SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR MPC (EAMCET) | **DPP TEST-27** | **Date:14-05-2020**

Time: 3 Hours

MATHS – IIA

Syllabus:*Probability*

1. **A problem in mathematics is given to three students A, B, and C and their respective probability of solving the problem is 1/2, 1/3 and 1/4. Respective probability that the problem is solved is**

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

2. **Five horses are in a race Mr. A selects two of the horses at random and bets on them. The probability that Mr. A selected the winning horse is**

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

3. **The probability that A speaks truth is 4/5, while this probability for B is 3/4. The probability that they contradict each other when asked to speak on a fact is**

1) $\frac{3}{20}$ 2) $\frac{1}{5}$ 3) $\frac{7}{20}$ 4) $\frac{4}{5}$

4. **A pair of fair dice is thrown independently three times. The probability of getting a score of exactly 9 twice is**

1) $\frac{1}{729}$ 2) $\frac{8}{9}$ 3) $\frac{8}{729}$ 4) $\frac{8}{243}$

5. **It is given that the events A and B are such that** $P(A)=\frac{1}{4}, P\left(\frac{A}{B}\right)=\frac{1}{2}$ *and* $P\left(\frac{B}{A}\right)=\frac{2}{3}$ **thenP(B) is**

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

6. **In binomial distribution** $B\left(b, P=\frac{1}{4}\right)$**, if the probability of at least one success is greater than or equal to** $\frac{9}{10}$**, then n is greater than**

1) $\frac{1}{\log_{10}4-\log_{10}3}$ 2) $\frac{1}{\log_{10}4+\log_{10}3}$ 3) $\frac{9}{\log_{10}4-\log_{10}3}$ 4) $\frac{4}{\log_{10}4-\log_{10}3}$

7. **An urn contains nine balls of which three are red, four are blue, and two are green. Three balls are drawn at random without replacement from the urn. The probability that the three balls have different colours is**

1) $\frac{2}{23}$ 2) $\frac{1}{3}$ 3) $\frac{2}{7}$ 4) $\frac{1}{21}$

8. **Consider 5 independent Bernoulli's trails each with probability of success P. If the probability of at least one failure is greater than or equal to** $\frac{31}{32}$**, then p lies in the interval**

1) $\left(\frac{11}{12},1\right)$ 2) $\left(\frac{1}{2},\frac{3}{4}\right)$ 3) $\left(\frac{3}{4},\frac{11}{12}\right)$ 4) $\left[0,\frac{1}{2}\right]$

9. **Three numbers are chosen at random without replacement from {1,2,3,……,8}. The probability that their minimum is 3 given that their maximum is 6, is:**

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

10. A multiple choice examination has 5 questions. Each question has three alternative answers of which exactly one is correct. The probability that a student will get 4 or more correct answers just by guessing is:

1) $\frac{17}{3^5}$ 2) $\frac{13}{3^5}$ 3) $\frac{11}{3^5}$ 4) $\frac{10}{3^5}$

11. Two events A and B have probilities 0.25 and 0.50 respectively. The probability that both A and B occur simultaneously is 0.14. Then the probability that neither A nor B occurs is

1) 0.39 2) 0.25 3) 0.11 4) None of these

12. If A and B are two events such that P(A) > 0 and $P(B) \neq 1$ then $P(\overline{A}/\overline{B})$ is equal to (Here $\overline{A}$ and $\overline{B}$ are complements of A and B respectively)

1) $1-P\left(\frac{A}{B}\right)$ 2) $1-P\left(\frac{\overline{A}}{B}\right)$ 3) $\frac{1-P(A\cup B)}{P(\overline{B})}$ 4) $\frac{P(\overline{A})}{P(B)}$

13. Three identical dice are rolled. The probability that the same number will appear on each of them is

1) $\frac{1}{6}$ 2) $\frac{1}{36}$ 3) $\frac{1}{18}$ 4) $\frac{3}{28}$

14. An unbiased die with faced marked 1,2,3,4,5 and 6 is rolled four times. Out of four faces values obtained, the probability that the minimum face value is not less than 2 and the maximum face value is not greater than five is then

1) $\frac{16}{81}$ 2) $\frac{1}{81}$ 3) $\frac{80}{81}$ 4) $\frac{65}{81}$

15. Let A, B, C be three mutually independent events. Consider the two statements S_1 and S_2
S_1: A and $B\cup C$ are independent
S_2 :A and $B\cap C$ are independent then,

1)both S_1 and S_2 are true 2) only S_1 is true 3) only S_2 is true 4) neither S_1 nor S_2 is true

16. Three of the six vertices of a regular hexagon are chosen at random. The probability that the triangle with three vertices is equilateral is

1) $\frac{1}{2}$ 2) $\frac{1}{5}$ 3) $\frac{1}{10}$ 4) $\frac{1}{20}$

17. If the integers m and n are chosen at random between 1 and 100, then the probability that a number of the form 7^m+7^n is divisible by 5 equals.

1) $\frac{1}{4}$ 2) $\frac{1}{7}$ 3) $\frac{1}{8}$ 4) $\frac{1}{49}$

18. If $P(B)=\frac{3}{4}$, $P(A\cap B\cap \overline{C})=\frac{1}{3}$ and $P(\overline{A}\cap B\cap \overline{C})=\frac{1}{3}$, then $P(B\cap C)$ is

1) $\frac{1}{12}$ 2) $\frac{1}{6}$ 3) $\frac{1}{15}$ 4) $\frac{1}{9}$

19. A six-faced fair dice is shown until 1 comes. Then the probability that 1 comes in even number of trails is

1) $\frac{5}{11}$ 2) $\frac{5}{6}$ 3) $\frac{6}{11}$ 4) $\frac{1}{6}$

20. Four fair dice D_1, D_2, D_3 and D_4 each having six faces numbered 1,2,3,4,5 and 6 are rolled simultaneously. The probability that D_4 shows a number appearing on one of D_1, D_2 and D_3 is

1) $\frac{91}{216}$ 2) $\frac{108}{216}$ 3) $\frac{125}{216}$ 4) $\frac{127}{216}$

MATHS – IIB

Syllabus :*Definite Integration*

21. $\int_{-1}^{1} \frac{1}{\left(1+x^2\right)^2}\,dx$

1) $\frac{\pi}{4}+\frac{1}{2}$ 2) $\frac{\pi}{4}-\frac{1}{2}$ 3) $\frac{\pi}{8}$ 4) $\frac{\pi}{16}$

22. $\int_{0}^{\infty} \frac{dx}{\left(x+\sqrt{x^2+1}\right)^3} =$

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

23. **If** $\int_{0}^{K} \frac{dx}{2+8x^2} = \frac{\pi}{16}$ **then K=**

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

24. $\int_{0}^{\pi/2} e^{\sin^2 x} \sin 2x\,dx =$

1) e 2) e + 1 3) e – 1 4) 2e + 1

25. $\int_{1/3}^{1} \frac{\left(x-x^3\right)^{1/3}}{x^4}\,dx =$

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

26. $\int_{0}^{\pi} \frac{\tan x}{\sec x+\cos x}\,dx =$

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

27. $\int_{0}^{1} \sqrt{x(1-x)}\,dx =$

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{6}$ 4) $\frac{\pi}{8}$

28. $\int_{0}^{1} \frac{1}{x+\sqrt{x}}\,dx =$

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

29. $\int_{0}^{\pi/2} \left(2\tan\frac{x}{2}+x\sec^2\frac{x}{2}\right)dx =$

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

30. $\int_{0}^{1} x\tan^{-1}x\,dx =$

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

31. $\int_0^1 \frac{xe^x}{(1+x)^2}\,dx =$

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

32. **If** $I=\int_0^1 \sqrt{1+x^3}\,dx$ **then**

1) $I>1$ 2) $I\neq\frac{\sqrt{5}}{2}$ 3) $I>\frac{\sqrt{7}}{2}$ 4) $I<\frac{\sqrt{7}}{2}$

33. $\int_0^{\pi/2} \frac{1}{4\cos^2 x+9\sin^2 x}\,dx =$

1) $\frac{\pi}{12}$ 2) $\frac{\pi}{10}$ 3) $\frac{\pi}{5}$ 4) $\frac{\pi}{2}$

34. **The value of** $\int_{-\pi}^{\pi} \frac{\cos^2 x}{1+a^x}\,dx,\ a>0$ **is**

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

35. $\int_{-1}^{1}(ax^3+bx)\,dx=0$ **for**

1) any values of a and b 2) a > 0, b > 0 only 3) a < 0 and b < 0 only 4) a > 0 and b < 0 only

36. **The solution for** x **of the equation** $\int_{\sqrt{2}}^{x} \frac{dt}{t\sqrt{t^2-1}}=\frac{\pi}{2}$ **is**

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

37. $\int_0^{\pi/2} \frac{5\tan x-3\cot x}{\tan x+\cot x}\,dx =$

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

38. $\int_0^{\pi/2} \frac{\sqrt{\cot x}}{\sqrt{\tan x}+\sqrt{\cot x}}\,dx =$

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

39. **The value of** $\int_0^1 \frac{8\log(1+x)}{1+x^2}\,dx$ **is**

1) $\frac{\pi}{2}\log 2$ 2) $\log 2$ 3) $\pi\log 2$ 4) $\frac{\pi}{8}\log 2$

40. $\int_{-\pi}^{\pi} \frac{2x(1+\sin x)}{1+\cos^2 x}\,dx =$

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

PHYSICS

Syllabus :***Dual Nature of Matter, Atoms, Nuclei.***

41. **An electron is accelerated by p.d of 1000Vits velocity will be ____ m/s**

1) $3.78\times10^7\,m/s$ 2) $1.89\times10^7\,m/s$ 3) $5.67\times10^7\,m/s$ 4) $0.95\times10^7\,m/s$

42. The ratio of de Broglie wave length of proton and α particle having same kinetic energy is

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

43. Which of the following shows particle nature of light

1) Refraction 2) interference 3) polarization 4) photoelectric effect

44. In case of electrons and photons having the same wavelength. What is same for them.

1) Energy 2) Velocity 3) Momentum 4) Angular Momentum

45. The energy of photon of wavelength $'\lambda'$ is

1) $hc\lambda$ 2) $\frac{hc}{\lambda}$ 3) $\frac{\lambda}{hc}$ 4) $\frac{\lambda h}{c}$

46. The deBroglie wavelength of neutron in thermal equilibrium at temperature T is

1) $\frac{30.8}{\sqrt{T}}A^{\circ}$ 2) $\frac{3.08}{\sqrt{T}}A^{\circ}$ 3) $\frac{0.308}{\sqrt{T}}A^{\circ}$ 4) $\frac{0.0308}{\sqrt{T}}A^{\circ}$

47. A particle is dropped-from a height 'H'. The de Broglie wavelength of particle as a function of height is proportional to

1) H 2) $H^{1/2}$ 3) H^{0} 4) $H^{-1/2}$

48. The threshold frequency for photoelectric effect on sodium corresponds to a wavelength of $5000A^{\circ}$. Its work function is

1) $4\times10^{-19}J$ 2) $1J$ 3) $2\times10^{-19}1J$ 4) $3\times10^{-19}1J$

49. A radio transmitter operates at a frequency 880 KHz and a power of 10 Kw. The no of photons emitted per second is

1) 1.72×10^{31} 2) 1.327×10^{25} 3) 1.327×10^{37} 4) 1.327×10^{45}

50. The ratio of energies of hydrogen atom in first to second excited states is

1) 1/4 2) 4/9 3) 9/4 4) 4

51. The angular momentum of the electron in hydrogen atom in ground state is

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

52. The ratio between Bohr radii is

1) 1 : 2 : 3 2) 2 : 4 : 6 3) 1 : 4 : 9 4) 1 : 3 : 5

53. The ionization energy of L^{++} is

1) 9 hcR 2) 6 hcR 3) 2 hcR 4) hcR

54. Which series in the spectrum of hydrogen atom lies in the visible region of electro magneticspectrum

1) paschen 2) Balmer 3) Lyman 4) Brackett

55. The ratio of maximum to minimum wavelength in Balmer series is

1) 3 : 4 2) 1 : 4 3) 5 : 36 4) 5 : 9

56. A nucleus $_nX^m$ emits one α particle and two β -particles, the resulting nucleus is

1) $^{m-8}_{m-4}Z$ 2) $^{m-6}_{r}Z$ 3) $^{m-4}_{n}X$ 4) $^{m-4}_{n-2}Y$

57. Half life of radio active element depends on

1) amount of element present 2) temperature
3) pressure 4) nature of element

58. If 1mg of uranium^{235} is annihilated, energy liberated is

1) $9\times10^{10}\ J$ 2) $9\times10^{19}\ J$ 3) $9\times10^{18}\ J$ 4) $9\times10^{17}\ J$

59. If an electron and positron annihilates, then the energy liberated is

1) $3.2\times10^{-13}\ J$ 2) $1.6\times10^{-13}\ J$ 3) $4.8\times10^{-13}\ J$ 4) $6.4\times10^{-13}\ J$

60. If the radius of $_{12}Al^{27}$ is taken to be R_{Al} then the radius of $_{53}Te^{125}$ is nearly

1) $\frac{5}{3}R_{Al}$ 2) $\frac{3}{5}R_{Al}$ 3) $\left(\frac{13}{53}\right)^{1/3}R_{Al}$ 4) $\left(\frac{53}{13}\right)^{1/3}R_{Al}$

CHEMISTRY

Syllabus: ***Organic Compounds Containing C, H and 'O' (Alcohol)***

61. An example for a polyhydric alcohol is
1) Methyl alcohol 2) Neopentyl alcohol 3) Sec butyl alcohol 4) Mannitol

62. Ethyl alcohol is manufactured from ethylene by
1) Permanganate 2) Catalytic Oxidation
3) Hydrolysis of ethyl hydrogen sulphate 4) Reduction

63. Best reagent to convert ethanoic Acid to ethand is
1) $NaBH_4$ 2) $LiAlH_4$/ water 3) H_2 / Pt 4) $LiAlH_4$/dryether

64. $CH_3COOH + C_2H_5OH \xrightarrow[Heat]{X} CH_3COOC_2H_5 + H_2O$ **. In the reaction 'X' is**
1) Sodium metal 2) aqKOH 3) Conc. H_2SO_4 4) Dil. HC*l*

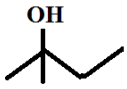
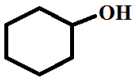
65. $C_2H_5OH + PCl_3 \rightarrow C_2H_5Cl + X$ *Here X* **is an oxy acid of phosphorus X is?**
1) H_3PO_4 2) H_3PO_3 3) H_3PO_2 4) HPO_3

66. Which of the following alcohol react most readily with Lucas reagent?
1) $CH_3CH_2CH_2OH$ 2) $(CH_3)_2CHOH$ 3) $(CH_3)_3COH$ 4) CH_3CH_2OH

67. The reaction of ethanol with H_2SO_4 does not give
1) Ethylene 2) Diethyl ether 3) Acetylene 4) Ethyl hydrogen sulphate

68. $H-C\equiv C-H + H_2 \xrightarrow{Pd-BaSO_4/Quinoline} A \xrightarrow{Hcl} B \xrightarrow{aqKOH} C$ **Here the 'C' is**
1) Propane 2) Ethanol 3) Ethyne 4) Ethylene

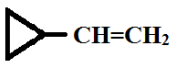
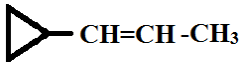
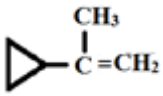
69. The relative rates of reaction with concentrated H_2SO_4 of the following is

I.  **II.**  **III.** 

1) I > II > III 2) II >I > III 3) I > III > II 4) II > III > I

70. Fusel oil is a mixture of
1) Ethers 2) alcohols 3) alcohols & ethers 4) alcohols and ketones

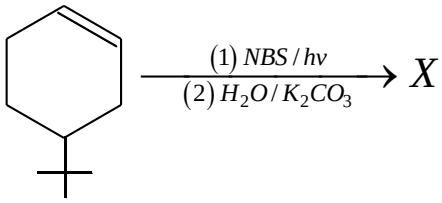
71. Rate of hydration of

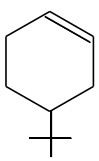
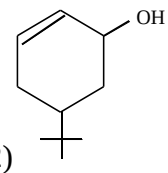
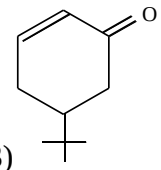
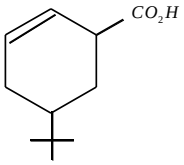
I.  **II.**  **III.** 

1)I < II < III 2) I < III < II 3)II < I < III 4) III < II <1

72. $Glycerol \xrightarrow{KHSO_4} A \xrightarrow{LiAlH_4} B$ **A and B are**
1) Acrolein, allyl alcohol 2) Glycerylsulphate, acrylic acid
3) Allyl alcohol, acrolein 4) only acroein (B is not formed)

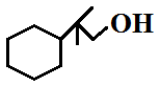
73. The product of the reaction given below is



1)  2)  3)  4) 

74. Which of the following compounds can be used as antifreeze in automobile Radiators?
1) Methyl alcohol 2) Glycol 3) Nitrophenol 4) Ethyl alcohol

75. Which of the following is not the product of dehydration of



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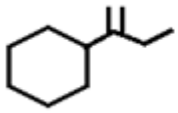
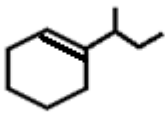
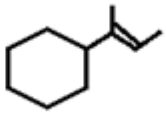
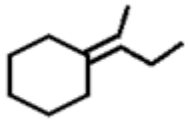
1) 

2) 

3) 

4) 

76. Which one of the following contains $C_{sp^2}-OH$ bond?

1) Vinyl alcohol 2) allyl alcohol 3) Benzyl alcohol 4) carbolic acid

77. $(CH_3)_3C-OH \xrightarrow{H_2SO_4} (CH_3)_2C=CH_2$ **This reaction takes place through**

1) SN^1 mechanism 2) SN^2 mechanism 3) E_1 mechanism 4) E_2 mechanism

78. Absolute alcohol is prepared from rectified spirit by?

1) steam distillation 2) fractional distillation
3) distillation with CaO&Ca 4) Simple distillation

79. An enzyme which brings about the conversion of starch in to maltose is known as

1) Diastase 2) Zymase 3) Maltase 4) Invertase

80. Iodo form can not be prepared from?

1) CH_3OH 2) C_2H_5OH 3) CH_3CHO 4) CH_3COCH_3

KEY SHEET

MATHS - IIA

1)	**1**	2)	**4**	3)	**3**	4)	**4**	5)	**2**	6)	**1**	7)	**3**	8)	**4**	9)	**2**	10)	**3**
11)	**1**	12)	**3**	13)	**2**	14)	**1**	15)	**1**	16)	**3**	17)	**1**	18)	**1**	19)	**1**	20)	**1**

MATHS - IIB

21)	**1**	22)	**1**	23)	**2**	24)	**3**	25)	**3**	26)	**3**	27)	**4**	28)	**2**	29)	**1**	30)	**1**
31)	**3**	32)	**1**	33)	**1**	34)	**2**	35)	**1**	36)	**1**	37)	**1**	38)	**4**	39)	**3**	40)	**2**

PHYSICS

41)	**2**	42)	**1**	43)	**3**	44)	**3**	45)	**2**	46)	**1**	47)	**4**	48)	**1**	49)	**1**	50)	**3**
51)	**3**	52)	**3**	53)	**1**	54)	**2**	55)	**4**	56)	**3**	57)	**4**	58)	**1**	59)	**2**	60)	**1**

CHEMISTRY

61)	**4**	62)	**3**	63)	**4**	64)	**3**	65)	**2**	66)	**3**	67)	**3**	68)	**2**	69)	**4**	70)	**2**
71)	**1**	72)	**1**	73)	**2**	74)	**2**	75)	**2**	76)	**1**	77)	**3**	78)	**3**	79)	**1**	80)	**3**

Hints & Solutions

MATHS - IIA

1. $P(A\cup B\cup C)=P(A)+P(B)+P(C)-P(A\cap B)-P(B\cap C)-P(A\cap C)+P(A\cap B\cap C)$
2. Let H be a winning horse

   $n(s)=5_{C_2}=10(\text{number of ways 'A' select horses})$

   $n(E)=\{HH_1,HH_2,HH_3,HH_4\}=4$

   $P(E)=\frac{4}{10}=\frac{2}{5}$
3. $P(E)=P\left(A\cap\overline{B}\right)+P\left(\overline{A}\cap B\right)$

   $=P(A)P\left(\overline{B}\right)+P\left(\overline{A}\right)P(B)$

   $=\frac{4}{5}\times\frac{1}{4}+\frac{3}{4}\times\frac{1}{5}=\frac{7}{20}$
4. $n=3, P=\frac{1}{9}, q=\frac{8}{9}, r=2$

   $P(X=2)=3_{C_2}\times\left(\frac{8}{9}\right)^1\times\frac{1}{9}=\frac{8}{243}$
5. $P\left(\frac{B}{A}\right)=\frac{2}{3}$

   $\Rightarrow\frac{P(A\cap B)}{P(A)}=\frac{2}{3}\Rightarrow P(A\cap B)=P(A)\frac{2}{3}$

   $=\frac{1}{4}\times\frac{2}{3}=\frac{1}{6}$

   $P\left(\frac{A}{B}\right)=\frac{1}{2}$

   $\frac{P(A\cap B)}{P(B)}=\frac{1}{2}\Rightarrow\frac{1}{6P(B)}=\frac{1}{2}\Rightarrow P(B)=\frac{1}{3}$
6. $p=\frac{1}{4}, q=\frac{3}{4}$

   $p(X\geq 1)\geq\frac{9}{10}$

   $\frac{1}{10}\geq P(X=0)\Rightarrow\frac{1}{10}\geq n_{C_0}\left(\frac{3}{4}\right)^n$

   $\Rightarrow\log_{10}{}^{\frac{1}{10}}\geq n\log_{10}{}^{\left(\frac{3}{4}\right)}$

   $\Rightarrow-\log_{10}^{10}\geq n\left(\log_{10}^{3}-\log_{10}^{4}\right)$

   $\Rightarrow 1\leq n\left(\log_{10}^{4}-\log_{10}^{3}\right)$

   $\Rightarrow n\geq\frac{1}{\log_{10}^{4}-\log_{10}^{3}}$
7. $P(E)=\frac{3}{9}\times\frac{4}{8}\times\frac{2}{7}=\frac{1}{21}$
8. $P(X\geq 1)\geq\frac{31}{32}$

$1-P(X=0)\geq\frac{31}{32}$

$\frac{1}{32}\geq P(X=0)$

$\frac{1}{32}\geq p^n\Rightarrow\frac{1}{32}\geq p^5$

$\Rightarrow\frac{1}{2}\geq P\Rightarrow P\leq\frac{1}{2}\Rightarrow PE\left[0,\frac{1}{2}\right]$

9. max is $6=5_{C_2}=10(1,2,3,4,5)$

min = 3 and max = 6 = (3,4,6), (3,5,6)

$P(E)=\frac{2}{10}=\frac{1}{5}$

10. $P=\frac{1}{3}, q=\frac{2}{3}, n=5$

$P(X\geq 9)=P(X=4)+P(X=5)=\frac{11}{243}$

11. $P(\overline{A}\cap\overline{B})=1-P(A\cup B)=1-(P(A)+P(B)-P(A\cap B))$

$=1-(0.25+0.5-0.14)=0.39$

12. $P\left(\frac{\overline{A}}{B}\right)=\frac{P(\overline{A}\cap\overline{B})}{P(\overline{B})}=\frac{1-P(A\cup B)}{P(\overline{B})}$

13. $P(E)=\frac{6}{6^3}=\frac{1}{36}$

14. $2\leq E\leq 5$

$P(E)=\frac{4}{6}\times\frac{4}{6}\times\frac{4}{6}\times\frac{4}{6}=\left(\frac{2}{3}\right)^4=\frac{16}{81}$

15. $S_1: P(A\cap(B\cup C))=P((A\cap B)\cup(A\cap C))$

$=P(A\cap B)+P(A\cap C)-P(A\cap B\cap C)$

$=P(A)P(B)+P(A)P(C)-P(A)P(B)P(C)$

$=P(A)(P(B)+P(C)-P(B\cap C))$

16. $P(E)=\frac{2}{6_{C_3}}=\frac{2}{20}=\frac{1}{10}$

17. For each m = 1,5,9,…,97 there exist

n = 3,7,….99

i.e 25×25

similarly for m = 2,6,10,….98 there exist

n = 4,8,10,….100

i.e 25×25

$P(E)=\frac{2\times[25\times 25+25\times 25]}{100\times 100}=\frac{1}{4}$

18. Apply Vern diagram

$P(B\cap C)=P(B)-P(A\cap B\cap\overline{C})-P(\overline{A}\cap\overline{B}\cap\overline{C})$

$=\frac{3}{4}-\frac{1}{3}-\frac{1}{3}=\frac{1}{12}$

19. $P=\frac{1}{6}, q=\frac{5}{6}$

$P(E)=\frac{q}{1+q}=\frac{\frac{5}{6}}{1+\frac{5}{6}}=\frac{5}{11}$

20. $P(E)=1-\frac{6.5^3}{64}=1-\left(\frac{5}{6}\right)^3=1-\frac{125}{216}=\frac{91}{216}$

MATHS - IIB

21. put $x=\tan\theta$

22. $\int_0^{\infty}\frac{dx}{\left[x+\sqrt{x^2+1}\right]^n}=\frac{n}{n^2-1}$

23. use $\int\frac{1}{a^2+x^2}\,dx=\frac{1}{a}\tan^{-1}\frac{x}{a}+c$

24. put $\sin^2 x=t$; $\sin 2x.dx=dt$

25. $\int_{1/3}^{1}\frac{\left(x^3\right)^{1/3}\left[\frac{1}{x^2}-1\right]^{1/3}}{x^4}\,dx=\int_{1/3}^{1}\left(\frac{1}{x^2}-1\right)^{1/3}\frac{1}{x^3}\,dx$

Put $\frac{1}{x^2}-1=t$

26. $\int_0^{\pi}\frac{\sin x}{1+\cos^2 x}\,dx=-\left[\tan^{-1}(\cos x)\right]_0^{\pi}$

27. $\int_a^b\sqrt{(x-a)(b-x)}\,dx=\frac{\pi}{8}(b-a)^2$

28. *put* $x=t^2$

29. $\frac{d}{dx}\left(2x\tan\frac{x}{2}\right)=2\tan\frac{x}{2}+x\sec^2\frac{x}{2}$

30. Use integration by parts

31. $\int_0^1\frac{\left(\left[x+1\right]-1\right)e^x}{(1+x)^2}\,dx=\int_0^1 e^x\left(\frac{1}{1+x}-\frac{1}{(1+x)^2}\right)dx$

Use $\int e^x\left[f(x)+f'(x)\right]dx=e^x f(x)+c$

32. $0<x<1\Rightarrow 0<x^3<1$

$\Rightarrow 1<x^3+1<2\Rightarrow 1<\sqrt{x^3+1}<\sqrt{2}$

$\Rightarrow\int_0^1 1\,dx<\int_0^1\sqrt{1+x^3}\,dx\Rightarrow 1<I$

33. $\int_0^{\pi/2}\frac{dx}{a^2\cos^2 x+b^2\sin^2 x}=\frac{\pi}{2ab}$

34. *use* $\int_a^b f(x)\,dx=\int_a^b f(a+b-x)\,dx$

35. $\therefore ax^3+bx$ is an odd function for $\forall a,b$

$\int_{-1}^{1}\left(ax^3+bx\right)dx=0$ for all values of a and b

36. $\left(\sec^{-1} t\right)_{\sqrt{2}}^{x} = \frac{\pi}{2} \Rightarrow \sec^{-1} x - \frac{\pi}{4} = \frac{\pi}{2}$

$\sec^{-1} x = \frac{3\pi}{4} \Rightarrow x = \sec\frac{3\pi}{4} = -\sqrt{2}$

37. $\int_0^{\pi/2} \frac{a\tan x - b\cot x}{\tan x + \cot x}\, dx = (a-b)\frac{\pi}{4}$

38. $\int_0^{\pi/2} \frac{f(\cot x)}{f(\tan x) + f(\cot x)}\, dx = \frac{\pi}{4}$

39. *use* $\int_0^1 \frac{\log(1+x)}{1+x^2}\, dx = \frac{\pi}{8}\log 2$

40. $\int_{-\pi}^{\pi} \frac{2x(1+\sin x)}{1+\cos^2 x}\, dx$

$= \int_{-\pi}^{\pi} \frac{2x}{1+\cos^2 x}\, dx + \int_{-\pi}^{\pi} \frac{2x\sin x}{1+\cos^2 x} dx$

$= 0 + 2\int_{-\pi}^{\pi} \frac{x\sin x}{1+\cos^2 x}\, dx$

$= 2.2\int_0^{\pi} \frac{x\sin x}{1+\cos^2 x}\, dx$

Use $\int_0^a f(x)\, dx = \int_0^a f(a-x)\, dx$

PHYSICS

41. $eV = \frac{1}{2}mv^2 \rightarrow V = \sqrt{\frac{2eV}{m}}$

42. $\frac{\lambda p}{\lambda \alpha} = \sqrt{\frac{m\alpha}{mp}} = \sqrt{\frac{4mp}{mp}} = 2:1$

43. Photoelectric effect

44. $p = \frac{h}{\lambda} \rightarrow \lambda = \frac{h}{p}$ *if* $\lambda e = \lambda p$

So p = same

45. $E = h\upsilon = \frac{hc}{\lambda}$

46. $\lambda = \frac{h}{\sqrt{2mkT}} = \frac{6.63\times10^{-34}}{\sqrt{2\times1.67\times10^{-27}\times1.38\times10^{-23}T}}$

47. $V = \sqrt{2gh}$; $\lambda = \frac{h}{mv} = \frac{h}{m\sqrt{2gh}}$

48. $W_0 = \frac{hc}{\lambda_0} = 4\times10^{-19}\,J$

49. $n = \frac{P}{E} = \frac{P}{h\upsilon}$

50. $\frac{E_1}{E_2} = \frac{n_2^2}{n_1^2} = \frac{3^2}{2^2} = \frac{9}{4}$

51. $mvr = \frac{nh}{2\pi} \rightarrow \frac{h}{2\pi}$

52. 1 : 4 : 9

53. $IE = Rchz^2 = Rch(3)^2 = 9hcR$

54. Balmer series

55. $\frac{1}{\lambda} = Rz^2\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$

56. conceptual $\alpha = {}_2He^4$, $\beta = {}_{-1}e^0$

57. conceptual

58. $E = mc^2$

59. $E = m_e c^2 + mpc^2$

$m_e = mp$

$E = 2m_e c^2$

$= 2\times 9.1\times 10^{-31}\times\left(3\times 10^8\right)^2 = 1.6\times 10^{-13}\ J$

60. $R = R_0 A^{1/3}$

$R\ \alpha\ A^{1/3}$

$\frac{R_{Al}}{R_{Te}} = \left(\frac{Al}{Al}\right)^{1/3}$

$R_{Te} = \frac{5}{3}R_{Al}$

CHEMISTRY

61. $\begin{matrix} CH_2OH \\ | \\ (CHOH)_4 \\ | \\ CH_2OH \end{matrix}$

62. $C_2H_5HSO_4 + H_2O \rightarrow C_2H_5OH + H_2SO_4$

$H_2C = CH_2 + H_2SO_4 \rightarrow C_2H_5HSO_4$

63. Conceptual

64. Conceptual

65. $3C_2H_5OH + PCl_3 \rightarrow 3C_2H_5Cl + H_3PO_3$

66. $3^\circ - OH > 2^\circ - OH > 1^\circ - OH$ due to the formation of stable $c\oplus$

67. Conceptual

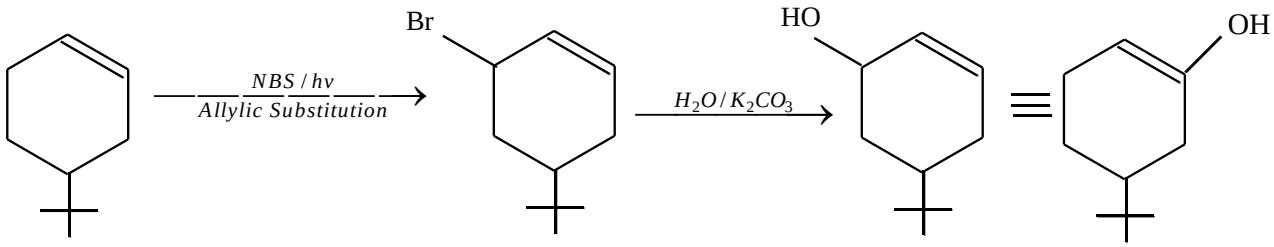
68. $H - C \equiv C - H + H_2 \xrightarrow{Pd - BaSO_4 / Quinoline} C_2H_4 \xrightarrow{HCl} C_2H_5Cl \xrightarrow{aqKOH} C_2H_5OH$

69. Stability of alkene in diving force

70. Conceptual

71. Conceptual

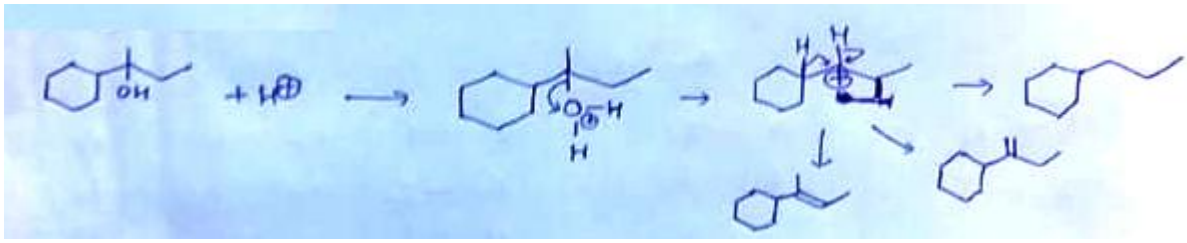
72. Conceptual

73. 

$H_2O + K_2CO_3 \rightarrow \underset{(aq)}{KOH} + CO_2$

74. Conceptual

75.



76. Conceptual
77. Conceptual
78. Conceptual
79. Conceptual
80. Conceptual