MELUHA INTERNATIONAL SCHOOL

HYDERABAD

SR MPC | **JEE MAINS MODEL** | **Date: 15-04-2020**

Time: 3 Hrs | **Max. Marks: 300**

SECTION – I
(SINGLE CORRECT ANSWER TYPE)

This section contains 20 multiple choice questions. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and -1 if not correct.

MATHS

SYLLABUS : Statistics, Mathematical Reasoning, Complex numbers, Definite Integrals, Areas

1. The average of 'n' numbers $x_1,x_2,x_3,---x_n$ of $x_1$is replaced by 'a' , then the name average is

1) $\frac{n\bar{x}-x_1+a}{n}$ 2) $\frac{\bar{x}-x_1+a}{n}$ 3) $(n-1)\bar{x}-x_1+a$ 4) $a\bar{x}$

2. The mean of 100 items is 49. It was later discovered three items taken as 40,20,50 were actually 60,70,80 respectively. The correct mean is

1) 98 2) 825 3) 48 4) 41.5

3. A frequency distribution

Daily wag(s):	**5**	**6**	**7**	**10**	**12**	**15**
No.of workers:	**10**	**x**	**13**	**8**	**5**	**4**

has arithmetic mean 7.85. The mission term 'x' is

1) 10.5 2) 10.05 3) 15.5 4) 15

4. For the arithmetic progression a, a+d, ----, a+nd. The mean deviation from mean

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

5. The arithmetic mean of n observations is $\bar{x}$ if the sum of n-5 observations is 'a' then the mean of remaining 5 observations is

1) $\frac{n\bar{x}+a}{5}$ 2) $\frac{n\bar{x}-a}{5}$ 3) $n\bar{x}+a$ 4) $n\bar{x}$

6. If $iz^3+z^2-z+i=0$ then the value of $|z|$ is

1) 1 2) 2 3) <1 4) >1

7. Let $z=\alpha-\frac{i}{2},\alpha\in R$ **then** $|i+Z|^2-|i-Z|^2=$

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

8. $z_1\bar{z}_2+\bar{z}_1z_2$ is (if z_1 and z_2 are too complex numbers)

1) purely real 2) purely imaginary

3) Nothing can be said 4) any complex numbers

9. The centre of the circle $z\bar{z}-(2+3i)z-(2-3i)\bar{z}+9=0$ *is*

1) (2,-3) 2) (2,3) 3) (-2,-3) 4) (-2,3)

10. If $i=\sqrt{-1}$ **then** $\sum_{i=1}^{13}i^n+i^{n+1}=$

1) i-1 2) i+1 3) 1-i 4) i

11. $\int_{-\pi}^{\pi}(\cos px-\sin qx)^2\,dx$, where p and q are integers is equal to

1) $-\pi$ 2) 0 3) π 4) 2π

12. $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}}\left(\sqrt{\tan x}+\sqrt{\cot x}\right)dx=$

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

13. **The value of the integral** $\int_0^{\pi}\frac{\sin\left(n+\frac{1}{2}\right)x}{\sin\left(\frac{x}{2}\right)}dx\left(n\in N\right)$ is

1) π 2) 2π 3) 3π 4) 6π

14. **Let X and Y be two functions of** θ when $X\cos\theta+Y\sin\theta=1, X\sin\theta-Y\cos\theta=\theta$. If

$f\left(\theta\right)=\left(\frac{dx}{d\theta}\right)^2+\left(\frac{dy}{d\theta}\right)^2$ then $\int_0^{\frac{1}{2}}\frac{1}{\sqrt{1-f\left(\theta\right)}}d\theta=$

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

15. **If the equality** $\int_0^{x}\frac{bt\cos 4t-a\sin 4t}{t^2}dt=\frac{a\sin 4x}{x}-1$ holds for all x such that $0<x<\frac{\pi}{4}$ then a and b are given by

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

16. **If** $2\int_0^1\tan^{-1}xdx=\int_0^1\cot^{-1}\left(1-x+x^2\right)dx$, then $\int_0^1\tan^{-1}\left(1-x+x^2\right)dx$ is equal to

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

17. $\int_0^{\pi}\sqrt{1+4\sin^2\frac{x}{2}-4\sin\frac{x}{2}}dx=$

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

18. **For** $0\le x\le\frac{\pi}{2}$, the value of $\int_0^{\sin^2 x}\sin^{-1}\left(\sqrt{t}\right)dt+\int_0^{\cos^2 x}\cos^{-1}\left(\sqrt{t}\right)dt$ equals

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

19. **If** $f\left(x\right)=\frac{e^x}{1+e^x}, I_1=\int_{f(-a)}^{f(a)}xg\left\{x\left(1-x\right)\right\}dx$ and $I_2=\int_{f(-a)}^{f(a)}g\left\{x\left(1-x\right)\right\}dx$ then $\frac{I_2}{I_1}$ is

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

20. **If** $I_n=\int_{\frac{\pi}{2}}^{\infty}e^{-x}\cos^n x\,dx$ then $\frac{I_{2018}}{I_{2016}}=$

1) $\frac{2018\times 2019}{\left(2017\right)^2+1}$ 2) $\frac{2018\times 2017}{\left(2018\right)^2+1}$ 3) $\frac{2018\times 2016}{\left(2017\right)^2+1}$ 4) $\frac{2018\times 2017}{\left(2019\right)^2+1}$

SECTION-II
(Numerical Value Answer Type)

This section contains 5 questions. The answer to each question is a Numerical values comprising of positive or negative decimal numbers.

Marking scheme: +4 for correct answer, 0 in all other cases.

21. The geometric mean of 2,4,16 and 32 is

22. The harmonic mean of $\frac{1}{5},\frac{1}{10},\frac{1}{15},\frac{1}{20},\frac{1}{25},\frac{1}{30},\frac{1}{35}$ is

23. Mode of the data 3,2,5,2,3,5,6,6,5,3,5,2,5 is

24. The area (in sq. units) of the region $\left\{(x,y): x\geq 0, x+y\leq 3, x^2\leq 4y \text{ and } y\leq 1+\sqrt{x}\right\}$ is __

25. The area (in. sq. units) of the region described by $A=\left\{(x,y)/\, y\geq x^2-5x+4, x+y\geq 1, y\leq 0\right\}$ is_____

PHYSICS

SECTION – I
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SYLLABUS : Dual nature of radiation and matter, Atoms, Nuclei, Semi conductors

26. When light of wave length less than $6000^0 A$ **is incident on a metal, electrons are emitted. The approximate work function of the metal is**

1) 1eV 2) 2eV 3) 4eV 4) 6eV

27. The work function of the substance is 40eV. The longest wave length of light that can cause photo electron emission from this substance is (approximately)

1) 540 nm 2) 400 nm 3) 310nm 4) 220 nm

28. Ultraviolet radiation of 6.2 eV falls on an alluminium surface (work function 4.2eV) . The kinetic energy in joule of the fastest electron emitted is (approximately)

1) 3.2×10^{-21} 2) 3.2×10^{-19} 3) 3.2×10^{-17} 4) 3.2×10^{-15}

29. Light of wave length $5000^0 A$ **falls on a metal surface having work function 1.9eV. The stopping potential is**

1) 0.58V 2) 6.58V 3) 8.58V 4) 10.58V

30. The photoelectric work function of a metal is 1eV. Light of wave length $\lambda=3000^0 A$ **falls on it. The velocity of ejected photoelectrons nearly is**

1) $10\ m/s$ 2) $10^3\ m/s$ 3) $10^4\ m/s$ 4) $10^6\ m/s$

31. In the spectrum of hydrogen atom, ratio of the longest wave length in Lyman series to the longest wave length in Balmer series is

1) $\frac{5}{27}$ 2) $\frac{1}{93}$ 3) $\frac{4}{9}$ 4) $\frac{3}{2}$

32. The energy of the highest energy photon of Balmer series of hydrogen spectrum is close to

1) 13.6 eV 2) 3.4eV 3) 1.5eV 4) 0.85eV

33. The ratio of the de-Broglie wave length of a α **-particle and a proton of same kinetic energy is**

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

34. The ionization potential of the hydrogen is 13.6V. The energy required to remove an electron from the second orbit of hydrogen is

1) 3.4eV 2) 6.8eV 3) 13.6eV 4) 1.51eV

35. An α -particle of energy 5Mev is scattered through 180^0 by a Uranium nucleus. The distance of the closest approach of the order of

1) $1^0 A$ 2) $10^{-10} cm$ 3) $10^{-12} cm$ 4) $10^{-16} cm$

36. For uranium nucleus, how does its mass vary with volume

1) $m \alpha V$ 2) $m \alpha \frac{1}{V}$ 3) $m \alpha \sqrt{V}$ 4) $m \alpha V^2$

37. A nucleus with number 220 initially at rest emits an α -particle. If the Q-value of the reaction is 5.5MeV, the KE of α -particle is

1) 4.4 MeV 2) 5.4 MeV 3) 5.6 MeV 4) 6.5 MeV

38. After 280 days, the activity of a radioactive sample is 6000 dps. The activity reduces to 3000 dps after another 140 days. The initial activity of the sample in dps is

1) 6000 2) 9000 3) 3000 4) 24000

39. If a star can convert all the He nuclei completely into oxygen nuclei, the energy released per oxygen nuclei is (mass of He is 4.0026 amu and mass of oxygen nucleus is 15.9994 amu)

1) 7.6 MeV 2) 56.12 MeV 3) 10.24 MeV 4) 23.9 MeV

40. $^{221}_{87}Ra$ is a radioactive substance having half-life of 4 days. The probability that a nucleus undergoes decay after two half-lifes

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

41. Half-life of a radioactive substance is 10 years. Probability of decay of a nucleus in 20 years is

1) 75% 2) 50% 3) 25% 4) zero

42. $_{92}U^{234}$ has half-life 2.5×10^{10} years. Its mass corresponding to an activity 1mC is nearly

1) $1.5\times10^{-8} gm$ 2) $4.2\times10^{-6} gm$ 3) 163 gm 4) 259 gm

43. In one average life, a fraction f_1 of a radioactive substance decays and in one half-life, its f_2 fraction decays then $\frac{f_1}{f_2}$ is

1) 1.3 2) 1.8 3) 0.9 4) 2.5

44. Ratio of amounts of radioactive substances X and Y, at any instants is 1:4. Half0life of substance X is 18 Hr and of Y 12 Hr. After three days, ratio of the amounts of the two substances will be

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

45. Radioactive substances X and Y have half-lives 10 Hr and 20 Hr respectively. Initially, they contain equal number of radioactive atoms. After 20 Hr, their rates of disintegration are in the ratio

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

SECTION-II
(Numerical Value Answer Type)

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46. If stopping potential corresponding to wave lengths $4000^0 A$ *and* $4500^0 A$ are 1.3 V and 0.9V respectively then the work function of the metal is (in meV) ____

47. If the energy of a particle is reduced to one fourth then the percentage increase in its de Broglie wave length will be (in %) _____

48. The momentum of a photon of electromagnetic radiation is $3.3\times10^{-29} kgm/\sec$. The frequency of these waves is $X\times10^{13} Hz$ then X = _____

49. In $\alpha - ray$ scattering experiment, the number of particles scattered at 90^0 be 28 per minute. Then the number of particles scattered per minute by the same foil but at 60^0 are _____

50. If the potential energy of a hydrogen atom in the ground state be zero then its energy in the first excited state will be (in eV) ____

CHEMISTRY
SECTION – I
(SINGLE CORRECT ANSWER TYPE)

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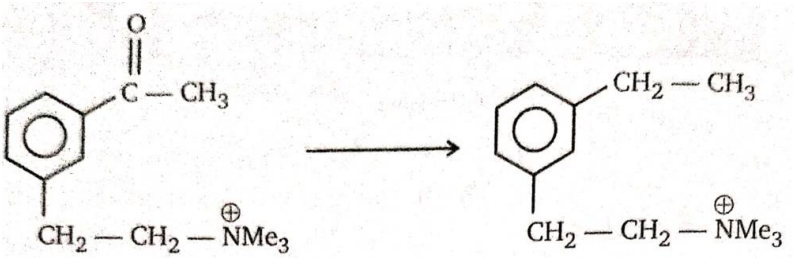
SYLLABUS : Carbonyl Compounds & carboxylic acids, Chemistry in every day life, Amines, Metallurgy

51.



Above conversion can be achieved by

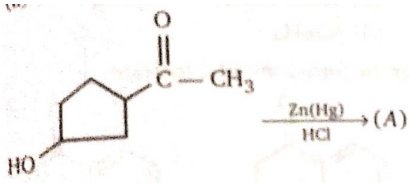
1) Wolf-Kishner reduction
2) Clemmensen reduction
3) $LiAlH_4$
4) $NaBH_4$

52. $CH_3-\overset{OH}{\underset{|}{C}}H-CH_2-CH_2-\overset{O}{\overset{\|}{C}}-CH_3 \rightarrow CH_3-\overset{OH}{\underset{|}{C}}H-(CH_2)_3-CH_3$

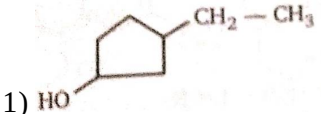
Above conversion can be achieved by

1) Wolff-Kishner reduction
2) Clemmensen reduction
3) $LiAlH_4$
4) $NaBH_4$

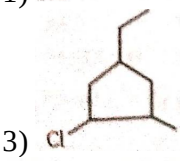
53.

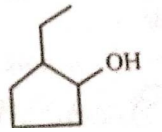


Identify the A.

1) 

2) 

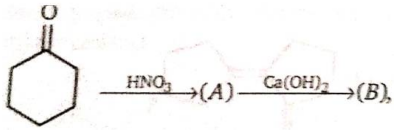
3) 

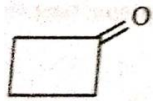
4) 

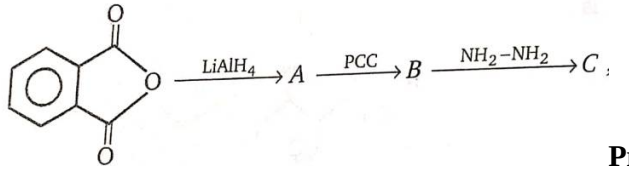
54. 

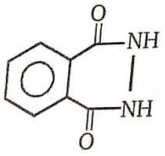
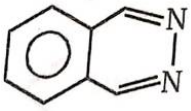
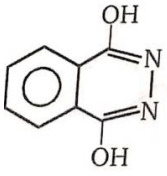
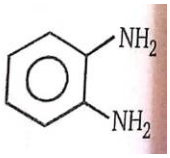
Compound (A) & (B) can be differentiated by;

1) 2-4-DNP
2) Fehling solution
3) Lucas reagent
4) $NaHSO_3$

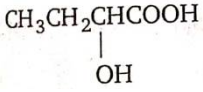
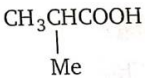
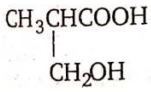
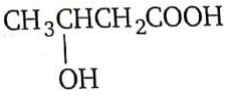
55.  **Product (B) in this reaction is:**

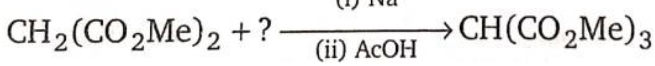
1)  **2)**  **3)**  **4)** 

56.  **Product (C) is :**

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

57. **An optically active compound 'X' has molecular formula $C_4H_8O_3$. It evolves CO_2 with $NaHCO_3$. 'X' reacts with $LiAlH_4$ to give an achiral compound. 'X' is:**

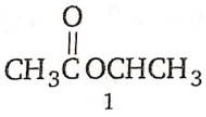
1)  2)  3)  4) 

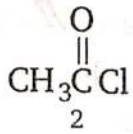
58. 

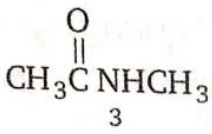
Which of the following reactants will complete the above reaction?

1) $CH_2\left(CO_2Me\right)_2$ 2) $\left(CO_2Me\right)_2$ 3) $Cl-CO_2Me$ 4) $COCl_2$

59. **Arrange the following in order of increasing reactivity (least $\rightarrow$ most) towards nucleophile**

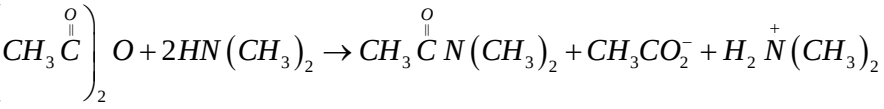
 1

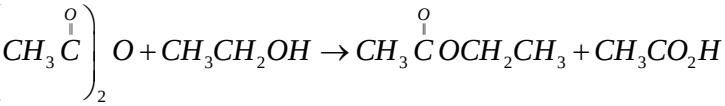
 2

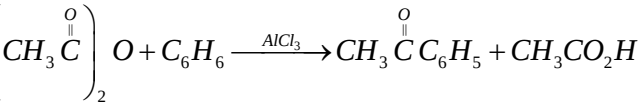
 3

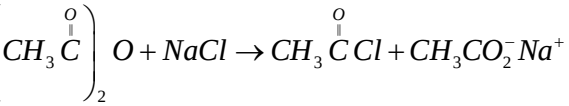
1) 1 < 2 < 3 2) 3 < 1 < 2 3) 1 < 3 < 2 4) 2 < 1 < 3

60. **Which reaction is not possible for acetic anhydride?**

1) 

2) 

3) 

4) 

61. **Aniline is more basic than**

1) NH_3 2) CH_3NH_2 3) N-methyl aniline 4) P - nitroaniline

62. **In the reaction of** $C_6H_5OH \xrightarrow[ZnCl_2]{NH_3} X$ **;** 'X' **may be**

1) $C_6H_5NH_2$ 2) C_6H_5Cl 3) C_6H_5CHO 4) C_6H_5COOH

63. **In the reaction** $C_2H_5NH_2 \xrightarrow[HCl]{NaNO_2} \underset{\text{unstable}}{[X]} \xrightarrow{H_2O} Y$. Y is

1) $C_2H_5N_2Cl$ 2) C_2H_5Cl 3) C_2H_5OH 4) C_2H_6

64. **Aniline on heating with 'X' in the presence of KOH gives a product with very bad smell. Which of the following is 'X'?**

1) CH_3Cl 2) $CHCl_3$ 3) CH_2Cl_2 4) C_2H_5Cl

65. $C_6H_5Cl \xrightarrow[Cu_2O]{NH_3} A \xrightarrow[Alc.KOH]{CHCl_3} B$ **In this reaction 'B' is**

1) C_6H_5CN 2) $C_6H_5CH_2CN$ 3) $C_6H_5CH_2NC$ 4) C_6H_5NC

66. **Galena on heating in limited supply of air gives lead metal. This is known as**

1) Smelting 2) Calcination 3) Self reduction 4) Sulphatizing roasting

67. **Liquation method is used to refine following crude metal**

1) Silver 2) Tin 3) Mercury 4) Copper

68. **In the extraction of iron from haematite, the charge used is haematite, coke and lime stone in the following weight ratio**

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

69. **During electrolytic reduction of Alumina, the reaction at cathode is**

1) $2H_2O_2 \rightarrow O_2 + 4H^+ 4e^-$ 2) $3F^- \rightarrow 3F + 3e^-$

3) $Al^{+3} + 3e^- \rightarrow Al$ 4) $2H^+ + 2e^- \rightarrow H_2$

70. **Choose the correct code regarding Roasting process**

I) It is the process of heating ore in air to obtain the oxide

II) It is an exothermic process

III) It is used for hydrated oxide and oxy salt ore

IV) It is used after the concentration of ore

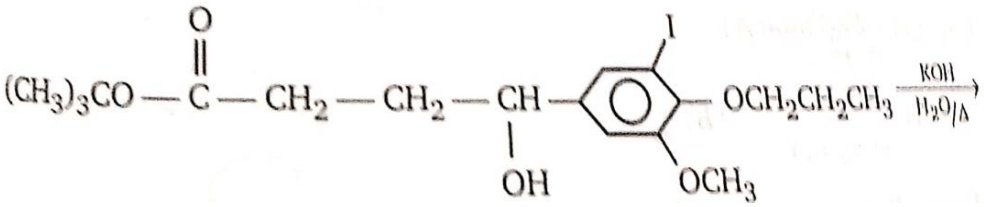
1) I, II and III 2) I, II and IV 3) I, III and IV 4) I, II, III and IV

SECTION-II
(Numerical Value Answer Type)

This section contains 5 questions. The answer to each question is a Numerical values comprising of positive or negative decimal numbers.

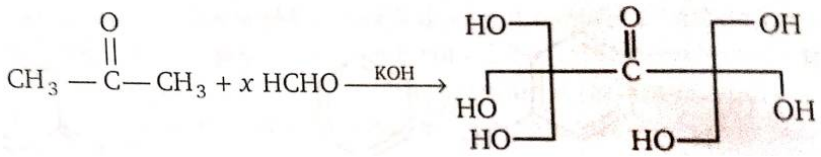
Marking scheme: +4 for correct answer, 0 in all other cases.

71.



Total number of products obtained in above reaction is ____

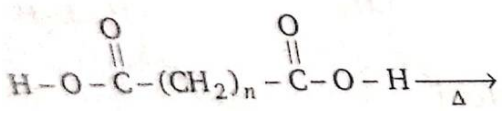
72.



x **= moles of HCHO consumed.**

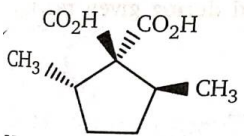
Value of (*x*) will be ____

73.



Product, At what value of (*n*) given compound will not evolve CO_2 gas ___

74.



How many product will be formed when above compound undergo de-carboxylation ___

75. Deamination (or) diazotization of *n*-Bu-NH_2 with $NaNO_2$/HCl gives .... isomeric butene

KEY SHEET

MATHS

1) **1**	2) **3**	3) **4**	4) **2**	5) **2**	6) **1**	7) **2**	8) **1**	9) **1**	10) **1**
11) **4**	12) **3**	13) **1**	14) **1**	15) **1**	16) **2**	17) **4**	18) **1**	19) **1**	20) **2**
21) **8**	22) **0.05**	23) **5**	24) **2.5**	25) **3.16**					

PHYSICS

26) **2**	27) **3**	28) **2**	29) **1**	30) **4**	31) **1**	32) **2**	33) **3**	34) **2**	35) **1**
36) **1**	37) **2**	38) **4**	39) **3**	40) **2**	41) **1**	42) **3**	43) **1**	44) **2**	45) **2**
46) **1.8**	47) **100**	48) **1.5**	49) **112**	50) **23.8**					

CHEMISTRY

51) **2**	52) **1**	53) **2**	54) **2**	55) **3**	56) **2**	57) **3**	58) **3**	59) **2**	60) **4**
61) **4**	62) **1**	63) **3**	64) **2**	65) **4**	66) **3**	67) **2**	68) **2**	69) **3**	70) **2**
71) **2**	72) **6**	73) **2**	74) **1**	75) **3**					

Hints & Solutions

1. Given $\overline{X} = \dfrac{\sum x}{n} \Rightarrow \mu(new) = \dfrac{n\bar{x} - x_1 + a}{n}$

2. $\dfrac{\sum x}{100} = 49$

   $\Rightarrow \dfrac{x_1 + x_2 + x_3 + ... + x_{100} - 20 - 40 - 50 + 60 + 70 + 80}{100} = 49$

3. Mean , $7.85 = \dfrac{50 + 6f + 91 + 80 + 60 + 60}{40 + f}$

4. $\bar{x} = \dfrac{1}{2n+1}\left[a + (a+d) + ... + (a+2nd)\right]$=a+nd

   Mean deviation from mean = $\dfrac{1}{2n+1}\sum_{r=0}^{2n} |(a+rd) - (a+nd)|$

5. If m is the mean of 50 observations then

   $\bar{x} = \dfrac{(n-5)\dfrac{a}{n-5} + 5m}{n-5+5} \Rightarrow m = \dfrac{n\bar{x} - a}{5}$

6. By verification I satisfies the given equation

7. $|i+z|^2 + |i-z|^2 = \left|\dfrac{i}{2} + \alpha\right|^2 - \left|\dfrac{3i}{2} - \alpha\right|^2 = -2$

8. $z_1 = a + ib \Rightarrow \overline{z_1} = a - ib, z_2 = c + id \Rightarrow \overline{z_2} = c - id$

   Then $z_1\overline{z_2} + \overline{z_1}z_2$ is purely real

9. Centre of the circle $z\bar{z}+\bar{a}z+a\bar{z}+b=0$ is -a

10. $\sum_{i=1}^{13} i^n(1+i)=(1+i)\left(i+i^2+i^3+...+i^{13}\right)=i-1$

11. $\int_{-\pi}^{\pi}\left(\cos^2 px+\sin^2 qx\right)dx-2\int_{-\pi}^{\pi}\cos px\sin qxdx$

$=2\int_0^{\pi}\left(\cos^2 px+\sin^2 qx\right)dx=\int_0^{\pi}(1+\cos 2px+1-\cos 2qx)\,dx$

12. $\int_{\pi/4}^{\pi/2}\left(\frac{\tan x+1}{\sqrt{\tan x}}\right)dx$

13. $I_{n+1}-I_n=2\int_0^{\pi}\cos(n+1)\,dx$

$\therefore I_{n+1}=I_n\Rightarrow I_{n+1}=I_n=...=I_1$

$\Rightarrow I_n=\pi$

14. $f(\theta)=\left(\frac{dx}{d\theta}\right)^2+\left(\frac{dy}{d\theta}\right)^2=\theta^2$

15. $\int_0^x\frac{bt\cos 4t-a\sin 4t}{t^2}dt=b\int_0^x\frac{\cos 4t}{t}dt-a\int_0^x\frac{\sin 4t}{t^2}dt$ and use by parts

16. $\int_0^1 Tan^{-1}\left(1-x+x^2\right)dx=\int_0^1\frac{\pi}{2}-Cot^{-1}\left(1-x+x^2\right)dx=\frac{\pi}{2}-2\int_0^1 Tan^{-1}xdx$

17. $\int_0^{\pi}|1-\sin\frac{x}{2}|\,dx=\int_0^{\pi/3}\left(1-\sin\frac{x}{2}\right)dx\int_{\pi/3}^{\pi}\left(\sin\frac{x}{2}-1\right)dx$

18. $f(x)=\int_0^{\sin^2 x}Sin^{-1}\sqrt{t}dt+\int_0^{\cos^2 x}Cos^{-1}\sqrt{t}dt$

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

Therefore f(x) is a constant function

19. $f(a)+f(-a)=1$

$I_1=\int_{f(-a)}^{f(a)}xg\left(x(1-x)\right)dx=\int_{f(-a)}^{f(a)}(1-x)\,g\left(x(1-x)\right)dx$

$\Rightarrow I_1=I_2-I_1\Rightarrow\frac{I_2}{I_1}=2$

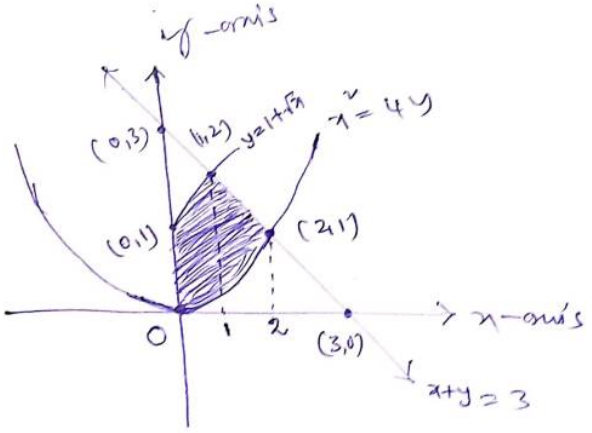
20. Using $\frac{I_n}{I_{n-2}}=\frac{n(n-1)}{n^2+1}$

21. $G.M=(2.4.16.32)^{1/4}=8$

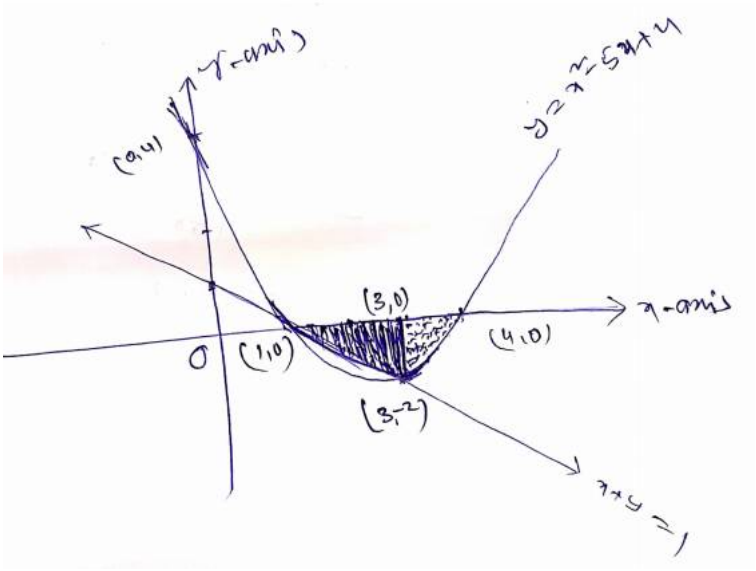
22. $H.M=\frac{n}{\frac{1}{x_1}+\frac{1}{x_2}+...+\frac{1}{x_n}}$

23. Most repeated number

24. Area = $\int_0^1\sqrt{4y}dy+\int_1^2\left(30y-(y-1)^2\right)dy$



25. Area $= \frac{1}{2}\times 2\times 2+\int_3^4 \left(5x-x^2-4\right)dx$



PHYSICS SOLUTIONS

26. $\lambda = 6000^0 A$

$\phi = hv_0$

$\phi = \frac{hc}{\lambda_0} = \frac{12400}{6000} = 2eV$

27. $\lambda = \frac{12400}{\phi} = \frac{12400}{40} = 3nm$

28. $KE = hv - hv_0$

29. $V_0 = \frac{hv-\phi}{e}$

30. $\frac{1}{2}mv^2 - \left(\frac{hc}{\lambda}-\phi\right)$

31. $\frac{1}{\lambda_1} = R\left(\frac{1}{1^2}-\frac{1}{2^2}\right) = \frac{R}{1}\left[\frac{3}{4}\right]$

$$\frac{1}{\lambda_B} = R\left(\frac{1}{4} - \frac{1}{3^2}\right) = \frac{R}{9}\left[\frac{5}{36}\right]$$

$$\frac{\lambda_2}{\lambda_B} = \frac{\frac{5R}{36}}{\frac{3R}{4}} = \frac{5}{27}$$

32. $E = \frac{\lambda c}{\lambda}$

conceptual

33. $\lambda = \frac{h}{p} = \frac{h}{\sqrt{2mqv}} = \frac{h}{\sqrt{2mKE}}$

34. conceptual

35. $\frac{1}{2}mv^2 = \frac{Ze^2}{44 \in_0 r}$

36. mass = density × volume

37. $KE = \left(\frac{A-4}{A}\right)Q$

38. $A = A_0 e^{-\lambda t}$

39. $E = mc^2$

40. $\frac{1}{2}\theta = \frac{N}{N_0} = \left(\frac{1}{2}\right)^n$

41. $N = N_0 e^{-\lambda t}$

$T = \frac{.693}{\lambda}$

42. $A = A_0 e^{-\lambda t}$

43. $T_{9v} = \frac{1}{\lambda} = \frac{T}{.693}$

44. $T = \frac{.693}{\lambda}$

$N = N_0 e^{-\lambda t}$

45. $T = \frac{.693}{\lambda}$

$N = N_0 e^{-\lambda t}$

46. $w = \frac{hc}{\lambda} - ev_0$

47. $\lambda \propto \frac{1}{\sqrt{E}}$

48. $p = \frac{v}{c} = \frac{hv}{c}$

49. Conceptual

50. $E = -13.6\left(\frac{z^2}{n^2}\right)$

CHEMISTRY

51. Clemmensen reductions are only effective on aromatic ketones.
52. Wolf Kishner reduction is the best reagent (it will not effect the – OH group)
53. Clemmensen reduction will effect both carbonyl group and -OH group.
54. $\underset{(A)}{CH_3-CO-CH_3}+\underset{(B)}{CH_3-CO-CH_3}$

    Both A and B can be differentiated by Fehling soltuion
55. A = adipic acid B = cyclo pentanone
56. 

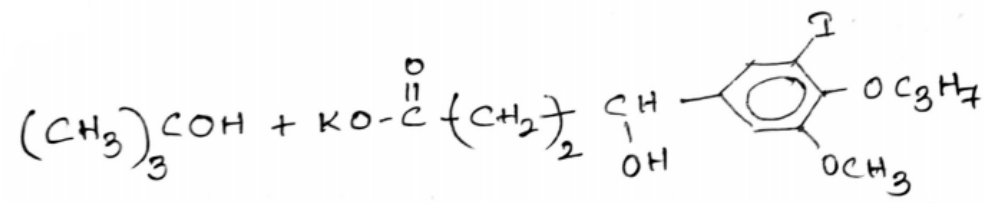
57. $CH_3-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_2-COOH \xrightarrow{LiAlH_4} CH_3-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_2-OH$

58. Cl – CO_2Me
59. 3 < 1 < 2
60. Conceptual
61. Conceptual
62. Conceptual
63. $C_2H_5NH_2 \xrightarrow[HCl]{NaNO_2} \underset{(unstable)}{C_2H_5N_2Cl} \xrightarrow{H_2O} C_2H_5OH + N_2$
64. Carbyl amine reaction

    $\therefore X = CHCl_3$

    $Ph-NH_2 + CHCl_3 + 3KOH \rightarrow PhNC + 3KCl + 3H_2O$
65. $Ph-Cl + NH_3 \xrightarrow{Cu_2O} Ph-NH_2 \xrightarrow[KOH]{CHCl_3} PhNC$
66. $2PbS + 3O_2 \rightarrow 2PbO + 2SO_2$

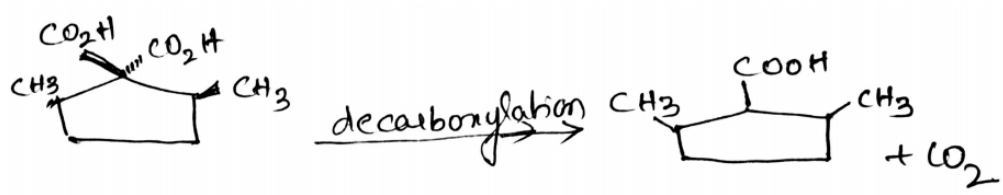
    $PbS + 2PbO \rightarrow 3Pb + SO_2\,(self\ \ reduction)$
67. Liquation process is used for the purification of metal, which it self is readily fusible, but the impurities present in it are not, used for the purification of 'Sn' and Zn, and for removing Pb from Zn-Hg alloy.
68. Conceptual
69. Cathode : $Al^{+3} + 3e^- \rightarrow 3Al$

    Anode : $2O^{2-} \rightarrow O_2 + 4e^-$
70. Conceptual
71. 

72. The product contains 6 alcoholic groups. So, it need six HCHO groups.

73. Up to n = 2 it forms anhydride molecule.

74.



75.