ERROR QUESTION PAPER

SRI CHAITANYA IIT ACADEMY, India.

A Right Choice for the Real Aspirant

ICON CAMPUS – GUNTUR

SEC: Sr.Super60_STERLING&NUCLEUS_BT	**JEE-MAIN**	**Date:**
Time:	**RPTM-07 to 09**	**Max. Marks: 300**

IMPORTANT INSTRUCTION:

1. Immediately fill in the Admission number on this page of the Test Booklet with **Blue/Black** Ball Point **Pen** only.
2. The candidates should not write their Admission Number anywhere (except in the specified space) on the Test Booklet/ Answer Sheet.
3. The test is of **3 hours** duration.
4. The Test Booklet consists of 90 questions. The maximum marks are **300.**
5. There are **three** parts in the question paper 1,2,3 consisting of **Physics, Chemistry** and **Mathematics** having **30 questions** in each subject and subject having **two sections.**
   (I) Section –I contains 20 **multiple choice** questions with only one correct option.
   Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.
   (II) Section-II contains 10 **Numerical Value Type** questions. Attempt any 5 questions only, if more than 5 questions attempted, First 5 attempted questions will be considered.

■ The Answer should be within **0 to 9999.** If the Answer is in **Decimal** then round off to the **nearest Integer** value (Example i,e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11).**
To cancel any attempted question bubble on the question number box.
For example: To cancel attempted question 21. Bubble on 21 as shown below

Question Answered for Marking **Question Cancelled for Marking**

Marking scheme: +4 for correct answer, 0 if **not attempt** and **-1** in all other cases.

6. Use **Blue / Black Point Pen only** for writing particulars / marking responses on the Answer Sheet. **Use of pencil is strictly prohibited.**
7. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electron device etc, except the Identity Card inside the examination hall.
8. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
9. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Hall. **However, the candidate are allowed to take away this Test Booklet with them.**
10. **Do not fold of make any stray marks on the Answer Sheet**

Name of the Candidate (in Capital): _____

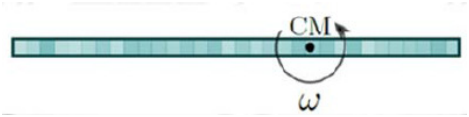
Admission Number: | | | | | | | | | |

Candidate's Signature:_____ **Invigilator's Signature:** _____

ERROR QUESTION PAPER

PHYSICS

1. A thin rod has a non-uniform density. It is mounted on an axle passing through its center of mass and perpendicular to it, as shown. It is rotated about the axle. Which of the following must be true, no matter how the mass in the rod is distributed?



a) The two parts have the same mass.

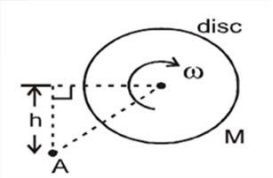
b) The magnitudes of the momentum of the two parts are equal.

c) The magnitudes of the angular momentum of the two parts, about the center of mass, are equal

d) The kinetic energies of the two parts are equal.

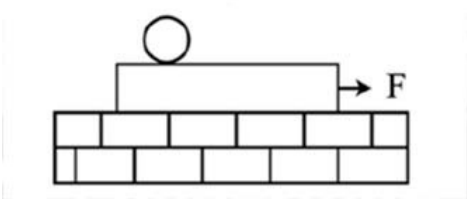
1) a and c 2) b alone 3) a and b 4) All the above

2. A uniform disc of mass M and radius R is rotating about its center of mass (the center of mass is at rest) with an angular speed ω. The angular momentum of disc about a point A (as shown) will be



1) $mR^2\omega$ 2) $mR^2\omega + MhR\omega$ 3) $\frac{1}{2}mR^2\omega$ 4) $\frac{1}{2}mR^2\omega + MhR\omega$

3. A plank with a uniform sphere placed on it is resting on a smooth horizontal plane. Plank is pulled to the right by a constant force F. If the sphere does not slip over the plank, which of the following is **incorrect?**



1) Work done by friction on sphere is zero

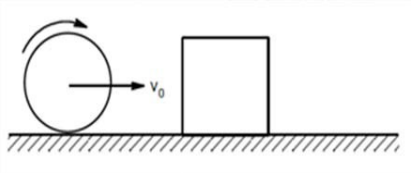
2) The change in kinetic energy of the system is equal to work done by the force F

3) Work done by friction acting on the sphere is equal to its total kinetic energy

4) Acceleration of the center of sphere is less than that of the plank

ERROR QUESTION PAPER

4. A cylinder of mass m rolling towards a cube of same mass on rough horizontal surface (coefficient of friction $=\mu$) with velocity v_0 as shown in figure. Assume elastic collision and friction is negligible between cube and cylinder. Then after collision



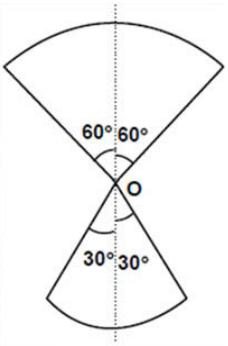
1) Cylinder will never stop

2) Cylinder will stop permanently

3) Cylinder will stop momentarily and then move forward

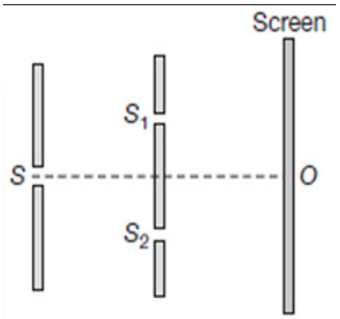
4) Cylinder will stop momentarily and then move backward

5. Two sectors made of same material and same radius R but angle 120^0 and 60^0 are arranged as shown with center as origin. Location of center of mass from O is



1) $\frac{R\left(\sqrt{3}-1\right)}{\pi}$ 2) $\frac{2R\left(\sqrt{3}-1\right)}{3\pi}$ 3) $\frac{R\left(\sqrt{3}-1\right)}{3}$ 4) $R\left(\sqrt{3}-1\right)$

6. Figure shows a set-up perform Young's double slit experiment. A monochromatic source of light is placed at S. S_1 and S_2 act as coherent sources and interference pattern is obtained on the screen. Match **Column-I** with **Column-II** keeping in mind the young's double slit experiment.



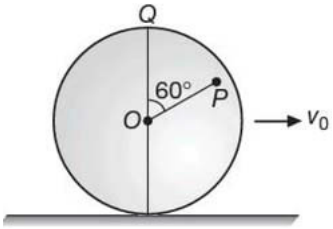
ERROR QUESTION PAPER

	Column-I		Column-II
A)	S is removed and two real sources of different wavelengths are placed at S_1 and S_2.	p)	Interference fringes disappear.
B)	Width of S_1 is two times the width of S_2.	q)	There is uniform illumination on a large part of the screen.
C)	S_1 is closed.	r)	The zero order fringe will not form at O
D)	A thin transparent plate is placed in front of S_1. Assuming negligible absorption by the plate.	s)	Intensity of a dark fringe will be non-zero, but less than the intensity of bright fringe.

1) $A-(p)\ B-(r,s)\ C-(p)\ D-(q,r)$ **2)** $A-(p,q)\ B-(s)\ C-(p,q)\ D-(r)$

3) $A-(p,q)\ B-(r,s)\ C-(p)\ D-(q)$ **4)** $A-(q,r)\ B-(s)\ C-(p)\ D-(p,q)$

7. A disc of radius r rolls without slipping on a rough horizontal floor. If velocity of its centre of mass is v_0, then velocity of point P at distance $\frac{r}{2}$ such that $\angle POQ = 60^0$ as shown in figure is



1) $\frac{v_0\sqrt{3}}{2}$ 2) $\frac{v_0\sqrt{7}}{2}$ 3) $\frac{v_0}{2}$ 4) v_0

8. A spherical body of radius R is allowed to roll without slipping down an incline to reach the bottom with a speed v_0.The incline is then made smooth by waxing and the body is allowed to slide without rolling to reach the bottom with a speed of $\frac{5v_0}{4}$.The radius of gyration of the body about an axis passing through its center is

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

9. Assertion (A): Light from an object falls on a concave mirror forming a real image of the object. If both the object and mirror are immersed in water, there is no change in position of the image

Reason (R): The formation of image by reflection does not depend on surrounding medium, so there is no change in position of image.

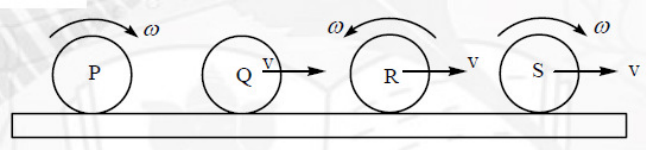
1) If both A and R are true and R is the correct explanation of A.

2) If A is false but R is true

3) If both A and R are true but R is not the correct explanation of A

4) If A is true but R is false.

10. Four solid spheres are made to move on a rough horizontal surface. Sphere P is given a spin and released. Sphere Q is given a forward linear velocity. Sphere R and S are given linear and rotational motions as shown in the figure. Directions of the friction force on spheres P, Q, R, S are respectively.



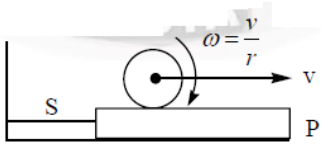
1) Right, Left, Left, either Left or Right

2) Left, Right, Left, either Left or Right

3) Right, Left, Left, Right

4) Right, Left, Right, Left

11. A cylinder is rolling without slipping on a horizontal plane P. The friction between the plank P and the cylinder is sufficient for no slipping. The coefficient of friction between the plank and the ground surface is zero. Initially, P is attached with a string S as shown in the figure. If the string is now burned, then



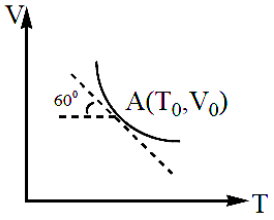
1) Linear velocity of the cylinder will decrease and angular velocity will increase

2) The plank will remain static

3) The plank will start motion with a speed v along backward direction

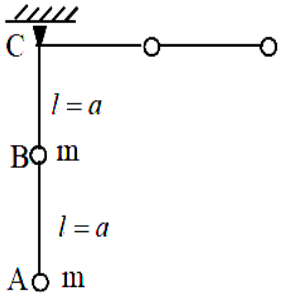
4) The plank will start motion with a speed v along forward direction

12. A gas is undergoing an adiabatic process. At a certain stage A, the values of volume and temperature (V_0, T_0). From the details given in the graph, find the value of adiabatic constant γ.



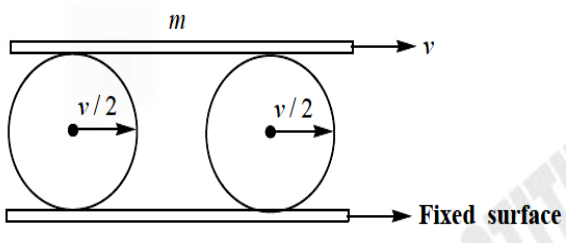
1) $\frac{V_0}{\sqrt{3}T_0}+1$ 2) $\frac{V_0\sqrt{3}}{T_0}+1$ 3) $\frac{3V_0}{T_0}+1$ 4) $\frac{V_0}{T_0}+\sqrt{3}$

13. A weightless rod of length $2a$ carries two equal masses 'm', each one tied at lower end A and the other at the middle of the rod at B. The rod can rotate in vertical plane about a fixed horizontal axis passing through C. The rod is released from rest in horizontal position. The speed of the mass B at the instant rod become vertical is:



1) $\sqrt{\frac{3ga}{5}}$ 2) $\sqrt{\frac{4ga}{5}}$ 3) $\sqrt{\frac{6ga}{5}}$ 4) $\sqrt{\frac{7ga}{5}}$

14. A plate of mass m is placed on a solid and hallow spheres each of mass m. If the speed of the plate is v, assuming pure rolling of the spheres with all contacting surfaces, the kinetic energy of the system (spheres + plate) will be

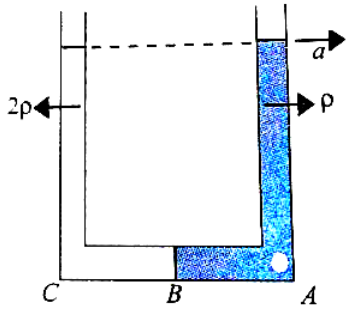


1) $\frac{53}{60}mv^2$ 2) $\frac{43}{50}mv^2$ 3) $\frac{43}{60}mv^2$ 4) $\frac{33}{50}mv^2$

15. An ideal gas undergoes a process in which $PV^{-2}=$constant, where V is the volume occupied by the gas initially at pressure P. At the end of the process, rms speed of gas molecules has became $2^{1/2}$ times of its initial value. Find the value of C_v so that energy transferred by the heat to the gas is '2' times of the initial energy.

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

16. A U-tube of base length $'\ell'$ filled with the same volume of two liquids of densities ρ and 2ρ is moving with an acceleration 'a' on the horizontal plane. If the height difference between the two surfaces (open to atmosphere) becomes zero, then the height h is given by

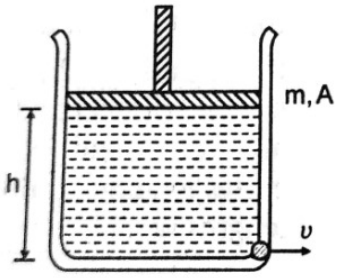


1) $\frac{2a}{3g}\ell$ 2) $\frac{a}{g}\ell$ 3) $\frac{3a}{2g}\ell$ 4) $\frac{a}{2g}\ell$

17. A wooden block is floating in a liquid. 50% of its volume is inside the liquid when the vessel is stationary. Percentage of volume immersed when the vessel moves upwards with an acceleration $a = g/2$ is:

1) 33.33% 2) 50 % 3) 25 % 4) 75 %

18. A cylindrical vessel contains a liquid of density ρ upto a height h. The liquid is closed by a piston of mass m and area of cross-section A. There is a small hole at the bottom of the vessel.



The speed v with the liquid comes out of the hole is :

1) $\sqrt{2gh+\frac{mg}{A}}$ 2) $\sqrt{2\left(gh+\frac{mg}{A}\right)}$ 3) $\sqrt{2\left(gh+\frac{mg}{\rho A}\right)}$ 4) $\sqrt{2gh}$

19. A body X with a momentum p collides with another identical stationary body Y one dimensionally. During the collision, Y gives an impulse J to body X. Then coefficient of restitution is

1) $\frac{J}{2p}-1$ 2) $\frac{J}{p}-1$ 3) $\frac{J}{p}+1$ 4) $\frac{2J}{p}-1$

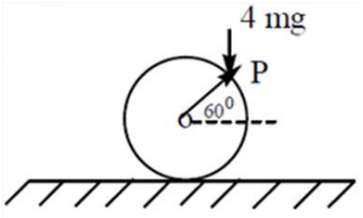
20. A plate of thickness t made of a material of refractive index μ is placed in front of one of the slits in a double-slit experiment. What should be the minimum thickness t which will make the intensity at the center of the fringe pattern zero?

1) $\frac{\lambda}{2(\mu-1)}$ 2) $(\mu-1)\lambda$ 3) $(\mu-1)\frac{\lambda}{2}$ 4) $\frac{\lambda}{(\mu-1)}$

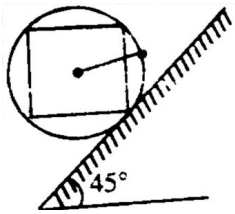
ERROR QUESTION PAPER
NUMERICAL VALUE TYPE

21. A pulley of radius 1.5m is rotated about its axis by a force $F=(12t-3t^2)N$ applied tangentially (while t is measured in seconds). If moment of inertia of the pulley about its axis of rotation is $4.5\,kg\,m^2$, the number of rotations made by the pulley before its direction of motion is reversed, will be $\frac{K}{\pi}$. The value of K is____.

22. A solid sphere of mass m and radius R is lying on a rough horizontal plane. A constant force 4mg acts vertically at point P such that OP makes an angle 60^0 with horizontal. Minimum coefficient of friction is $n\times10^{-2}$ so that sphere starts pure rolling. Then the value of n is____

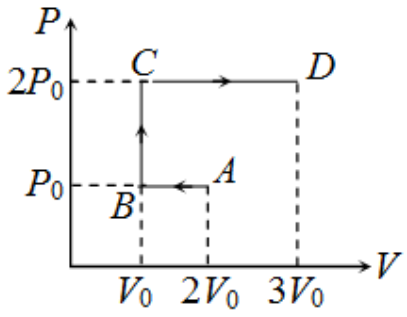


23. Four identical rods, each of mass m are welded at their ends to form a square and the corners are then welded to a light metal hoop of radius r. If the rigid assembly of rods and hoop is allowed to roll down the inclined rough surface and the minimum value of the coefficient of static friction which will prevent slipping is $-\frac{k}{10}$. Find the value of k.



24. A body of mass m = 4 kg starts moving with velocity v_0 in a straight line is such a way that work is being done on it at the rate which is proportional to the square of velocity as given by $P=\beta v^2$ where $\beta=\frac{0.693}{2}$. The time (in seconds) elapsed before which velocity of body is doubled is

25. P-V diagram of an ideal gas is as shown. Work done by the gas in the process ABCD is found to be xP_0V_0. Then x =



ERROR QUESTION PAPER

26. Two coherent point sources S_1 and S_2 vibrating in phase emit light of wavelength λ. The separation between the sources is 3λ. Consider a line passing through S_2 and perpendicular to the line S_1S_2. If the smallest distance from S_2 where a minimum of intensity occurs $\frac{(n+5)\lambda}{20}$, find n

27. The potential energy of a particle of mass m free to move along x-axis is given by $U=\frac{1}{2}kx^2$ for $x<0$ and $U=0$ for $x\geq 0$ (x denotes the x-coordinate of the particle and k is a positive constant). If the total mechanical energy of the particle is E, then its speed at $x=-\sqrt{\frac{2E}{k}}$ is

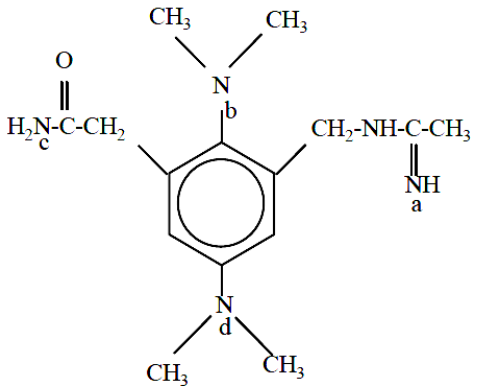
28. The figure shows two slits S_1 and S_2 in a horizontally fixed place. Here $d=1mm, D=1m$. Take origin at O, (midpoint of S_1 and S_2) and XY plane as shown in the figure. The screen is released from rest under gravity vertically downwards from the initial position as shown. (take $g=10ms^{-2}$)

29. Two discs, each having moment of inertia $5kg\,m^2$ about its central axis, rotating with speeds $10\,rad\,s^{-1}$ and $20\,rad\,s^{-1}$, are brought in contact face to face with their axes of rotation coincided. The loss of kinetic energy in the process is (J)

30. In a certain thermodynamical process, the pressure of a gas depends on its volume as kV^3. The work done when the temperature changes from 100^0C to 300^0C will be ……..nR, when n denotes number of moles of a gas.

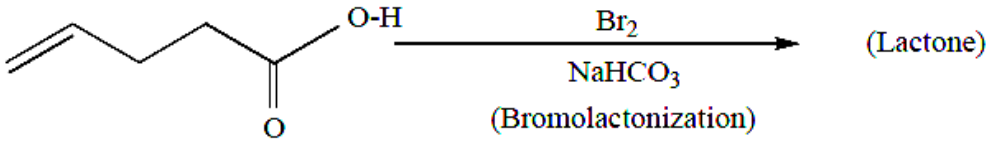
CHEMISTRY

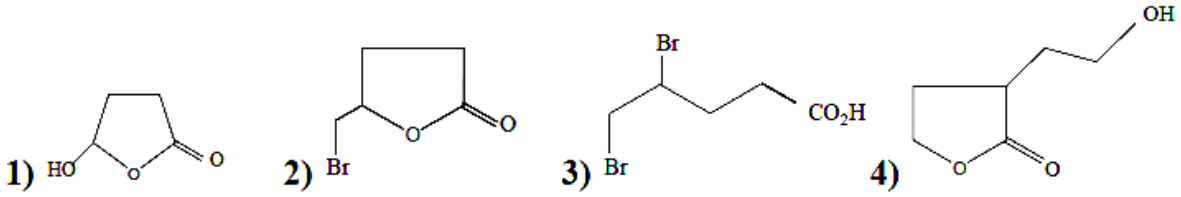
31. Basicity order of N in following compound is:



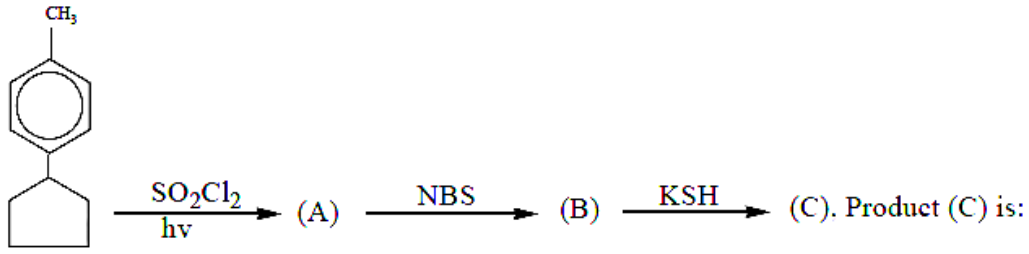
1) a > b > d > c 2) b > d > a > c 3) a > b > c > d 4) a > c > b > d

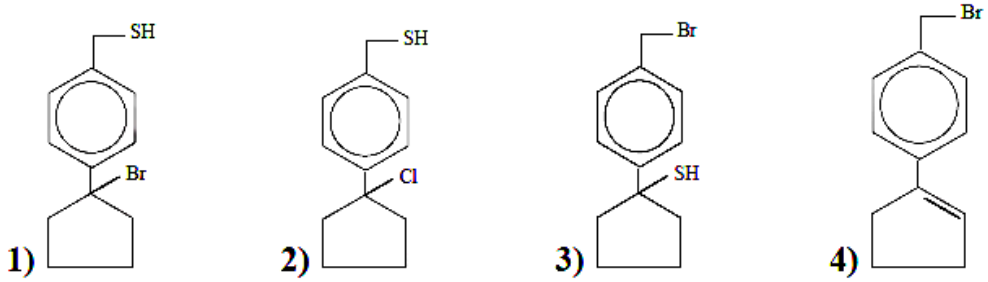
32.





33.





34. **Statement l :** Amylose chain adopts a helical arrangement.

Statement 2 : Presence of $\alpha-(1\rightarrow 4')$-glycosidic bonds force to adopt a helical shape.

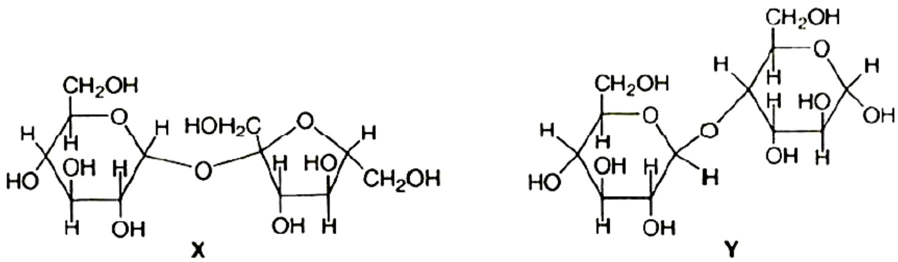
1) Statement-1 is true, statemnent-2 is true and statement-2 is correct explanation for statement-1.

2) Statement-l is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

3) Statement-1 is true, statement-2 is false.

4) Statement-1 is false, statement-2 is true.

35. The correct statement(s) about the following sugars X and Y is/are



1) The glucosidic linkages in X and Y are β and α ,respectively

2) The glucosidic linkages in X and Y are α and α, respectively

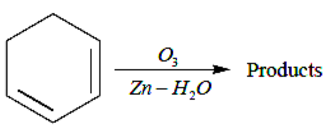
3) X is a non-reducing sugar and Y is a reducing sugar

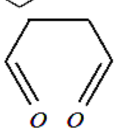
4) X is a reducing sugar and Y is a non-reducing sugar

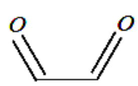
36. The alkyne $H_3C-CH_2-C\equiv CH$ and $H_3C-C\equiv C-CH_3$ can be distinguished by the following methods except

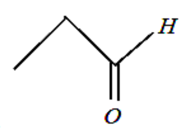
1) Baeyer's reagent
2) Na-metal
3) Tollen's reagent
4) Ammoniacal Cu_2Cl_2 solution

37.



1) 

2) 

3) Both (1) and (2) **4)** 

38.

Match the following

List-I	**List-II**
1) Urea formaldehyde resin	a) $\left(-NH-(CH_2)_5-CO-\right)_n$
2) Neoprene	b) $\left(-NH-(CH_2)_6-NH-\right)_n$
3) PVC	c) $\left(\begin{array}{c}-CH_2-C=CH-CH_2-\\ \vert \\ Cl\end{array}\right)_n$
4) Nylon-6	d) $\left(\begin{array}{c}-CH_2-CH-\\ \vert \\ Cl\end{array}\right)$
	e) $\left(NH-CO-NH-CH_2-\right)_n$

ERROR QUESTION PAPER

1) 1-e; 2-c; 3-d; 4-a
2) 1-e; 2-c; 3-b; 4-d
3) 1-e; 2-d; 3-c; 4-b
4) 1-a; 2-c; 3-d; 4-b

39.

Match the following

1) Morphine	a) Antipyretic
2) Aspirin	b) Narcotic analgesic
3) Paracetamol	c) Tranquillizer
4) Luminal	d) Non-narcotic
	e) Antiseptic

1) 1-a, 2-e, 3-b,4-d
2) 1-b, 2-d, 3-a, 4-c
3) 1-b, 2-c, 3-e, 4-d
4) 1-d, 2-b, 3-a, 4-e

40.

Match the column

Column I (Acid)	Column II (pK_a value)
1) $HCOOH$	p) 1.73
2) CH_3COOH	q) 3.74
3) $PhCOOH$	r) 4.17
4) $(COOH)_2$	s) 4.75

1) A-r, B-q, C-s, D-p
2) A-s, B-q, C-r, D-p
3) A-q, B-s, C-p, D-r
4) A-q, B-s, C-r, D-p

41. Which of the followng is the correct order regarding electron gain enthalpies(ignore negative sign)?

1) F > Cl > Br > I 2) Cl > Br > I > F 3) F > Br > Cl > I 4) Cl > F > Br > I

42.

Among the $XeF_2, SF_2Cl_2, XeOF_2, ICl_2^-, IOCl_4^-$ and F_2ClO^+

Statement I: XeF_2, $XeOF_2$ *and* ICl_2^- have zero dipole moment

Statement II: $IOCl_4^-$ and F_2ClO^+ have different electronic arrangement at central atom

Statement III: $IOCl_4^-$, SF_2Cl_2 and F_2ClO^+ have equal number of lone pairs of electrons at the central atom

Statement IV: All bond angles in each of species SF_2Cl_2, $IOCl_4^-$ and F_2ClO^+ are identical

The correct order for the abvoe statements is: (Given that: T for True and F for False)

ERROR QUESTION PAPER

1) TFTF 2) FFFF 3) TTFF 4) FTTF

43.

Which of the following statement or order is incorrect?

1) $H_2O > D_2O > H_2O_2$: dielectric constant

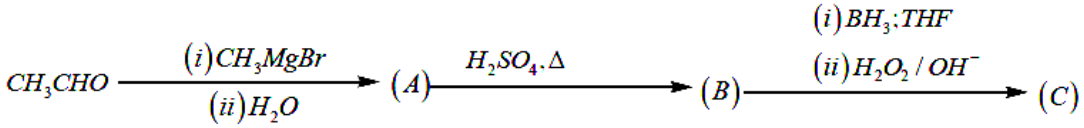
2) $D_2O > H_2O > H_2O_2$: melting point

3) At atmospheric pressure ice crystallises in the hexagonal form, but at very low temperatures it condenses to cubic form

4) $D_2O > H_2O > H_2O_2$: density

44.

Compounds A and C in the following reaction are



1) Position isomers 2) Identical 3) Optical isomers 4) Functional isomers

45. An element 'x' atomic number equals to ionic radii (P.M) of element which shows brick red colour on its flame colour test then 'x' atomic number equals to:

1) 138 2) 88 3) 72 4) 100

46. Graphite heat of formation is 'X' K.J/mole, diamond heat of formation is 'Y' K.J/mole and Fullarenes heat of formation is 'Z' K.J/mole. Then X+Y+Z is

1) 50 K.J/mole 2) 40 K.J/mole 3) 30 K.J/mole 4) 30 K.J/mole

47.

Column I (Salt)	Column – II (properties)
A) Na_2CO_3	**P)** Produce CO_2 on heating above 120^0C
B) $NaHCO_3$	**Q)**Exists in solid state
C) $CaCO_3$	**R)** Water soluble
D) $Ca(HCO_3)_2$	**S)** Produce CO_2 with dil HCl
	T) Does not react with $KMnO_4$ solution

1) A-PRST; B-PQRT; C-QRS; D-PQRST

2) A–PRST; B-PQST; C-PST; D-PQS

3) A-QRST; B-PQRST; C-PQST; D-PRST

4) A-PTQ; B-PS; C-PRS; D-PRST

ERROR QUESTION PAPER

48. Select incorrect statement is

1) The no. s-block metals (excluding radio active metals) which are denser then H_2O_2 equals to 5

2) The no. s-block metals (excluding radio active metals) which are denser then D_2O equals to 7

3) The no. s-block metals (excluding radio active metals) which are denser then H_2O equals to 7

4) The no. s-block metals (excluding radio active metals) which are denser then H_2O_2 equals to 4

49. A: Beryllium chloride has much lower electrical conductivity than calcium and magnesium chlorides (salts are exist in fused state)

R : Berillium exists as $\left[Be(H_2O)_4\right]^{++}$ in acid medium and $\left[Be(OH)_4\right]^{-}$ in basic medium

1) A is true R is true but R in not correct explanation of A

2) A is false R is true

3) is true R is true R is correct explanation of A

4) A is true R is false

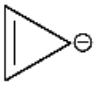
50. 1, 2 glycosidic linkage is present in

1) Lactose 2) Sucrose 3) Maltose 4) Amylose

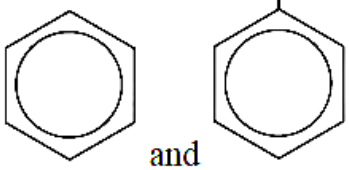
NUMERICAL VALUE TYPE

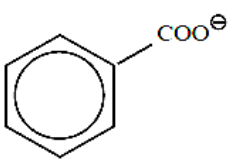
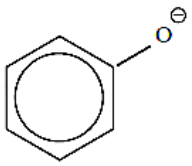
51. The number of chiral carbons in chloramphenicol is/are

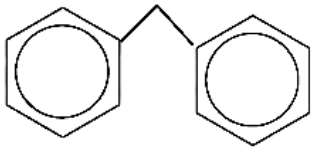
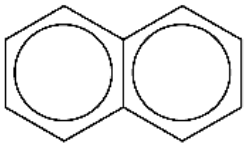
52. In how many of the following pairs first one has higher resonance energy?

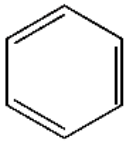
1) CO_3^{2-} and $HCOO^-$ **2)**  and $CH_2=CH-CH_2^-$

3)  and $CH_2=CH-CH=CH_2$ **4)**  and $CH_2=CH-\overset{\oplus}{C}H_2$

5)  and **6)** CH_3COOH and CH_3COONa

7) $CH_2 = CH - \bar{O}$ and $CH_2 = CH - OH$ **8)**  and 

9)  and 

10)  and $CH_2 = CH - CH = CH - CH = CH_2$

53. How many of the following compounds having odd number of electrons.

$Cs_2O, MgO, Cl_2O, ClO_2, NO, NO_2, N_2O_4, N_2O_5, CaOCl_2, N_2O, CO_2$

54. Find the number of molecules which are planar:

(i) SF_4 (ii) XeF_6 (iii) XeF_2 (iv) XeF_4 (v) H_2O (vi) NH_3 (vii) PH_3 (viii) PCl_5 (ix) PCl_3

55. Number of lone pair –bond pair repulsions at 90^0 are ' x' in $[BrICl]^-$,Number of lone pair-bond pair repulsions at 90^0 are ' y 'in BrF_4^- .

Find the value of $(x + y)$

56. Maximum number of optical isomers possible for fructose.

57. How many of the following are biodegradable polymers:

Nylon-6; Nylon-6,6; Nylon-2 Nylon-6; PHBV; Polyglycolic acid; Polylactic acid:

Polyacrylonitrile

58. How many of the following undergoes decomposition on heating at 600^0C is ….

Na_2CO_3, $MgCO_3$, $BaCO_3$, K_2CO_3, Rb_2CO_3, Cs_2CO_3, Li_2CO_3, $CaCO_3$

59. 1720 gr. of pure gypsum is heated at 200^0C and converts into dead burnt plaster. number of moles of steam evolved equals to ….

60. Among the following the no.of compounds which will give +ve iodoform reaction?

1) 1-phenyl Butan – 2- one 2) 2-methyl Butan – 2- ol

3) 3-methyl Butan – 2 –ol 4) 1-pheny ethanol

5) 3, 3 dimethyl Butan – 2 –one 6) 1 – Phenyl propan – 2- ol

61. Let $y(x)$ be the solution of differential equation $y-\cos x.\frac{dy}{dx}=y^2(1-\sin x)\cos x$ & $y(0)=1$ then

Statement-I: Integrating factor is $\sec x \tan x$

Statement-II: $x\left(\frac{\pi}{3}\right)=2$

1) S-I false, S-II is True
2) S-I false, S-II is false
3) S-I True, S-II True
4) S-I True, S-II is false

62.

Statement-**I**: $\int_0^1\left(\log_e\left(1+\sqrt{\sin x}\right)\right)^2 dx<\frac{1}{2}$

Statement-**II**: $\int_1^{\sqrt{3}}\sin^{-1}\left(\frac{2x}{1+x^2}\right)\left(\tan^{-1}x\right)^2 dx<\frac{\pi^3}{27}\left(\sqrt{3}-1\right)$

1) Statement-**I** false, Statement-**II** is true
2) Statement-**I** false, Statement-**II** is false
3) Statement-**I** True, Statement-**II** is false
4) Statement-**I** True, Statement-**II** true

63. $\int\frac{\sin 2x+2\tan x}{\cos^6 x+6\cos^2 x+4}dx=\frac{1}{\alpha}\ln\left|\beta+\frac{\gamma}{\cos^4 x}+\frac{\delta}{\cos^6 x}\right|+c$, , then match the below

	Column-I		**Column-II**
a.	α	p.	1
b.	β	q.	12
c.	γ	r.	4
d.	δ	s.	6

1) $(a, p), (b,q), (c,s), (d,r)$
2) $(a, p), (b,q), (c,r), (d,s)$
3) $(a,q), (b, p), (c,s), (d,r)$
4) $(a,q), (b, p), (c,r), (d,s)$

64.

A solution curve of the differential equation $\left(x^2+xy+4x+2y+4\right)\frac{dy}{dx}-y^2=0, x>0,$ passes through the point $(1,3)$. Then the solution of the curve is

1) Intersects $y=x+2$ exactly at three points

2) Intersects $y=x+2$ exactly at two points

3) Intersects $y=(x+2)^2$

4) Does not intersect $y=(x+3)^2$

65. The general solution of the differential equation of

$$\left(\frac{1}{x}-\frac{y^2}{(x-y)^2}\right)dx+\left(\frac{x^2}{(x-y)^2}-\frac{1}{y}\right)dy=0 \quad is$$

1) $\ln\left|\frac{x}{y}\right|+\frac{xy}{x-y}=C$ **2)** $\ln|xy|+\frac{xy}{x-y}=C$

3) $\frac{xy}{x-y}=Ce^{\frac{x}{y}}$ **4)** $\frac{xy}{x-y}=Ce^{xy}$

66. Let a function $f:(0,\infty)\to[0,\infty)$ be defined by $f(x)=\left|1-\frac{1}{x}\right|$. Then, f is

1) Neither injective nor surjective 2) Not injective but it is surjective

3) Both injective as well as surjective 4) Injective only

67. The value of the definite integral $\int_0^1 \frac{4x^3\left(1+x^{4(2009)}\right)}{\left(1+x^4\right)^{2011}}dx$, is equal to

1) $\frac{1}{2012}$ 2) $\frac{1}{2011}$ 3) $\frac{1}{2010}$ 4) $\frac{1}{2009}$

68.

If $\int\left(x^{24}+x^{16}+x^8\right)\left(2x^{16}+3x^8+6\right)^{1/8}dx=\frac{1}{\alpha}\left(2x^{24}+3x^{16}+6x^8\right)^{\frac{\beta}{\gamma}}+C$ (Where C is constant of integration and β,γ are coprime numbers) then the value of $(\alpha+\beta+\gamma)$ is

1) 81 2) 71 3) 61 4) 51

69. If $\lim_{x\to 0}\frac{x+\sin x - x\cos x - \tan x}{x^n}$ exists and is non-zero finite value, then the value of n is

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

70. **STATEMENT-1:** f is an even function, g and h are odd functions, all 3 being polynomials.

Given

$f(1)=0, f(2)=1, f(3)=-5, g(1)=1, g(-3)=2, g(5)=3, h(1)=3, h(3)=5 \text{ and } h(5)=1$. The value of $f(g(h(1)))+g(h(f(3)))+h(f(g(-1)))$ is equal to zero.

STATEMENT-2: If a polynomial function $P(x)$ is odd then $P(0)=0$

1) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1

2) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1

3) Statement-1 is true, statement-2 is false

4) Statement-1 is false, statement-2 is true

71. A variable plane passes through a fixed point (a,b,c) and meets the axes A, B, C. The locus of the point of intersection of the planes through A, B, C and parallel to the co-ordinate planes is

1) $\frac{a}{x}+\frac{b}{y}+\frac{c}{z}=1$ 2) $\frac{a}{x}+\frac{b}{y}+\frac{c}{z}=-1$ 3) $\frac{a}{x}+\frac{b}{y}+\frac{c}{z}=-2$ 4) $\frac{a}{x}+\frac{b}{y}+\frac{c}{z}=2$

72. The foot of perpendicular of the point $(2,0,5)$ on the line $\frac{x+1}{2}=\frac{y-1}{5}=\frac{z+1}{-1}$ is (α,β,γ). Then which of the following is NOT correct

1) $\frac{\gamma}{\alpha}=\frac{5}{8}$ 2) $\frac{\alpha\beta}{\gamma}=\frac{4}{15}$ 3) $\frac{\beta}{\gamma}=-5$ 4) $\frac{\alpha}{\beta}=-8$

73

Let S be the set of all (λ,μ) for which the vectors $\lambda\vec{i}+\vec{j}+k, \vec{i}+2\vec{j}-\mu k \text{ and } 3\vec{i}-4\vec{j}+5k$, where $\lambda-\mu=2$, are coplanar, then $\sum_{(\lambda,\mu)\in S} 80\left(\lambda^2+\mu^2\right)$ is equal to

1) 995 2) 2290 3) 2370 4) 970

ERROR QUESTION PAPER

74.

$$\lim_{t\to 0}\left(1^{\frac{1}{\sin^2 t}}+2^{\frac{1}{\sin^2 t}}+\text{-----}+n^{\frac{1}{\sin^2 t}}\right)^{\sin^2 t} \text{ is equal to}$$

1)n 2) n^2 3) n^2+n 4) $n(n+1)/2$

75.

Let the functions $f:R\to R,\ g:R\to R$ be defined as $f(x)=\begin{cases}x+2, & x<0\\ x^2, & x\geq 0\end{cases}$ and

$g(x)=\begin{cases}x^3, & x<1\\ 3x-2, & x\geq 1\end{cases}$

Then the number of points in R where (fog) (x) is NOT differentiable, is equal to

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

76. The solution curve of the differential equation $\left(\left(\frac{y^2}{x^2}+\frac{1}{8}\right)^2-\frac{1}{64}\right)\frac{dy}{dx}=\frac{x}{2}+\frac{2y^2}{x}$ passes through the point (2,3) , the curve is given by

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

3) $3x^4-2y^3+6=0$ 4) $x^4+y^3=43$

77.

The length of the perpendicular drawn from the point (2, 1, 4) to the plane containing the lines $\vec{r}=(\hat{i}+\hat{j})+\lambda(\hat{i}+2\hat{j}-\hat{k})$ and $\vec{r}=(\hat{i}+\hat{j})+\mu(-\hat{i}+\hat{j}-2\hat{k})$ is

1) $\sqrt{3}$ **2)** $1/\sqrt{3}$ **3)** 1/3 **4)** 3

78.

Let $f(x)=x^4-4x^3+12x^2+x-1$. Then which of the following statements are True

S_1: $f(x)=0$ has two real and distinct roots

S_2: $f^1(x)=0$ has one real root

S_3: $f^{11}(x)=0$ has two real and distinct roots

1) S_1, S_2 are true **2)** S_2, S_3 are true

3) S_1, S_3 are true **4)** S_1, S_2, S_3 are true

ERROR QUESTION PAPER

79.

The equation $\begin{vmatrix} (1+x)^2 & (1-x)^2 & -(2+x^2) \\ 2x+1 & 3x & 1-5x \\ x+1 & 2x & 2-3x \end{vmatrix} + \begin{vmatrix} (1+x)^2 & 2x+1 & x+1 \\ (1-x)^2 & 3x & 2x \\ 1-2x & 3x-2 & 2x-3 \end{vmatrix} = 0$

1) has no real solution

2) has 4 real solutions

3) has two real and two non real solutions

4) has infinite number of solutions, real or non real

80.

Assertion(A): $A = \left[a_{ij}\right]_{4\times 4}$ such that $a_{ij} = \begin{cases} 2 & when\ i = j \\ 0 & when\ i \neq j \end{cases}$ then $\det\left(adj\left(adj\ \ A\right)\right) = 2^{30}$

Reason(R): If A is $n \times n$ matrix and K is a scalar then $|kA| = k^n |A|$, $|Adj\ A| = |A|^{n-1}$

1) both A, R true and R is correct explanation of A

2) A is false, R is true

3) A is true, R is false

4) Both A, R true, but R is not correct explanation of A

NUMERICAL VALUE TYPE

81.

Let $I_1 = \int_0^1 \frac{e^x}{1+x} dx$, $I_2 = \int_0^1 \frac{x^2 dx}{e^{x^3}\left(2-x^3\right)}$ then $\left[\frac{I_1}{I_2}\right] =$ _____ [.] is step function

82.

Let $f(x) = \begin{cases} \int_0^x \left(4+|t-2|\right) dt & for\ x > 3 \\ ax^2 + bx & for\ x \leq 3 \end{cases}$. If $f(x)$ is differentiable at $x = 3$ then $\frac{b}{a} - 80$ is equal to

ERROR QUESTION PAPER

83.

Let $f:R\to R$ be a differentiable function such that its derivative f' is continuous and $f(\pi)=-6$. If $F:[0,\pi]\to R$ is defined by $F(x)=\int_0^x f(t)dt$ and $\int_0^{\pi}(f'(x)+F(x))\cos x\,dx=2$, then the value $|f(0)|$ is

84.

Let $f(x)=\begin{cases}5, & -\infty<x\le 2\\ px, & 2<x<4\\ 3x-q, & 4\le x<\infty\end{cases}$ and

$g(x)=\begin{cases}3x+2, & -\infty<x<1\\ x+1, & 1\le x<\infty\end{cases}$. If $\lim_{x\to 1} f(g(x))=5$ then find the value of $2p+q=$

85.

If $f(x)=\begin{cases}\sqrt{\{x\}}, & x\notin I\\ 1 & x\in I\end{cases}$ and $g(x)=\{x\}^2$ where $\{x\}$ is fractional part of x, then area between $f(x)$ and $g(x)$ for $x\in[0,10]$ is A then $\frac{3}{5}A$ is

86.

If $y=f(x)$ satisfies the differential equation

$\frac{dy}{dx}+\frac{x}{1+x^2}y=\frac{x}{1+x^2}$, $f(0)=\frac{4}{3}$, then the value of $f\left(\sqrt{8}\right)+\frac{8}{9}=$

87.

Let $\vec{r}=(\vec{a}\times\vec{b})\sin x+(\vec{b}\times\vec{c})\cos y+2(\vec{c}\times\vec{a})$ where $\vec{a}$, $\vec{b}$, $\vec{c}$ are non – zero and non – coplanar vectors. If $\vec{r}$ is orthogonal to $\vec{a}+\vec{b}+\vec{c}$, then the minimum value of $\frac{20}{\pi^2}\left(x^2+y^2\right)$

ERROR QUESTION PAPER

88.

If $x = e^{2t+2} + \cos\left(\frac{\pi t}{3}\right) + \sin\left(\frac{2\pi t}{3}\right)$; $y = 2e^{t+1} - \frac{1}{2}\sin\left(\frac{\pi t}{3}\right) + \frac{1}{2}\cos\left(\frac{2\pi t}{3}\right)$ and the value of $\frac{dy}{dx}$ at $t = -1$ is given as $\frac{A + (B\sqrt{C} - D)\pi}{A + (B\sqrt{C} - E)\pi}$ where A, B, C, D, E are natural numbers and C is prime, then the value of A+B+C+D+E is _____

89.

If $\int \frac{1}{\cos^3 x - \sin^3 x} dx = A\tan^{-1}(\sin x + \cos x) + B\ln\left|\frac{\sqrt{2} + (\sin x + \cos x)}{\sqrt{2} - (\sin x + \cos x)}\right| + C$ then the value of $12A + 9\sqrt{2}\,B$ is equal to

90.

If p,q,r,s are in A.P and $f(x) = \begin{vmatrix} p + \sin x & q + \sin x & p - r + \sin x \\ q + \sin x & r + \sin x & -1 + \sin x \\ r + \sin x & s + \sin x & s - q + \sin x \end{vmatrix}$ such that $\int_0^2 f(x)dx = -4$ then the positive value of the common difference of the A.P is _____