^3 x\cos x}}=\frac{k}{\sqrt{\cot x}}+c$ **then k=**

25. **If** $[\square]$ **denotes the greatest integer function and** $x\in\left(\frac{2}{3},1\right)$ **and** $\int\frac{[5-3x]}{x-2}dx=k\log|x-2|+c$ **then k =**

PHYSICS

SYLLABUS: ***Waves Upto The principle of Superpostion of waves: Equation of resultant wave, resultant amplitude, constructive interference and destructive interference***

26. **Which of the following option(s) is/ are false for mechanical waves?**
1) These waves require a medium for propagation, they cannot propagate through vacuum
2) They involve oscillation of constituent particles
3) They depend on the elastic properties of the medium
4) They have the same speed in all the mediums

27. **The speed of wave of time period T and propagation constant K is**
1) 2π/TK 2) TK/2π 3) 1/TK 4) T/K

28. **The property required for propagation of transverse wave is**
1) longitudinal strain 2) lateral strain
3) shearing strain 4) poisson's ratio

29. **The angle between particle velocity and wave velocity in a transverse wave is**
1) Zero 2) π/4 3) π/2 4) π

30. **The time taken by a particle in reaching from a trough to its third trough in a transverse wave is**
1) T/4 2) 2T 3) 3T/4 4) T

31. **The velocity of sound is not affected by change in**
1) temperature 2) medium 3) pressure 4) wavelength

32. **A plane progressive wave is given by y=2cos6.284(330t-x). The time period of the wave is**
1) 1/330s 2) 2π×330s 3) $(2\pi\times330)^{-2}$s 4) 6.284/330s

33. **Equation of a plane progressive wave is given by y=0.6sin2π(t-x/2). On reflection from a denser medium its amplitude becomes 2/3 of the amplitude of the incident wave. The equation of the reflected wave is**
1) y=0.6sin2π(t+x/2) 2) y=-0.4sin2π(t+x/2)
3) y=0.4sin2π(t+x/2) 4) y=-0.4sin2π(t-x/2)

34. **A uniform string of length 20 m is suspended from a rigid support. A short wave pulse is introduced at its lowest end. It starts moving up the string. The time taken to reach to support is (Take, g=10ms^{-2})**
1) $2\pi\sqrt{2}$s 2) 2s 3) $2\sqrt{2}$s 4) $\sqrt{2}$s

35. **The speed of a transverse wave in a stretched string is 700cms^{-1}. If the string is 2m long, the frequency with which it resonates in fundamental mode is**
1) 7/12 Hz 2) 7/4 Hz 3) 14 Hz 4) 2/7 Hz

36. **A small wave is sent along a stretched string with a velocity of 150ms^{-1}. If the string is 50 cm long, density is 8 gm/c.c and the area of cross section is 6×10^{-3}cm^2. Calculate the tension applied on the string.**
1) 104 N 2) 106 N 3) 108 N 4) 110 N

37. **A wire of mass 9.8×10^{-3} kg per metre passes over a friction less pull fixed on the top of an inclined plane which makes an angle of 30^o with horizontal. Two massesM_1,M_2 are attached to the two ends of wire, M_1 is at rest on an inclined plane and M_2 is hanging vertically downwards. The system is in equillibrium. If a transverse wave progresses with a velocity of 100 m/s in the wire then the values of M_1,M_2 are**
1) 20 kg, 40 kg 2) 10 kg, 30 kg 3) 20 kg, 10 kg 4) 10 kg, 40 kg

38. **Two points are located at a distance of 10 m and 15 m from the source of oscillation. The period of oscillation is 0.05 second and the velocity of the wave is 300 m/ sec. What is the phase difference between the oscillations of two points?**
1) π 2) $\pi/6$ 3) $\pi/3$ 4) $2\pi/3$

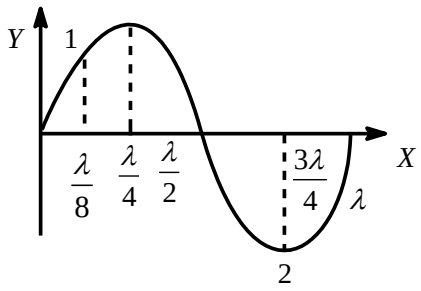
39. **The young's modulus of the material of the rod is 2×10^{11}N/m^2 and its density is 8000 kg/m^3. The time taken by a sound wave to transverse 1m of the rod will be**
1) 10^{-4}sec 2) 2×10^{-4}sec 3) 8×10^{-2}sec 4) 16×10^{-2}sec

40. **If at STP velocity of sound in a gas (γ=1.5) is 600m/s, the r.m.s velocity of the gas molecules at STP will be**
1) 400 m/s 2) 600 m/s 3) $600\sqrt{2}$ m/s 4) $300\sqrt{2}$ m/s

41. **A wave of frequency 400 Hz has a velocity of 320 m/s. The distance between the particles differing in phase by 90^o is**
1) 20 cm 2) 40 cm 3) 60 cm 4) 80 cm

42. **At a change of pressure of 10^5N/m^2, the volume strain of water is 5×10^{-5}. The speed of sound in water is [$\rho_w=10^3$ kg/m^3]**
1) 1414 m/s 2) 2000 m/s 3) 3000 m/s 4) 1600 m/s

43. **Phase difference between the particles 1 and 2 located in a transverse wave as shown in figure is**



1) $\pi/4$ 2) $3\pi/4$ 3) $7\pi/4$ 4) $5\pi/4$

44. **The ratio of the speed of sound in nitrogen gas to that in helium gas at 300K**
1) $\sqrt{2}/7$ 2) $\sqrt{1}/7$ 3) $\sqrt{3}/5$ 4) $\sqrt{6}/5$

45. **An observer standing near the sea shore observes 54 waves per minute. If the wavelength of the water wave is 10m then the velocity of water wave is**
1) 540 ms^{-1} 2) 5.4 ms^{-1} 3) 0.184 ms^{-1} 4) 9 ms^{-1}

SECTION-II
(Numerical Value Answer Type)

46. **A simple wave motion is represented by $y=5(\sin4\pi t+\sqrt{3}\cos4\pi t)$. Its amplitude is**

47. **A transverse harmonic wave on a string is described by $y(x,t)=3.0\sin(36t+0.18x+\pi/4)$ where x and y are in cm and t is in second. The positive direction of x is from left to right. Then velocity of the wave is**

48. **Two solid bars having same Young's modulus but made of different material such that the ratio of the mass densities is $\rho_1/\rho_2=4$. The ratio of the speed of the longitudinal wave in the bars i.e., v_2/v_1 is**

48. **A string of mass 2.5 kg is under tension of 200N. The length of the stretched string is 20.0 m. If the transverse jerk is struck at one end of the string, the disturbance will reach the other end in**

50. **A uniform rope of mass 0.1 kg and length 2.45 m hangs from a ceiling. Find the speed of transverse wave in the rope at a point 0.5m distant from the lower end ($g=9.8m/s^2$)**

CHEMISTRY

SYLLABUS : *Solutions Upto Raoult's Law*

51. **A mixture of salt and water is separated by**
1) filtration 2) crystallisation 3) Distillation 4) Both 2 and 3

52. **The number of moles of solute present in 0.5 lit of 0.5M solution is**
1) 0.5 2) 5×10^{-3} 3) 5×10^{-2} 4) 0.25

53. **250ml of Na_2CO_3 solution contains 5.3g of solute. Its normality is**
1) 0.4N 2) 4N 3) 0.2N 4) 0.5N

54. **For which acid, gram equivalent weight is equal to gram molecular weight**
1) H_3PO_2 2) H_3PO_3 3) H_3PO_4 4) All

55. **The normality of 0.98% (w/v) H_2SO_4 solution is**
1) 0.1N 2) 0.2N 3) 0.4N 4) 1N

56. **At 25^oC for a given solution M=m, Then at 50^oC the correct relationship is (where M=molarity, m=molality)**
1) M=m 2) M>m 3) M<m 4) M=2m

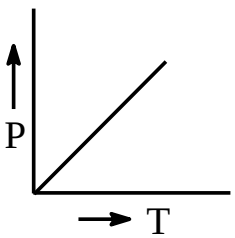
57. **3.42 g of sucrose ($C_{12}H_{22}O_{11}$) is dissolved in 90g of water. Then the molefraction of solute is**
1) 1/5 2) 1/50 3) 1/51 4) 1/501

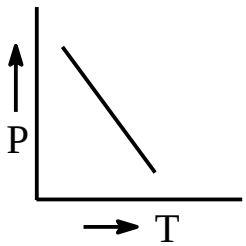
58. **If 'M' is the molecular weight of $CaCO_3$. Its equivalent weight is**
1) M 2) M/2 3) M/3 4) M/5

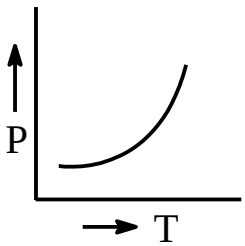
59. **0.126g of oxolic acid ($H_2C_2O_4.2H_2O$) is completely oxidised by 'x' ml of 0.01N $KMnO_4$ solution in acidic medium. The value of 'x' is**
1) 2 2) 200 3) 20 4) 2000

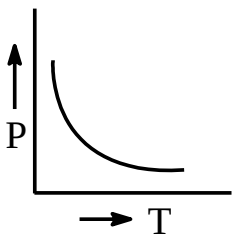
60. **On adding some common salt to water its boiling point**
1) Increases due to lower vapour pressure
2) Decreases due to lower vapour pressure
3) Decreases due to higher vapour pressure
4) Does not change

61. **The graph obtained by taking vapour pressure(p) of a liquid on Y-axis and temperature(T) on X-axis will be**

1) 

2) 

3) 

4) 

62. Which of the following statement is Raoult's law

1) The relative lowering of v.p of a solution is directly proportional to the molefraction of solute
2) The relative lowering of v.p of a solution is directly proportional to the molefraction of solvent
3) The relative lowering of v.p of a solution is equal to the molefraction of the solute
4) The relative lowering of v.p of a solution is equal to the molefraction of the solvent

63. M=molarity of a solution w=%(w/w)
D=density of the solution m=gram molecular weight of solute
Then the correct relationship is

1) $M=w\times d\times 10/m$ 2) $M=m\times d/w$
3) $M=w\times d/m$ 4) $M=w\times 1000\times d/m$

64. The correct expression of relation between molality(m) and molarity(M) is [d=density]

1) $m=1000\times M/(1000\times d)-(M\times GMW_{solute})$ 2) $m=1000\times d/1000-(M\times GMW_{solute})$
3) $m=M\times d/(1000\times d)-(M\times GMW_{solute})$ 4) All are correct

65. Increase soubility of CO_2 in soft drinks and soda water at high pressure is the application of

1) Raoult's law 2) Charle's law
3) Henry's law 4) Gay-Lussac's law

66. If camphor is burning in the air, it undergoes to sublimation and gives the solution of

1) gas in gas 2) solid in gas 3) solid in solid 4) gas in solid

67. Calculate equivalent weight of P_4 from the following reaction
$P_4\rightarrow PH_3+H_2PO^-_2$

1) 41.33 2) 31.4 3) 16 4) 12

68. The quantitative expression of concentration term without units is

1) molarity(M) 2) Normality(N) 3) molality(m) 4) molefraction(x)

69. For which of the following Raoult's law is not applicable

1) urea 2) Glucose 3) Sucrose 4) Common salt

70. The tanks used by scuba divers are filled with the mixture of

1) N_2, O_2, He 2) N_2, O_2, Ar 3) N_2, O_2, Ne 4) O_2, He, CO_2

SECTION-II
(Numerical Value Answer Type)

71. The number of millimoles of solute present in 10 ml of decimolar solution is

72. In the reaction $H_2CO_3+NaOH\rightarrow NaHCO_3+H_2O$, the equivalent weight of carbonic acid is

73. The molefraction of solvent in 0.1 molal aqueous solution is

74. A mixture contains three components namely X,Y and Z. The molefractions of X=0.2 and Z=0.3. Then the molefraction of "y" is?

75. 18 gm of glucose is dissolved in 90 gm of water. The relative lowering of vapour pressure of the solution is equal to

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SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

JR MPC WEEK-1
Time: 3 Hours

JEE MAINS MODEL

Date: 10-05-2020

KEY SHEET

MATHS

1) **1**	2) **2**	3) **4**	4) **2**	5) **1**	6) **4**	7) **4**	8) **2**	9) **1**	10) **3**
11) **2**	12) **1**	13) **3**	14) **2**	15) **2**	16) **1**	17) **2**	18) **3**	19) **2**	20) **3**
21) **2**	22) **3**	23) **1**	24) **-2**	25) **2**					

PHYSICS

26) **4**	27) **1**	28) **3**	29) **3**	30) **2**	31) **3**	32) **1**	33) **2**	34) **3**	35) **2**
36) **3**	37) **3**	38) **4**	39) **2**	40) **3**	41) **1**	42) **1**	43) **4**	44) **3**	45) **4**
46) **10**	47) **2**	48) **2**	49) **0.5**	50) **2.21**					

CHEMISTRY

51) **4**	52) **4**	53) **1**	54) **1**	55) **2**	56) **3**	57) **4**	58) **2**	59) **2**	60) **1**
61) **3**	62) **3**	63) **1**	64) **1**	65) **3**	66) **2**	67) **1**	68) **4**	69) **4**	70) **1**
71) **1**	72) **62**	73) **0.998**	74) **0.5**	75) **0.02**					

HINTS & SOLUTIONS

MATHS-IIA

MATHS-IIA

1. $1-x+6x^2 = A(1-x^2)+Bx(1+x)+Cx(1-x)$

Comparing constants we get A=1

2. $x^2+1=(Ax+B)(x-2)+C(x^2+4)$

Comparing we get A,B,C

3. $x^2-1=A(x^2+1)+(Bx+C)x$

Comparing we get A,B,C

4. $(x-1)^2=A(x^2+1)+(Bx+C)x$

Comparing we get A,B,C

5. **put x-1 = t**

6. $f(1)=2, f(2)=3$

$f(x)=q(x)(x-2)(x-3)+ax+b$

Sub x=1,2 we get the values of a,b

7. $x=A(x-3)+B(x-2)$

$$\frac{x}{(x-2)(x-3)}=\frac{-2}{x-2}+\frac{3}{x-3}=\frac{-2}{-2\left(1-\frac{x}{2}\right)}+\frac{3}{-3\left(1-\frac{x}{3}\right)}$$

8. **Roots are 1+i, 1-i**

Equation is $x^2-(1+i+1-i)x+(1+i)(1-i)=0$

9. $$\left(\frac{\alpha}{\beta}-\frac{\beta}{\alpha}\right)^2=\left(\frac{\alpha^2-\beta^2}{\alpha\beta}\right)^2=\frac{(\alpha+\beta)^2(\alpha-\beta)^2}{\alpha^2\beta^2}$$

$$=\frac{(\alpha+\beta)^2\left((\alpha+\beta)^2-4\alpha\beta\right)}{(\alpha\beta)^2}$$

10. $3\alpha^2+5\alpha-7=0\Rightarrow(3\alpha+5)\alpha=7\Rightarrow\frac{1}{3\alpha+5}=\frac{\alpha}{7}$

$$\Rightarrow\frac{1}{(3\alpha+5)^2}+\frac{1}{(3\beta+5)^2}=\left(\frac{\alpha}{7}\right)^2+\left(\frac{\beta}{7}\right)^2$$

11. $$\int\frac{1+x^2+x^2}{x^2(1+x^2)}dx=\int\frac{1}{x^2}+\frac{1}{(1+x^2)}dx$$

12. **Ratioanalize denominator**

13. **Put** $Sin^{-1}x=t$

14. $\cos 7x\cos 3x=\frac{1}{2}(\cos 10x+\cos 4x)$

15. **Put** $Tan^{-1}\left(\frac{x^2+1}{x}\right)=t$

16. **Put** $\log(\log x)=t$

17. **Put** $xe^x=t$

18. $$\frac{1}{\sin(b-a)}\int\frac{\sin((x-a)-(x-b))}{\sin(x-a)\sin(x-b)}dx$$

19. $$\int\frac{\left(1+\sqrt{x}\right)\left(1+\sqrt[4]{x}\right)\left(1-\sqrt[4]{x}\right)}{1-\sqrt[4]{x}}dx$$

20. **Put** $x^2=\sin\theta$

21. $x^3+x^2+1=(Ax+B)(x^2+3)+(Cx+D)(x^2+2)$

Comparing we get A,B,C,D

22. $x^2+5=(x^2+2)+k$

23. $\alpha^2+\beta^2=(\alpha+\beta)^2-2\alpha\beta=(a-2)^2+2(a+1)=a^2-2a+6$

$f(a)=a^2-2a+6\Rightarrow f^1(a)=2a-2=0\Rightarrow a=1$

24. $$\int\frac{dx}{\sqrt{\sin^3 x\cos x}}=\int\frac{dx}{\sqrt{\sin^4 x\cot x}}=\int\frac{\cos ec^2x}{\sqrt{\cot x}}dx$$

25. $\frac{2}{3}<x<1\Rightarrow 2<3x<3\Rightarrow -3<-3x<-2$

$\Rightarrow 2<5-3x<3\Rightarrow[5-3x]=2$

PHYSICS

26. **Mechanical waves have different speed in different medium**

27. $V = \frac{w}{k}\left(\because w = \frac{2\pi}{T}\right)$

28. **Medium must possess elasticity of shape**
i.e., Shearing strain

29. **Wave travels in a transverse wave, particles of the medium vibrate perpendicular to the direction of wave propagation i.e., angle =** 90^0 *or* $\frac{\pi}{2}$ **radians**

30. **Time period between two successive trough or crest is T**
Time taken between trough to its 3rd trough = 2T

31. $\frac{P}{\rho}$ **= constant**

Pressure does not effect the velocity of sound

32. $Y = 2\cos\left((6.284)330t - (6.284)x\right)$

Compare with $Y = A\cos(\omega t - kx)$

Then $\omega = (6.284)330$

$T = \frac{2\pi}{\omega}$

33. $Y = 0.6\sin 2\pi\left(t - \frac{x}{2}\right)$

Compare with $Y = A\sin(\omega t - kx)$

Then A = 0.6

On reflecting $A^1 = \left(\frac{2}{3}\right)0.6 = 0.4$

Reflected wave equation becomes $Y = -0.4\sin 2\pi\left(t + \frac{x}{2}\right)$

34. $t = 2\sqrt{\frac{\ell}{g}}$

35. $n = \frac{V}{2\ell}$

36. $V = \sqrt{\frac{T}{As}}$

37. $T = M_1 g\sin 30^0$

$T = \frac{M_1 g}{2}, T = M_2 g$

$\Rightarrow M_1 = 2M_2$

$V = \sqrt{\frac{T}{\mu}} \Rightarrow T = 98N$

Sub T in $T = M_2 g \Rightarrow M_2 = 10kg$

$\therefore M_1 = 20kg$

38. $\lambda = VT$

$\Delta\phi = \frac{2\pi}{\lambda}(\Delta x)$

39. $V=\sqrt{\frac{Y}{s}}$

$t=\frac{S}{V}$

40. $V_{rms}=\sqrt{\frac{3}{8}}V_{sound}$

41. $\Delta\phi=\frac{2\pi}{\lambda}(\Delta x)$

42. $V=\sqrt{\frac{K}{s}}$

43. $\Delta\phi=\frac{2\pi}{\lambda}(\Delta x)$

44. $V\alpha\sqrt{\frac{\gamma}{M}}\Rightarrow\frac{V_{N_2}}{V_{He}}=\sqrt{\frac{^8N_2}{8_{He}}}\times\frac{M_{He}}{M_{N_2}}$

45. **G.T, n=54 waves/min = 54/60 waves/sec**

$V=n\lambda$

46. $Y=5\left(\sin 4\pi t+\sqrt{3}\cos 4\pi t\right)=10\sin\left(4\pi t+\frac{\pi}{3}\right)$

Amplitude is 10

47. $Y=3\sin\left(3t+0.18x+\frac{\pi}{4}\right)$

$Y=A\sin(\omega t+kx+\phi)$

$V=\frac{\omega}{k}$

48. $V=\sqrt{\frac{Y}{\rho}}\Rightarrow V\alpha\frac{1}{\sqrt{\rho}}\Rightarrow\frac{V_2}{V_1}=\sqrt{\frac{\rho_1}{\rho_2}}=2$

49. $\mu=\frac{M}{\ell}$ *and* $V=\sqrt{\frac{T}{\mu}}$

And $t=\frac{\ell}{V}$

50. $t=2\sqrt{\frac{\ell}{g}}$

CHEMISTRY

51. **A mixture of salt & water forms a solution**
It can be separated by special methods like crystallization, distillation, etc

52. $M=\frac{n}{v}$

$D=M\times v$

53. **w=5.3g**
Vol. of solution = 250ml
GEW of $Na_2CO_3=53$

$N=\frac{w}{GEW}\times\frac{1000}{v}$

54. **Eq. Wt of** $H_3PO_2 = \frac{Mol.Wt}{Basicity}$

55. $0.98\%(w/v)$ H_2SO_4 **means 0.98g of** H_2SO_4 **is present in 100ml of the solution**

Eq. Wt of H_2SO_4 **= 98/2**

$$N = \frac{w}{GEW} \times \frac{1000}{100}$$

56. **Molarity(M) is temperature dependent**
Molality(m) is independent of temperature

57. **No. of moles of sucrose =** $\frac{3.42}{342} = \frac{1}{100}$

No of moles of water $= \frac{90}{18} = 5$

Mole fraction of sucrose $= \frac{n_{solute}}{n_{solute} + n_{solvent}}$

58. $Eq.Wt\ of\ CaCO_3 = \frac{Mol.wt}{change\ on\ cation(or)anion}$

59. $N = \frac{w}{GEW} \times \frac{1000}{V(ml)}$

$N_1V_1 = N_2V_2$

60. **Solution of salt in water has lower vapour pressure hence higher is it's B.P**

61. **Vapour pressure of a liquid varies exponentially with Temp.**

62. **Raoult's Law : The relative lowering of vapour pressure of a solution is equal to the mole fraction of the solute**

63. $M = \frac{\% \times d \times 10}{GMW} = \frac{w \times d \times 10}{m}$

65. **Solubility of** CO_2 **in soft drinks is based on Henry's law**

It is an application of Henry's law

66. **Camphor in air is a good example for solid in gas type solution**

67. $P_4 \rightarrow \overset{-3}{P}H_3 + H_2\overset{+2}{P}O_2$

Eq. wt of oxidizing agent or reducing agent $= \frac{Mol.Wt}{change\ in\ oxidation\ state}$

68. **Mole fraction have no units because it is a relative quantity**

69. **Nacl undergoes dissociation. Hence Raoult's law is not applicable**

70. **The respiratory device of scuba divers contains a mixture of** He, O_2 & N_2

71. $M = \frac{Mil\lim oles\ of\ solute}{Volume\ in\ ml}$

72. $H_2CO_3 + NaOH \rightarrow NaHCO_3 + H_2O$

In the above equation only one hydrogen is replaced

Hence Eq. Wt of $H_2CO_3 = \frac{Mol.Wt}{1}$

73. $\chi_{solute} = \frac{m}{m + \frac{1000}{M.Wt\ of\ solvent}}$

74. **For any solution the sum of mole fractions of all components should be equal to unity**

75. $\chi_{solute} = \frac{P^c - P}{P^c}$