SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

JEE MAIN TOT GT-7

Time: 3 Hours   Max. Marks: 300 M

MATHEMATICS

1. Let S denote the set of all values of λ for which the system of equations

   $$\lambda x_1 + x_2 + x_3 = 1$$
   $$x_1 + \lambda x_2 + x_3 = 1$$
   $$x_1 + x_2 + \lambda x_3 = 1$$

   is in-consistent.

   Then $n(S)$ and $\sum_{\lambda \in S} |\lambda|$ respectively are

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

2. The roots of the equation
   $$(x-2018)(x-2019) + (x-2019)(x-2020) + (x-2020)(x-2018) = 0 \text{ are}$$

   A) imaginary   B) real and distinct
   C) real and equal   D) rational and equal

3. The vector $\bar{a} = \alpha \bar{i} + 2\bar{j} + \beta \bar{k}$ lies in the plane of the vector $\bar{b} = \bar{i} + \bar{j}$ and $\bar{c} = \bar{j} + \bar{k}$ and bisects the angle between $\bar{b}$ and $\bar{c}$ then which of the following gives possible values of α and β.

   A) $\alpha = 2, \ \beta = 2$ B) $\alpha = 1, \ \beta = 2$ C) $\alpha = 2, \ \beta = 1$ D) $\alpha = 1, \ \beta = 1$

4. The point represented by the complex number $2 - i$ is rotated about $(1,0)$ through an angle of $\dfrac{\pi}{2}$ in anti-clockwise direction. Then the new position of the point is

   A) $1 + 2i$ B) $-1 + 2i$ C) $2 + i$ D) $-1 - 2i$

5. A data consists of n observations $x_1, x_2, \ldots x_n$. If $\sum_{i=1}^{n}(x_i + 1)^2 = 9n$ and $\sum_{i=1}^{n}(x_i - 1)^2 = 5n$,

   Then the standard derivation of this data is

   A) $\sqrt{5}$ B) $\sqrt{7}$ C) 2   D) 5

6. Let α be a root of $x^2 + x + 1 = 0$ and suppose that a fair die is thrown 3 times. If a,b,c are the numbers shown on the die, then the probability that $\alpha^a + \alpha^b + \alpha^c = 0$ is

   A) $\dfrac{2}{36}$ B) $\dfrac{1}{27}$ C) $\dfrac{1}{72}$ D) $\dfrac{2}{9}$

7. The number of rational terms in the expansion of $\left(5^{\frac{1}{6}} + 2^{\frac{1}{8}}\right)^{100}$ is

   A) 4   B) 5   C) 6   D) 7

8. **If α and β are the roots of the quadratic equation $3x^2 - 16x + 5 = 0$, then**

$$Tan^{-1}\alpha + Tan^{-1}\beta - \tan^{-1}\left(\frac{\alpha+\beta}{1-\alpha\beta}\right) =$$

A) 0   B) π C) $\dfrac{\pi}{2}$ D) $-\pi$

9. **If $p \to (qVr)$ is false, then the truth values of p, q, r are respectively**

A) T,T,T   B) F,T,T   C) F,F,F   D) T,F,F

10. **The void relation in a set A is**
A) Refletive   B) Reflexive and symmetric
C) Reflexive and transtive   D) Trivially symmetric and transtive

11. $$\underset{x\to 0}{Lt} \frac{\int_0^x \sin^3 t . \cos t \, dt}{x^4}$$

A) 0.25   B) 2.5   C) 5.2   D) 0.52

12. **If $y = Tan^{-1}\left(\dfrac{1}{1+x+x^2}\right) + Tan^{-1}\left(\dfrac{1}{x^2+3x+3}\right) + Tan^{-1}\left(\dfrac{1}{x^2+5x+7}\right)$ then $y^1(0) =$**

A) $\dfrac{-3}{10}$ B) $\dfrac{-5}{10}$ C) $-\dfrac{7}{10}$ B) $-\dfrac{9}{10}$

13. $$\int \frac{(1-\cos\theta)^{\frac{2}{7}}}{(1+\cos\theta)^{\frac{9}{7}}} \, d\theta =$$

A) $\dfrac{7}{11}\left(\sin\dfrac{\theta}{2}\right)^{11/7} + c$ B) $\dfrac{2}{11}\left(\cos\dfrac{\theta}{2}\right)^{11/7} + c$ C) $\dfrac{7}{11}\left(Tan\dfrac{\theta}{2}\right)^{11/7} + c$ D) $\dfrac{11}{7}\left(Tan\dfrac{\theta}{2}\right)^{11/7} + c$

14. $$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \log\left(\frac{2-Sin\theta}{2+Sin\theta}\right) d\theta =$$

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

15. **The differential equation having the general solution $y = c(x-c)^2$ where c is an arbitrary constant.**

A) $\left(y^1\right)^2 = 4y^2\left(xy^1 - 2y\right)$ B) $\left(y^1\right)^3 = 4y\left(xy^1 - 2y\right)$

C) $\left(y^1\right)^3 = y\left(x^2y^1 - y\right)$ D) $\left(y^1\right)^3 = 2y\left(xy^1 - 2y\right)$

16. **The locus of the point represented by $x = t^2 + t + 1$, $y = t^2 - t + 1$ is**
A) $x^2 - 2xy + y^2 - 2x - 2y + 4 = 0$ B) $x^2 + 2xy + y^2 - 2x - 2y + 4 = 0$
C) $x^2 - 2xy + y^2 + 2x + 2y + 4 = 0$ D) $x^2 - 2xy - y^2 + 2x + 2y - 4 = 0$

17. **If the lines $x = ay + b$, $z = cy + d$ and $x = a^1z + b^1$, $y = c^1z + d^1$ are perpendicular.**
A) $ab^1 + bc^1 + 1 = 0$ B) $bb^1 + cc^1 + 1 = 0$
C) $cc^1 + a + a^1 = 0$ D) $aa^1 + c + c^1 = 0$

18. If $A\left(2,\dfrac{1}{2}\right)$, $B\left(3,\dfrac{1}{3}\right)$, $C\left(4,\dfrac{1}{4}\right)$, $D\left(K,\dfrac{1}{K}\right)$ are Concyclic the K=

A) $\dfrac{1}{4}$ B) $\dfrac{1}{14}$ C) $\dfrac{1}{24}$ D) $\dfrac{1}{5}$

19. The length of the perpendicular from the focus S of the parabola $y^2 = 4ax$ on the tangent at p is

A) $\sqrt{OS.SP}$ B) $OS.SP$ C) $OS + OP$ D) $None$

20. If the equation $(10x - 5)^2 + (10y - 4)^2 = \lambda^2 (3x + 4y - 1)^2$ represents a hyperbola then

A) $-2 < \lambda < 2$ B) $\lambda > 2$ C) $\lambda < -2, \lambda > 2$ D) $0 < \lambda < 2$

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. Let $f(x) = \dfrac{1}{1 + 2^{1-2x}}$ Then the value of $f\left(\dfrac{1}{2020}\right) + f\left(\dfrac{2}{2020}\right) + \ldots \ldots \ldots + f\left(\dfrac{2019}{2020}\right)$ is

22. The number of different words which can be formed by taking 3 letters at a time out of the letters of the word 'POISSION' is

23. The sum of 101 terms of an A.P. is 1212 .The middle term is

24. The number of values of 'a' for which the pair of lines represented by $3ax^2 + 5xy + (a^2 - 2)y^2 = 0$ are at right angles to each other is

25. The foci of the ellipse $\dfrac{x^2}{16} + \dfrac{y^2}{b^2} = 1$ and the hyperbola $\dfrac{x^2}{144} - \dfrac{y^2}{81} = \dfrac{1}{25}$ coincide then the value of b^2 is

SECTION – I
(SINGLE CORRECT ANSWER TYPE)

This section contains 20 multiple choice questions. Each question has 4 options (A), (B), (C) and (D) 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.

PHYSICS

26. A car approaching a crossing at a speed of 20m/s sounds a horn of frequency 628Hz . When 80m from the crossing the apparent frequency heard by an observer 60m from the crossing on the straight road which crosses the road at right angles is (velocity of sound =330m/sec)

A) 660Hz   B) 680Hz   C) 640Hz   D) 690Hz

27. A diatomic molecule is made of two masses m_1 and m_2 which are separated by a distance r. If we calculate its rotational energy by applying Bohr's rule of angular momentum quantization, its energy will be given by (n is an integer)

A) $\dfrac{(m_1 + m_2)^2 n^2 h^2}{2m_1^2 m_2^2 r^2}$ B) $\dfrac{n^2 h^2}{2(m_1 + m_2)r^2}$ C) $\dfrac{2n^2 h^2}{(m_1 + m_2)r^2}$ D) $\dfrac{(m_1 + m_2)n^2 h^2}{2m_1 m_2 r^2}$

28. The value of the resistor R_S needed in the dc voltage regulator circuit shown here equals
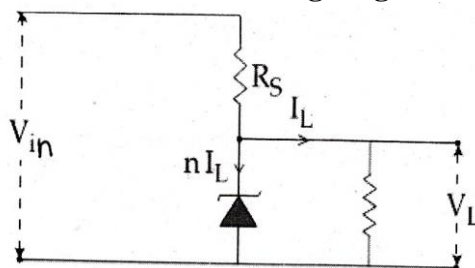

A) $\dfrac{(V_i - V_L)}{nI_L}$ B) $\dfrac{(V_i + V_L)}{nI_L}$ C) $\dfrac{(V_i - V_L)}{(n+1)I_L}$ D) $\dfrac{(V_i + V_L)}{(n+1)I_L}$

29. The variation of electric field between the two charges q_1 and q_2 along the line joining the charges is plotted against distance from q_1 (taking rightward direction of electric field as positive) as shown in the figure. Then the correct statement is.
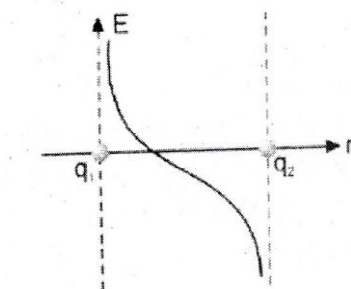

A) q_1 and q_2 are positive and $q_1 < q_2$ B) q_1 and q_2 are positive and $q_1 > q_2$

C) q_1 and positive and q_2 is negative and $q_1 < q_2$ D) q_1 and q_2 are negative and $q_1 < q_2$

30. Half lives of two radioactive elements A and B are 20minutes and 40 minutes, respectively. Initially the samples have equal number of nuclei. After 80 minutes the ratio of decayed number of A and B nuclei will be

A) 1:16   B) 4:1   C) 1:4   D) 5:4

31. The box of a pin hole camera of length L, has a hole of radius a. It is assumed that when the hole is illuminated by a parallel beam of light of wavelength λ the spread of the spot (Obtained on the opposite wall of the camera) is the sum of its geometrical spread and the spread due to diffraction . The spot would then have its minimum size(say b_{min}) when :

A) $a = \dfrac{\lambda}{L}$ and $b_{min} = \dfrac{2\lambda^2}{L}$ B) $a = \sqrt{\lambda L}$ and $b_{min} = \dfrac{2\lambda^2}{L}$

C) $a = \sqrt{\lambda L}$ and $b_{min} = \sqrt{4\lambda L}$ D) $a = \dfrac{\lambda^2}{L}$ and $b_{min} = \sqrt{4\lambda L}$

32. Two concentric coils each of radius equal to $2\pi cm$ are placed at right angles to each other. 3A and 4A are the currents flowing in each coil respectively .The magnetic induction in wb/m^2 at the Centre of the coils will be

A) 12×10^{-5} B) 10^{-5} C) 5×10^{-5} D) 7×10^{-5}

33. The potential at a point x (measured in μm) due to same charges situated on the X-axis is.

Given by $v(x) = \dfrac{20}{x^2 - 4}$ volt. The electric field E at x=4 μm is given by

A) $\dfrac{5}{3} {v}/{\mu m}$ and in the –ve x-direction   B) $\dfrac{5}{3} {v}/{\mu m}$ and in the +ve x- direction

C) $\dfrac{10}{9} {v}/{\mu m}$ and in the –ve x- direction   D) $\dfrac{10}{9} {v}/{\mu m}$ and in the +ve x-direction

34. The wavelength of the carrier waves in a modern optical fiber communication network is close to

A) 900nm   B) 600nm   C) 1500nm   D) 2400nm

35. Two bodies of mass 2kg and 5kg are attached to the ends of a spring of force constant 2128N/m. These bodies are given velocities of 2m/s and 5 m/s in mutually opposite directions. The maximum extension produced in the spring is.
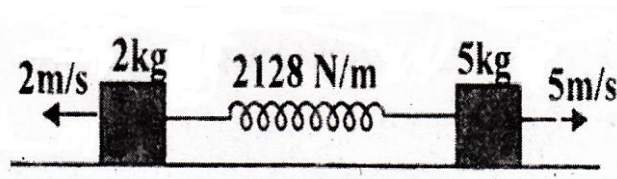
    A) 0.01m   B) 0.10m   C) 0.50m   D) 0.25m

36. A fish looking up through the water sees the outside world, contained in a circular horizon. If the refractive index of water is 4/3 and the fish is 12cm below the water surface, the radius of this circle (in cm) is

    A) $36\sqrt{7}$ B) $\dfrac{36}{\sqrt{7}}$ C) $36\sqrt{5}$ D) $4\sqrt{5}$

37. A satellite of mass 'm' revolves around the earth of radius 'R' at a height 'x' from its surface. If 'g' is the acceleration due to gravity on the surface of the earth, the orbital speed of the satellite is

    A) gx B) $\dfrac{gR}{R-x}$ C) $\dfrac{gR^2}{R+x}$ D) $\sqrt{\dfrac{gR^2}{R+x}}$

38. The actual value of resistance R, shown in the figure is 30Ω. This is measured in an experiment as shown using the standard formula $R = \dfrac{V}{I}$. Where V and I are the readings of the voltmeter and ammeter, respectively. If the measured value of R is 5% less, then the internal resistance of the voltmeter is.


    A) 35Ω B) 600Ω C) 570Ω D) 350Ω
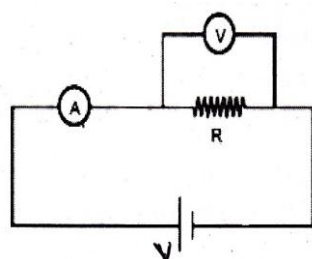
39. A small metal plate of work function ϕ is kept at a distance d from a singly ionized fixed ion. A monochromatic light beam is incident on the metal plate and photo electrons are emitted .The maximum wavelength of the light beam so that some of the electrons may go around the ion along circle is

    A) $\dfrac{4\pi\varepsilon_0 hcd}{e^2 + 8\pi\varepsilon_0 \phi d}$ B) $\dfrac{8\pi\varepsilon_0 hcd}{e^2 + 8\pi\varepsilon_0 \phi d}$ C) $\dfrac{hc}{8\pi\varepsilon_0 \phi}$ D) $\dfrac{hc}{4\pi\varepsilon_0 \phi}$

40. In the given P-V diagram the path(2) from A to B is Zigzag path, but (1) is simple path then
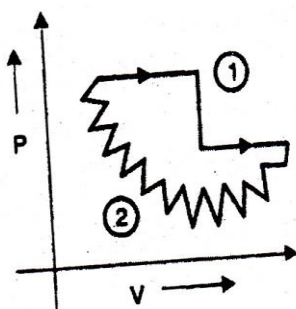

    A) $w_1 = w_2$ B) $\Delta u_1 = \Delta u_2$ C) $w_1 > w_2$ D) both 2 and 3

41. In the figure shown, a circuit contains two identical resistors with resistance R= 5Ω and an inductance with $L = 2mH$ .An ideal battery of 15V is connected in the circuit .What will the current through the battery along after the switch is closed?
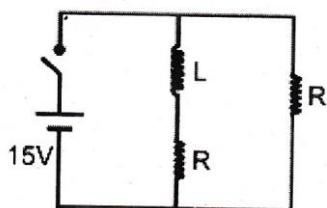
A) 6A   B) 7.5A   C) 5.5A   D) 3A

42. The pressure that has to be applied to the ends of a steel wire of length 10cm keep its length constant when its temperature is raised by $100^{o}c$ (for steel Young's modulus is $2\times10^{11} N / m^{2}$ and coefficient of thermal expansion is $1.1\times10^{-5} K^{-1}$

A) $2.2\times10^{8} pa$ B) $2.2\times10^{9} pa$ C) $2.2\times10^{7} pa$ D) $2.2\times10^{6} pa$

43. A point P moves in counter clockwise direction on a circular path as shown in the figure. The movement of P is such that it sweeps out a length $s = t^{3} + 5$ where s is in metre and t is in second .The radius of the path is 20m. The acceleration of p when t=25 is nearly.
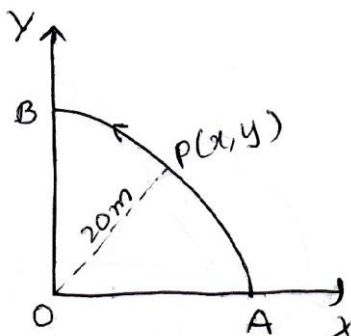
A) 13m/s   B) 12m/s   C) 7.2m/s   D) 14m/s

44. A block slides down a rough inclined plane of slope angle θ with a constant velocity. It is then projected up the same plane with an initial velocity v. The distance travelled by the block up the plane before coming to rest is

A) $\dfrac{v^{2}}{4g\sin\theta}$ B) $\dfrac{v^{2}}{2g\sin\theta}$ C) $\dfrac{v^{2}}{g\sin\theta}$ D) $\dfrac{4gv^{2}}{\sin\theta}$

45. Two vectors $\vec{A}$ and $\vec{B}$ have equal magnitudes. The magnitude of $(\vec{A}+\vec{B})$ is n times the magnitude of $(\vec{A}-\vec{B})$. The angle between $\overline{A}$ and $\overline{B}$ is

A) $\sin^{-1}\left(\dfrac{n-1}{n+1}\right)$ B) $\cos^{-1}\left(\dfrac{n^{2}-1}{n^{2}+1}\right)$ C) $\sin^{-1}\left(\dfrac{n^{2}-1}{n^{2}+1}\right)$ D) $\cos^{-1}\left(\dfrac{n-1}{n+1}\right)$

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.

46. The mean kinetic energy of monoatomic gas molecules under standard conditions is E_1. If the gas is compressed adiabatically 8times to its initial volume, the mean kinetic energy of gas molecules changes to E_2 .The ratio of E_2/E_1 is.

47. The current voltage relation of diode is given by $I = (e^{1000v/T} - 1)mA$, where the applied voltage V is in volt and the temperature T is kelvin. If a student makes an error measuring $\pm 0.01V$ while measuring the current of $5mA$ at 300k, what will be the error in the value of current in mA?

48. A coil of inductance $300mH$ and resistance 2Ω is connected to a source of voltage 2V. The current reaches half of its steady state value in (sec)

49. On a temperature scale Y, water freezes at $-160^\circ Y$ and Boils at $-50^\circ Y$ on this Y scale, a temperature of 340k is_____ ^0Y.

50. A vehicle is travelling at uniform speed 56kmph along a fly over bridge and a person of mass 50kg in the vehicle experience a normal reaction 390N as the vehicle crosses the highest point. The radius of curvature of the fly over bridge is_____ m.

SECTION – I
(SINGLE CORRECT ANSWER TYPE)

This section contains 20 multiple choice questions. Each question has 4 options (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** option can be correct.
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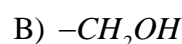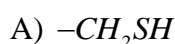
CHEMISTRY

51. Which of the following is the energy of a possible excited state of Hydrogen?

    A) $+13.6eV$ B) $-6.8eV$ C) $-3.4eV$ D) $+6.8eV$

52. Which is wrong with respect to our responsibility as a human being to protect our environment?
    A) Restricting the use of vehicles   B) using plastic bags
    C) Setting up compost tin in gardens   D) Avoiding the use of floodlighted facilities

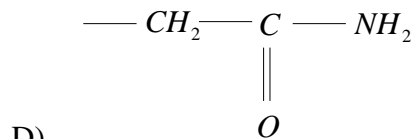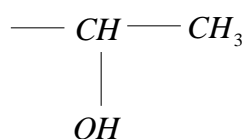53. From the graph, which is the best reducing agent to reduce Cu_2O at high temperature
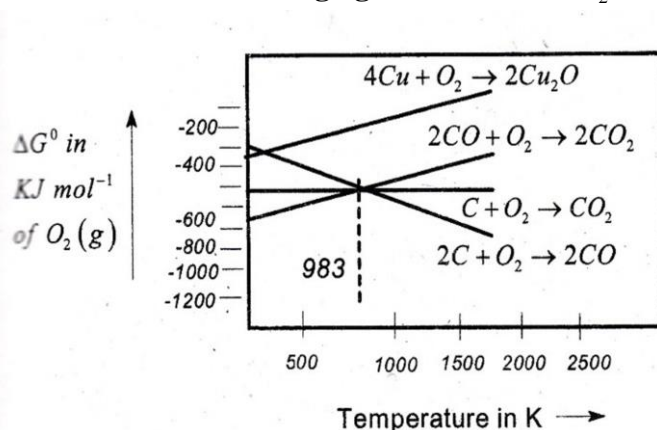
    A) $Coke$ B) CO C) CO_2 D) $1\&2$

54. Complete removal of both axial ligands (along the z-axis) from an octahedral complex leads to which of the following splitting patterns? (relative orbital energies not on scale)
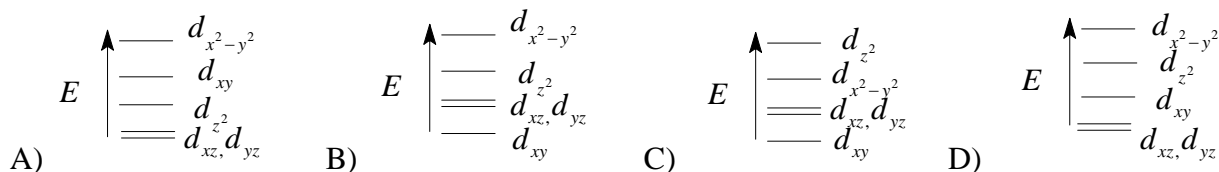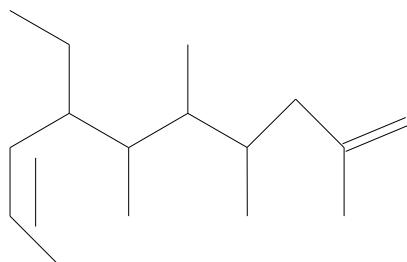
55. Identify the atoms or groups from the following that exhibit –R effect and +R effect when present on benzene ring:
-OR, -NHCOR, -CN, -X, -NO₂, -NH₂, >C=O
   A) −R effect: -NHCOR, -NO₂, >C=O
   +R effect: -CN, -OR, , -X ,-NH₂
   B) −R effect : -OR, -CN, -NO₂, >C=O
   +R effect: -NHCOR, -X ,-NH₂
   C) −R effect:, -CN -NO₂,-NH₂
   +R effect: -OR, -NHCOR, -X ,>C=O
   D) −R effect:, -CN, -NO₂, >C=O
   +R effect: OR, -NHCOR, -X ,-NH₂

56. $SiF_4 + H_2O \rightarrow A \xrightarrow{1000^0 C} B \xrightarrow{Na_2CO_3} c.$ Identify B and C ?

   A) $H_4SiO_4, Na_2 SiO_3$ B) $SiO_2, Na_2 S$ C) $SiO_2, Na_2 CO_3$ D) $SiO_2, Na_2 SiO_3$

57. Ferric chloride on rubbing to a bleeding wound causes
   A) Coagulation   B) Peptisation   C) emulsification   D) de- emulsification

58. The pair that contains two P-H bonds in each of the oxoacid is:
   A) $H_4P_2O_5$ and H_3PO_3 B) $H_4P_2O_5$ and H_3PO_2
   C) H_3PO_2 and $H_4P_2O_5$ D) H_3PO_3 and $H_4P_2O_6$

59. A crystal madeup of particles X,Y and Z, X forms fcc packing. Y occupies all octahedral voids of X and Z occupies an tetrahedral voids of X. If all the particles along one body diagonal are removed, then the formula of the crystal would be
   A) XYZ_2 B) X_2YZ_2 C) $X_8Y_4Z_5$ D) $X_5Y_4Z_8$

60. The general formula of a α-amino acid is
$H_2N \longrightarrow CH \longrightarrow COOH$
    |
    R

   Identify –R in serine.

   A) $-CH_2SH$ B) $-CH_2OH$

   C)
   $\longrightarrow CH \longrightarrow CH_3$
   |
   OH

   $\longrightarrow CH_2 \longrightarrow C \longrightarrow NH_2$
   ‖
   O
   D)

61. The IUPAC name of

   A) 7- ethyl – 2,4,5,6 – tetra methyldeca -1,8-diene
   B) 7- ethyl – 2- methyl4,5,6- tetra methyldeca -1,7-diene
   C) 7-(1-propenyl) 2,3,4,5-tetra methyl-nonene
   D) 4- ethyl-5,6,7,9-tetramethyl deca-2,9-diene

62. The freezing point of benzene decreases by $0.45^0 C$ when **0.2g of acetic acid is added to 20g of benzene. If acetic acid associates to form a dimer in benzene, percentage association of acetic acid in benzene will be:** (k_f **for benzene=5.12k kg mol^{-1}**)

    A) 94.52% B) 64.6% C) 80.4% D) 74.52%

63. SN^2 **reaction involving inversion of configuration takes place with an optically active compound Z. The compound Z is**

    A) CH_3CH_2X

    B) $(CH_3)_2 CHX$

    C) $CH_3CH_2CH(CH_3)X$

    D) $(CH_3)_3 CX$

64. **The correct match between item-I and Item-II is**

Item-I	Item-II
(a) High density polythene	(I) Iron(0)
(b) polyacrylonitrile	(II) Condensation at high temperature and pressure
(c) Novolac	(III) Ziegler – Natta catalyst
(d) Nylon 6	(IV) Acidor base catalysed

    A) $(a)\rightarrow(IV)$, $(b)\rightarrow(II)$, $(c)\rightarrow(I)$,$(d)\rightarrow(III)$

    B) $(a)\rightarrow(II)$, $(b)\rightarrow(IV)$,$(c)\rightarrow(I)$, $(d)\rightarrow(III)$

    C) $(a)\rightarrow(III)$,$(b)\rightarrow(I)$,$(c)\rightarrow(IV)$,$(d)\rightarrow(II)$

    D) $(a)\rightarrow(III)$, $(b)\rightarrow(I)$,$(c)\rightarrow(II)$, $(d)\rightarrow(IV)$

65. **Hinsberg's reagent is:**

    A) $C_6H_5SO_2Cl$ B) C_6H_5COCl C) $SOCl_2$ D) $COCl_2$

66. **p- Hydroxy benzophenone upon reaction with bromine in carbontetrachloride gives**
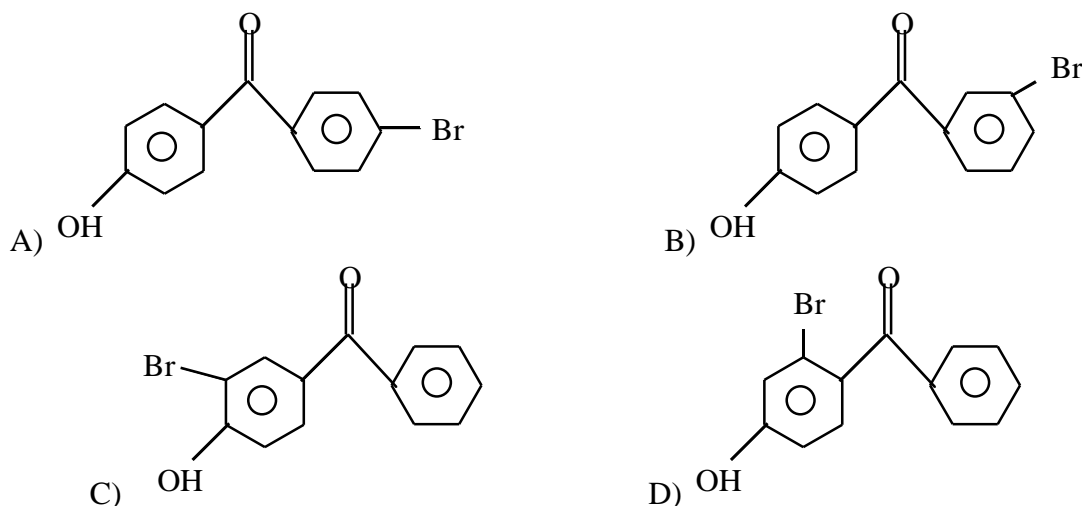
67. **Which among the following is the strongest acid?**

    A) $CHBr_3$ B) $CHCl_3$ C) CHI_3 D) $CH(CN)_3$

68. **The decreasing order of bond angles in BF$_3$, NH$_3$, PF$_3$ and** I_3^- **is**

    A) $I_3^- > BF_3 > NH_3 > PF_3$

    B) $BF_3 > I_3^- > PF_3 > NH_3$

    C) $BF_3 > NH_3 > PF_3 > I_3^-$

    D) $I_3^- > NH_3 > PF_3 > BF_3$

69. The concentration of the same solution of H_2O_2 in different methods are given below

	LIST-1		LIST-2
A)	Molarity	1)	6.8
B)	Normality	2)	22.4
C)	$\% \dfrac{w}{V}$	3)	4
D)	Volume strength	4)	2
		5)	10

The correct match is

	A	B	C	D
A)	5	3	1	2
B)	4	3	1	2
C)	3	4	1	2
D)	1	2	3	4

70)
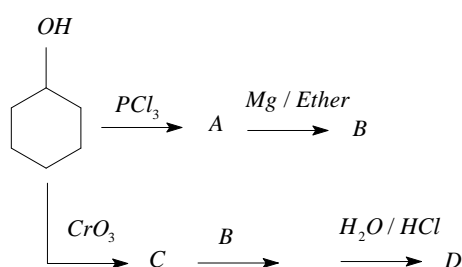
Find out the compound E
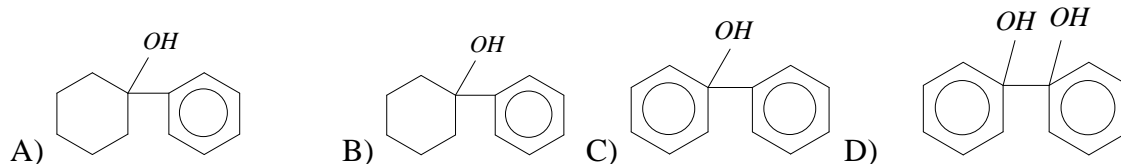
A)   B)   C)   D)

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. What is the approximate standard free energy change per mole of $Zn\left(in\ KJ\ mol^{-1}\right)$ for A Daniel cell at 298 k?(e.m.f =1.1 V)

72. The time taken for 10% completion of a first order reaction in 20 minutes. The time required for the completion of 19% of the same reaction in minutes is

73. The number of S-S bonds in $S_2O_6^{-2}$ are

74. Assuming ideal gas behavior, the ratio of density of ammonia to that of hydrogen chloride at same temperature and pressure is:

75. At 320 K, a gas A_2 is 20% dissociated to A (g). The standard free energy change at 320k and 1atm in $Jmol^{-1}$ is approximately.
$\left(R = 8.314 JK^{-1}mol^{-1}; \log(0.2) = -0.6990\right)$ (answer in two decimal accuracy)