COMMON ENTRANCE TEST - 2008

DATE	SUBJECT	TIME
19 - 04 - 2008		10.00 AM to 12.30 PM
	(COMBINED PAPER)	

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
120	150 MINUTES	140 MINUTES

MENTION YOUR	QUESTION BOOKLET DETAILS				
CET NUMBER	VERSION CODE	SERIAL NUMBER			
	A-1	147385			

IMPORTANT INSTRUCTIONS TO CANDIDATES

(Candidates are advised to read the following instructions carefully, before answering on OMR answer sheet.)

- Ensure that CET No. has been entered and shaded the respective circles on the OMR answer sheet.
- ENSURE THAT THE TIMING, MARKS PRINTED ON THE OMR ANSWER SHEET ARE NOT DAMAGED/MUTILATED/SPOILED.
- 3. This Question Booklet is issued to you by the invigilator after the 2nd Bell. i.e., after 10.00 a.m.
- 4. Enter the Serial Number of this question booklet on the OMR answer sheet.
- Carefully enter the Version Code of this question booklet on the OMR answer sheet and SHADE the respective circles completely.
- As answer sheets are designed to suit the Optical Mark Reader (OMR) system, please take special care while filling and shading the CET NO. & Version Code of this question booklet.
- 7. DO NOT FORGET TO SIGN AT THE BOTTOM PORTION OF OMR ANSWER SHEET IN THE SPACE PROVIDED.
- 8. Until the 3rd Bell is rung at 10.10 a.m.:
 - Do not remove the staple present on the right hand side of this question booklet.
 - Do not look inside this question booklet.
 - Do not start answering on the OMR answer sheet.
- After the 3rd Bell is rung at 10.10 a.m., remove the staple present on the right hand side of this question booklet and start answering on the OMR answer sheet.
- 10. This question booklet contains 120 questions and each question will have four different options / choices.
- 11. During the subsequent 140 minutes:
 - · Read each question carefully.
 - Determine the correct answer from out of the four available options / choices given under each question.
 - Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALLPOINT PEN against the question number on the OMR answer sheet.

CORRECT METHOD OF SHADING THE CIRCLE ON THE OMR SHEET IS AS SHOWN BELOW:



- Please note that even a minute unintended ink dot on the OMR sheet will also be recognised and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
- Use the space provided on each page of the question booklet for Rough Work AND do not use the OMR answer sheet for the same.
- After the last bell is rung at 12.30 p.m., stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
- 15. Hand over the OMR ANSWER SHEET to the room invigilator as it is.
- 16. After separating and retaining the top sheet (KEA Copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
- 17. Preserve the replica of the OMR answer sheet for a minimum period of One year.

SR - 33

A -

PHYSICS

SR - 33 Turn Over

- A ray of light enters from a rarer to a denser medium. The angle of incidence is i. Then
 the reflected and refracted rays are mutually perpendicular to each other. The critical
 angle for the pair of media is
 - 1) $Sin^{-1}(Tan i)$

2) $Tan^{-1}(Sin i)$

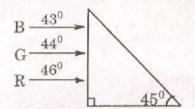
3) Sin^{-1} (Cot i)

- 4) $\cos^{-1}(Tan i)$
- 2. A fish in water (refractive index n) looks at a bird vertically above in the air. If y is the height of the bird and x is the depth of the fish from the surface, then the distance of the bird as estimated by the fish is
 - 1) $x + y \left(1 \frac{1}{n}\right)$

2) x + ny

3) $x + y \left(1 + \frac{1}{n}\right)$

- 4) $y + x \left(1 \frac{1}{n}\right)$
- 3. Figure shows a mixture of blue, green and red coloured rays incident normally on a right angled prism. The critical angles of the material of the prism for red, green and blue are 46°, 44° and 43° respectively. The arrangement will separate



- 1) red colour from blue and green
- 2) blue colour from red and green
- 3) green colour from red and blue
- 4) all the three colours.
- 4. A convex and a concave lens seperated by distance d are then put in contact. The focal length of the combination
 - 1) decreases

2) increases

3) becomes 0

- 4) remains the same
- A convex lens is made of 3 layers of glass of 3 different materials as in the figure. A point object is placed on its axis. The number of images of the object are



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

- If μ_0 is permeability of free space and ϵ_0 is permittivity of free space, the speed of light in vacuum is given by
 - 1) $\sqrt{\mu_0 \in 0}$

2) $\sqrt{\frac{\mu_0}{\epsilon_0}}$ 4) $\sqrt{\frac{\epsilon_0}{\mu_0}}$

3) $\sqrt{\frac{1}{\mu_0 \in \Omega}}$

- In Young's double slit experiment, a third slit is made in between the double slits. Then
 - 1) intensity of fringes totally disappears.
 - 2) only bright light is observed on the screen.
 - 3) fringes of unequal width are formed.
 - contrast between bright and dark fringes is reduced.
- The maximum number of possible interference maxima when slit separation is equal to 4 times the wavelength of light used in a double slit experiment is
 - 1) ∞

2) 9

3) 8

- In a Fraunhofer diffraction experiment at a single slit using a light of wavelength 400 nm, the first minimum is formed at an angle of 30° . The direction θ of the first secondary maximum is given by
 - 1) $Sin^{-1} \frac{2}{3}$

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

3) $Sin^{-1} \frac{1}{4}$

- 4) $Tan^{-1} \frac{2}{3}$
- Maximum diffraction takes place in a given slit for
 - Y-rays

2) ultraviolet light

3) infrared light

4) radio waves

- 11. An unpolarised beam of intensity I_0 falls on a polaroid. The intensity of the emergent light is
 - $1): I_0/2$

 $2) I_0$

3) 10/4

- 4) Zero
- 12. Which of the following is a dichroic crystal?
 - 1) Quartz

2) Tourmaline

3) Mica

- 4) Selenite
- 13. Two identical metal spheres charged with $+12\,\mu F$ and $-8\,\mu F$ are kept at certain distance in air. They are brought into contact and then kept at the same distance. The ratio of the magnitudes of electrostatic forces between them before and after contact is
 - 1) 12:1

2) 8:1

3) 24:1

- 4) 4:1
- 14. A small conducting sphere of radius r is lying concentrically inside a bigger hollow conducting sphere of radius R. The bigger and smaller spheres are charged with Q and q (Q > q) and are insulated from each other. The potential difference between the spheres will be
 - 1) $\frac{1}{4\pi\epsilon_0} \left(\frac{q}{r} \frac{q}{R} \right)$

 $2) \quad \frac{1}{4\pi \epsilon_0} \left(\frac{q}{R} - \frac{Q}{r} \right)$

 $3) \quad \frac{1}{4\pi\epsilon_0} \left(\frac{q}{r} - \frac{Q}{R} \right)$

- 4) $\frac{1}{4\pi\epsilon_0} \left(\frac{Q}{R} + \frac{q}{r} \right)$
- 15. The charges Q, +q and +q are placed at the vertices of an equilateral triangle of side l. If the net electrostatic potential energy of the system is zero, then Q is equal to
 - 1) -q/2

2) -q

3) +q/2

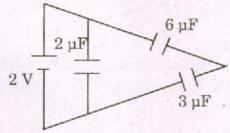
4) zero

- 16. How many $6\mu F$, 200 V condensers are needed to make a condenser of $18\mu F$, 600 V?
 - 1) 9

2) 18

3) 3

- 4) 27
- 17. The total energy stored in the condenser system shown in the figure will be

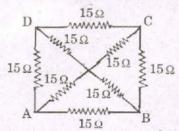


1) $2\mu J$

2) $4\mu J$

3) $8\mu J$

- 4) $16 \mu J$
- 18. A metal wire is subjected to a constant potential difference. When the temperature of the metal wire increases, the drift velocity of the electron in it
 - 1) increases, thermal velocity of the electron decreases
 - 2) decreases, thermal velocity of the electron decreases
 - 3) increases, thermal velocity of the electron increases
 - 4) decreases, thermal velocity of the electron increases
- 19. The equivalent resistance between the points A and B will be (each resistance is 15 Ω)



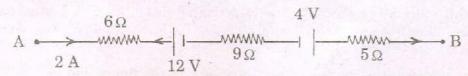
- 1) 30 Ω
- 2) 8 Ω
- 3) 10 Ω
- 4) 40 Ω
- 20. The terminals of a 18 V battery with an internal resistance of 24 Ω are connected to a circular wire of resistance 24 Ω at two points distant at one quarter of the circumference of a circular wire. The current through the bigger arc of the circle will be
 - 1) 0.75 A

2) 1.5 A

3) 2.25 A

4) 3 A

21. The potential difference between A and B in the following figure is



1) 32 V

2) 48 V

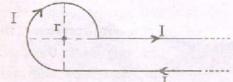
3) 24 V

- 4) 14 V
- 22. The magnetic field at the centre of a circular current carrying conductor of radius r is B_c . The magnetic field on its axis at a distance r from the centre is B_a . The value of B_c : B_a will be
 - 1) $1:\sqrt{2}$

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

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

- 4) $\sqrt{2}:1$
- 23. Current *T* is flowing in a conductor shaped as shown in the figure. The radius of the curved part is *r* and the length of straight portion is very large. The value of the magnetic field at the centre *O* will be

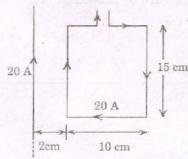


- 1) $\frac{\mu_0 I}{4\pi r} \left(\frac{3\pi}{2} + 1 \right)$
- 2) $\frac{\mu_0 I}{4 \pi r} \left(\frac{3 \pi}{2} 1 \right)$
- 3) $\frac{\mu_0 I}{4\pi r} \left(\frac{\pi}{2} + 1 \right)$
- 4) $\frac{\mu_0 I}{4\pi r} \left(\frac{\pi}{2} 1 \right)$
- 24. Two tangent galvanometers A and B are identical except in their number of turns. They are connected in series. On passing a current through them, deflections of 60^{0} and 30^{0} are produced. The ratio of the number of turns in A and B is
 - 1) 1:3

2) 3:1

3) 1:2

- 4) 2:1
- 25. The resultant force on the current loop PQRS due to a long current carrying conductor will be



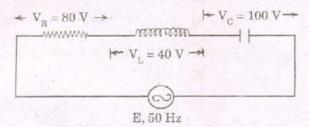
- 1) $10^{-4}N$
- 2) $3.6 \times 10^{-4} N$
- 3) $1.8 \times 10^{-4} N$
- 4) $5 \times 10^{-4} N$

- 26. A certain current on passing through a galvanometer produces a deflection of 100 divisions. When a shunt of one ohm is connected, the deflection reduces to 1 division. The galvanometer resistance is
 - 1) 100 Ω

2) 99 Ω

3) 10 Ω

- 4) 9.9 Ω
- 27. Two similar circular loops carry equal currents in the same direction. On moving the coils further apart, the electric current will
 - 1) increase in both
 - 2) decrease in both
 - 3) remain unaltered
 - 4) increases in one and decreases in the second
- 28. The value of alternating emf E in the given circuit will be



1) 220 V

2) 140 V

3) 100 V

- 4) 20 V
- 29. A current of 5A is flowing at 220 V in the primary coil of a transformer. If the voltage produced in the secondary coil is 2200 V and 50% of power is lost, then the current in the secondary will be
 - 1) 2.5 A

2) 5 A

3) 0.25 A

- 4) 0.5 A
- 30. For a series LCR circuit at resonance, the statement which is not true is
 - 1) Peak energy stored by a capacitor = peak energy stored by an inductor
 - 2) Average power = apparent power
 - 3) Wattless current is zero
 - 4) Power factor is zero

6.19.15				
31.	Solar sp	ectrum is an example for		
	1)	line emission spectrum	2)	continuous emission spectrum
	3)	band absorption spectrum	4)	line absorption spectrum
32.	When a	piece of metal is illuminated	by a mo	onochromatic light of wavelength λ , then
	stopping	potential is 3Vs. When same	surface	is illuminated by light of wavelength 2λ
	then sto		ne value	of threshold wavelength for photoelectric
	1)	4λ	2)	8λ
	3)	∜3 λ	4)	6λ
33.	The man		tted ele	ctrons in a photoelectric effect does no
	1)	wavelength	2)	frequency
	3)	intensity	4)	work function
34.	The ratio	o of minimum wavelengths of	Lyman a	and Balmer series will be
	1)	1.25	2)	0.25
	3)	5	4)	10

- 35. Hydrogen atom does not emit X-rays because
 - 1) it contains only a single electron
 - 2) energy levels in it are far apart
 - 3) its size is very small
 - 4) energy levels in it are very close to each other

- 36. If an electron and a proton have the same de-Broglie wavelength, then the kinetic energy of the electron is
 - 1) zero

- 2) less than that of a proton
- 3) more than that of a proton
- 4) equal to that of a proton
- 37. Two protons are kept at a separation of $40 \stackrel{0}{A}$. F_n is the nuclear force and F_e is the electrostatic force between them. Then
 - 1) $F_n >> F_e$

 $2) \quad F_n = F_e$

3) $F_n << F_e$

- 4) $F_n \approx F_e$
- 38. Blue colour of sea water is due to
 - 1) interference of sunlight reflected from the water surface
 - 2) scattering of sunlight by the water molecules
 - 3) image of sky in water
 - 4) refraction of sunlight
- 39. The ratio of the nuclear radii of elements with mass numbers 216 and 125 is
 - 1) 216:125

2) $\sqrt{216}:\sqrt{125}$

3) 6:5

- 4) none of these
- 40. On bombarding U^{235} by slow neutron, 200 MeV energy is released. If the power output of atomic reactor is 1.6 MW, then the rate of fission will be
 - 1) $5 \times 10^{22} / s$

2) $5 \times 10^{16} / s$

3) $8 \times 10^{16} / s$

4) $20 \times 10^{16} / s$

- 41. The masses of two radioactive substances are same and their half lives are 1 year and 2 years respectively. The ratio of their activities after 6 years will be
 - 1) 1:4

2) 1:2

3) 1:3

- 4) 1:6
- 42. $_{92}U^{235}$ undergoes successive disintegrations with the end product of $_{82}Pb^{203}$. The number of α and β particles emitted are
 - 1) $\alpha = 6$, $\beta = 4$

2) $\alpha = 6$, $\beta = 0$

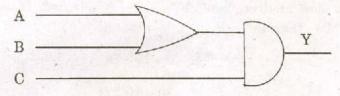
3) $\alpha = 8, \beta = 6$

- 4) $\alpha = 3, \beta = 3$
- 43. The most stable particle in Baryon group is
 - 1) neutron

2) omega - particle

3) proton

- 4) lamda particle
- 44. In an unbiased p-n junction
 - 1) Potential at p is more than that at n
 - 2) Potential at p is less than that at n
 - 3) Potential at p is equal to that at n
 - 4) Potential at p is +ve and that at n is -ve
- 45. To get an output y = 1 from the circuit shown, the inputs A, B and C must be respectively



1) 0, 1, 0

2) 1, 0, 0

3) 1, 0, 1

4) 1, 1, 0

- 46. Dimensional formula for the universal gravitational constant G is
 - 1) $M^{-1}L^{2}T^{-2}$

2) $M^{0}L^{0}T^{0}$

3) $M^{-1}L^{3}T^{-2}$

- 4) $M^{-1}L^3T^{-1}$
- 47. A body is projected vertically upwards. The times corresponding to height h while ascending and while descending are t_1 and t_2 respectively. Then the velocity of projection is (g is acceleration due to gravity)
 - 1) $g\sqrt{t_1t_2}$

2) $\frac{g t_1 t_2}{t_1 + t_2}$

 $3) \quad \frac{g\sqrt{t_1t_2}}{2}$

- $4) \quad \frac{g\left(t_1+t_2\right)}{2}$
- 48. A mass of 10 kg is suspended from a spring balance. It is pulled aside by a horizontal string so that it makes an angle of 60° with the vertical. The new reading of the balance is
 - 1) 20 kg.wt

2) 10 kg.wt

3) $10\sqrt{3}$ kg.wt

- 4) $20\sqrt{3}$ kg.wt
- 49. A body weighs 50 grams in air and 40 grams in water. How much would it weigh in a liquid of specific gravity 1.5?
 - 1) 30 grams

2) 35 grams

3) 65 grams

- 4) 45 grams
- 50. A body of mass 4 kg is accelerated upon by a constant force, travels a distance of 5 m in the first second and a distance of 2 m in the third second. The force acting on the body is
 - 1) 2 N

2) 4 N

3) 6 N

4) 8 N

- 51. A simple pendulum is suspended from the ceiling of a lift. When the lift is at rest its time period is T. With what acceleration should the lift be accelerated upwards in order to reduce its period to T/2? (g is acceleration due to gravity).
 - · 1) 2g

2) 3g

3) 4g

- 4) g
- 52. If γ is the ratio of specific heats and R is the universal gas constant, then the molar specific heat at constant volume C_v is given by
 - 1) γR

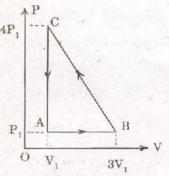
 $2) \quad \frac{(\gamma-1)R}{\gamma}$

3) $\frac{R}{\gamma - 1}$

- 4) $\frac{\gamma R}{\gamma 1}$
- 53. An ideal gas is taken via path ABCA as shown in figure. The network done in the whole cycle is



- 2) $-3P_1V_1$
- 3) $6P_1V_1$
- 4) zero

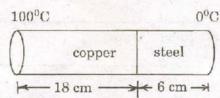


- 54. In which of the processes, does the internal energy of the system remain constant?
 - 1) Adiabatic

2) Isochoric

3) Isobaric

- 4) Isothermal
- 55. The coefficient of thermal conductivity of copper is 9 times that of steel. In the composite cylindrical bar shown in the figure, what will be the temperature at the junction of copper and steel?



1) $75^{\circ}C$

 $2) 67^{0}C$

3) $25^{\circ}C$

4) $33^{0}C$

56.		onic wave is given by $y = 6Sin 2\pi (2t - 0.1x)$, where x and s. The phase difference between two particles 2 mm apar
	at any instant is	
	1) 180	2) 360
	3) 54 ⁰	4) 72^0
57.	그 사람이 하는데 보면 하는데 그 나를 하는데	observer approach a stationary sound source so that the ould appear double the actual frequency? (v is velocity of
	1) v_2	2) 3 v
	3) 2 <i>v</i>	4) v
58.	If a black body emits 0.5 joules	of energy per second when it is at $27^{0}C$, then the
	amount of energy emitted by it	when it is at $627^{\circ}C$ will be
	. 1) 40.5 J	2) 162 J
	3) 13.5 J	4) 135 J
59.		ncy of 200 Hz. When its length is doubled and tension is h a frequency of 300 Hz. The ratio of the new tension to
	. 1) 9:1	2) 1:9
	3) 3:1	4) 1:3
60.	How many times more intense	is a 60 dB sound than a 30 dB sound?

3) 100 4) 4

(Space for Rough Work)

2) 2

1) 1000

CHEMISTRY

SR - 33 Turn Over

61.	The correct order in which the first ic	onisation potential increases is	
	1) Na, K, Be	2) K, Na, Be	
	3) K, Be, Na	4) Be, Na, K	
62.	10 cm ³ of 0.1 N monobasic acid requinormality is	ires 15 cm ³ of sodium hydroxide solution wh	108
	1) 1.5 N	2) 0.15 N	
	3) 0.066 N	4) 0.66 N	
63.	The IUPAC name for tertiary butyl io	dide is	
	1) 4-Iodobutane	2) 2-Iodobutane	
	3) 1-Iodo, 3-methyl propane	4) 2-Iodo 2-methyl propane	
64.	When sulphur dioxide is passed in an of sulphur is changed from	acidified $K_2Cr_2O_7$ solution, the oxidation st	ate
	1) + 4 to 0	2) + 4 to + 2	
	3) +4 to+6	4) +6 to +4	
65.	Mass of 0.1 mole of Methane is		
	1) 1 g	2) 16 g	
	3) 1.6 g	4) 0.1 g	

66.	Methoxy methane and ethanol are						
	1)	Position isomers	2)	Chain isomers			
	3)	Functional isomers	4)	Optical isomers			
67.	When th	e azimuthal quantum number has	the	value of 2, the number of orbitals possib			
	1)	7	2)	5			
	3)	3	4)	0			
68.		reaction $Fe_2O_3 + 3CO \longrightarrow 2F$ to reduce one mole of ferric oxide		$3CO_2$ the volume of carbon monoxid			
	1)	$22.4~\mathrm{dm}^3$	2)	$44.8~\mathrm{dm}^3$			
	3)	67.2 dm ³	4)	11.2 dm ³			
69.	The mon	omers of Buna-S rubber are					
	1)	vinyl chloride and sulphur	2)	butadiene			
	3)	styrene and butadiene	4)	isoprene and butadiene			
70.	An eleme	ent with atomic number 21 is a					
	1)	halogen	2)	representative element			
	3)	transition element	4)	alkali metal			

71.	The ma	ximum number of hydro	ogen bonds	unai	a molecule of water can have is
	1)	1		2)	2
	3)	3		4)	4
72.	A gas d	eviates from ideal beha	viour at a l	nigh	pressure because its molecules
	1)	attract one another		2)	show the Tyndall effect
	3)	have kinetic energy		4)	are bound by covalent bonds
73.	The rea	gent used to convert an	alkyne to	alke	ne is
	, 1)	Zn / HCl		2)	Sn / HCl
	3)	Zn-Hg / HCl		4)	Pd/H_2
74.	When c	ompared to ΔG^0 for t	he formati	on (of Al_2O_3 , the ΔG^0 for the formation of
	Cr_2O_3 is	8			
	1)	higher		2)	lower
	3)	same		4)	unpredicted
75.	In order	to increase the volume	of a gas by	109	%, the pressure of the gas should be
	1)	increased by 10 %		2)	increased by 1 %
	3)	decreased by 10 %		4)	decreased by 1 %
-	-				

76.	Catalytic dehydrogenation of a primary alcohol gives a							
	1)	secondary alcohol	2)	aldehyde				
	3)	ketone	4)	ester				
77.	Excess o	f PCl_5 reacts with conc. H_2SO_4 gi	ving					
	1)	chlorosulphonic acid	2)	thionyl chloride				
	3)	sulphuryl chloride	4)	sulphurous acid				
78.		ole of ammonia and one mole of h		ogen chloride are mixed in a closed				
	1)	$\Delta H > \Delta u$	2)	$\Delta H = \Delta u$				
	3)	$\Delta H < \Delta u$	4)	there is no relationship				
79.	The com	pound on dehydrogenation gives	a ke	tone. The original compound is				
	. 1)	primary alcohol	2)	secondary alcohol				
	3)	tertiary alcohol	4)	carboxylic acid				
80.	Which is	the most easily liquifiable rare g	as?					
	1)	Xe	2)	Kr				
	3)	Ar	4)	Ne				
_	and the same of th		Wast.					

81.	Mesomeric	effect involves delocalisation of	1	
	1) p	i electrons	2)	sigma electrons
	3) p	protons	4)	none of these
82.	Which of t	the following has the maximum	num	ber of unpaired 'd' electrons ?
	1) 2	$2n^{2+}$	2)	$Fe^{\dot{2}+}$
	3) 1	Vi ³⁺	4)	Cu^+
83.	One mole	of which of the following has the	e hig	ghest entropy?
	1) li	iquid nitrogen	2)	hydrogen gas
	3) n	nercury	4)	diamond
84.	Which of t	he following species does not ex-	ert a	a resonance effect ?
	1) ($C_6H_5NH_2$	2)	$C_6H_5\stackrel{^+}{N}H_3$
	. 3) (C_6H_5OH	4)	C_6H_5Cl
85.	A complex	compound in which the oxidatio	n ni	umber of a metal is zero is
	1) I	$K_4[Fe(CN)_6]$	2)	$K_3[Fe(CN)_6]$
	3) [.	$Ni(CO)_4$	4)	$\left[Pl\left(NH_{3}\right) _{4}\right] Cl_{2}$

86.		f at equilibrium the vess		I two moles of ${\it Cl}_2$ are taken in a closed bles of ${\it PCl}_5$, the number of moles of ${\it PCl}_3$
	1)	5	2)	3
	3)	6	4)	4.5
87.	How ma	ny optically active stereo	mers are pos	sible for butan-2, 3-diol ?
	1)	1	2)	2
	3)	3	4)	4
88.	An octal	nedral complex is formed	when hybrid	orbitals of the following type are involved
	1)	sp^3	2)	$d sp^2$
	3)	d^2sp^3	4)	sp^2d^2
89.	For the	reaction $2HI_{(g)} \rightleftharpoons H_{2(g)}$	$+I_{2(g)}-QKJ$, the equilibrium constant depends upon
	1)	temperature	2)	pressure
	3)	catalyst	4)	volume
90.	The ang	le strain in cyclobutane is		
	1)	24044	2)	29 ⁰ 16'
	3)	19022'	4)	$9^{0}44'$

91.	The number	of nodal	planes	present in	σ^*s	antibonding	orbitals is

1) 1

2)

3) 0

4) 3

92. Which of the following electrolytic solutions has the least specific conductance?

1) 0.02 N

2) 0.2 N

3) 2 N

4) 0.002 N

93. The overlapping of orbitals in benzene is of the type

1) sp-sp

2) p - p

3) $sp^2 - sp^2$

4) $sp^3 - sp^3$

94. The calculated bond order of superoxide ion $\left(O_2^-\right)$ is

1) 2.5

2) 2

3) 1.5

4) 1

95. Which of the following can be measured by the Ostwald-Walker dynamic method?

- 1) Relative lowering of vapour pressure
- 2) Lowering of vapour pressure
- 3) Vapour pressure of the solvent
- 4) all of these

96.	n-propyl	bromide on treating	with alcoholic K	OH produces					
	1)	propane	2)	propene					
	3)	propyne	4)	propanol					
97.	Mercury	is a liquid metal beca	ause						
	1)	it has a completely f	illed s-orbital						
	2)	it has a small atomic	size						
	3)	it has a completely f	illed d -orbital th	at prevents d-d overlapping of orbitals					
	4)	it has a completely f	illed d -orbital th	at causes d-d overlapping					
98.	where th		corners of the co	This crystallises in the cubic structurube and B atoms are at the body centres					
	1)	AB	2)	A_6B					
	3)	A_8B_4	4)	A_6B AB_6					
99.	Anisole is called		e action of methy	vI iodide on sodium phenate. The reactio					
	1)	Wurtz's reaction	2)	Williamson's reaction					
	3)	Fittig's reaction	4)	Etard's reaction					
100.	Malleability and ductility of metals can be accounted due to								
	1)	1) the presence of electrostatic force							
	2)	2) the crystalline structure in metal							
	3)	the capacity of layers	of metal ions to	slide over the other					
	4)	the interaction of ele	ctrons with meta	al ions in the lattice					

101. An ioni	c compound is expected to have tel	trahedral structure if r_+/r lies in the range of
1)	0.414 to 0.732	2) 0.225 to 0.414
3)	0.155 to 0.225	4) 0.732 to 1
102. Among	the following, which is least acidic	c?
1)	phenol	2) O-cresol
3)	p-nitrophenol	4) p-chlorophenol
103. A ligano	d can also be regarded as	
1)	Lewis acid	2) Bronsted base
3)	Lewis base	4) Bronsted acid
104. The cold	our of sky is due to	
1)	transmission of light	
2)	wavelength of scattered light	
3)	absorption of light by atmospher	ric gases
4)	All of these	or an experience of the second
105. Which Fehling		ounds answers to both iodoform test and
The state of the s	ethanol	2) methanal
3)	ethanal	4) propanone

106.	Helium	is used in balloons in place of hyd	lroge	en because it is
	1)	incombustible	2)	lighter than hydrogen
	3)	radioactive	4)	more abundant than hydrogen
107.	The bas	ic principle of Cottnell's precipita	tor i	s
	1)	Le-chatelier's principle		Manager and the control of the first of
	2)	peptisation		
	3)	neutralisation of charge on colle	oidal	particles
	4)	scattering of light		
108.	When ca	arbon monoxide is passed over sol	id ca	ustic soda heated to 200°C, it forms
	1)	Na ₂ CO ₃	2)	$NaHCO_3$
	3)	HCOONa	4)	CH_3COONa
109.			effe	ct of the increase of temperature on the
		um of the reaction?		
	1)	equilibrium is shifted to the left		
	2)	equilibrium is shifted to the righ	it	
	3)	equilibrium is unaltered		
	4)	reaction rate does not change		
110.	Hydroge	n gas is not liberated when the fo	llow	ing metal is added to dil. HCl
	1)	Ag	2)	Zn
	3)	Mg	4)	Sn
	A SHARE			

111. Consider the Born-Haber cycle for the formation of an ionic compound given below and identify the compound (Z) formed.

$$\begin{bmatrix} M_{(s)} & \xrightarrow{\Delta H_1} M_{(g)} & \xrightarrow{\Delta H_2} M_{(g)}^+ \\ \frac{1}{2} X_{2(g)} & \xrightarrow{\Delta H_3} X_{(g)} & \xrightarrow{\Delta H_4} X_{(g)}^- \end{bmatrix} \xrightarrow{\Delta H_5} Z$$

1) M^+X^-

2) $M^{-}X_{(s)}^{-}$

3) · M X

- 4) $M^+X_{(g)}^-$
- 112. In the brown ring test, the brown colour of the ring is due to
 - 1) ferrous nitrate

- 2) ferric nitrate
- 3) a mixture of NO and NO2
- 4) nitrosoferrous sulphate

- 113. Amines behave as
 - 1) Lewis acids
 - 3) aprotic acid

- 2) Lewis base
- 4) neutral compound
- 114. Dalda is prepared from oils by
 - 1) oxidation
 - 3) hydrolysis

- 2) reduction
- 4) distillation
- 115. The chemical name of anisole is
 - 1) Ethanoic acid
 - 3) Propanone

- 2) Methoxy benzene
- 4) Acetone

116.	The	number	of	disulphide	linkages	present	in	insulin	are
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1) 1

2) 2

3) 3

4) 4

117. 80 g of oxygen contains as many atoms as in

1) 80 g of hydrogen

2) 1 g of hydrogen

3) 10 g of hydrogen

4) 5 g of hydrogen

118. Which metal has a greater tendency to form metal oxide?

1) Cr

2) Fe

3) Al

4) Ca

119. Identify the reaction that does not take place in a blast furnace.

- $1) \quad CaCO_{3} {\longrightarrow\hspace{-2.5cm}} CaO + CO_{2} \qquad \qquad 2) \quad CaO + Si\,O_{2} {\longrightarrow\hspace{-2.5cm}} Ca\,Si\,O_{3}$
- $3) \quad 2Fe_2O_3 + 3C \longrightarrow 4Fe + 3CO_2 \quad 4) \quad CO_2 + C \longrightarrow 2CO$

120. Waxes are esters of

- 1) glycerol
- 2) long chain alcohols
- 3) glycerol and fatty acid
- 4) long chain alcohols and long chain fatty acids

MATHEMATICS

A variable line $\frac{x}{a} + \frac{y}{b} = 1$ is such that a + b = 4. The locus of the midpoint of the portion of the line intercepted between the axes is

$$1) \quad x + y = 4$$

2)
$$x + y = 8$$

3)
$$x + y = 1$$

4)
$$x + y = 2$$

2. The point (5, -7) lies outside the circle

1)
$$x^2 + y^2 - 8x = 0$$

$$2) \quad x^2 + y^2 - 5x + 7y = 0$$

3)
$$x^2 + y^2 - 5x + 7y - 1 = 0$$

3)
$$x^2 + y^2 - 5x + 7y - 1 = 0$$
 4) $x^2 + y^2 - 8x + 7y - 2 = 0$

If the circles $x^2 + y^2 = 9$ and $x^2 + y^2 + 2\alpha x + 2y + 1 = 0$ touch each other internally, 3. then $\alpha =$

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

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

4)
$$\frac{-4}{3}$$

The locus of the midpoints of the line joining the focus and any point on the parabola $y^2 = 4ax$ is a parabola with the equation of directrix as

1)
$$x + \alpha = 0$$

$$2) \quad 2x + a = 0$$

3)
$$x = 0$$
.

4)
$$x = \frac{a}{2}$$

- The tangents drawn at the extremeties of a focal chord of the parabola $y^2 = 16x$ 5.
 - 1) intersect on x = 0

- 2) intersect on the line x + 4 = 0
- 3) intersect at an angle of 600
- 4) intersect at an angle of 450

- 6. On the set Z, of all integers * is defined by a*b=a+b-5. If 2*(x*3)=5 then x=
 - 1)

2) 3

3) 5

- 4) 10
- 7. Which of the following is false?
 - 1) Addition is commutative in N.
 - 2) Multiplication is associative in N.
 - 3) If $a*b=a^b$ for all $a,b\in N$ then * is commutative in N.
 - 4) Addition is associative in N.
- 8. If $\vec{a} \cdot \hat{i} = \vec{a} \cdot (\hat{i} + \hat{j}) = \vec{a} \cdot (\hat{i} + \hat{j} + \hat{k}) = 1$ then $\vec{a} = \vec{a} = \vec{a} \cdot (\hat{i} + \hat{j} + \hat{k}) = 1$
 - 1) $\hat{i} + \hat{j}$

2) $\hat{i} - \hat{k}$

3) ;

- 4) $\hat{i} + \hat{j} \hat{k}$
- 9. If \vec{a} and \vec{b} are unit vectors and $|\vec{a} + \vec{b}| = 1$ then $|\vec{a} \vec{b}|$ is equal to
 - 1) $\sqrt{2}$

2)

3) √5

- 4) $\sqrt{3}$
- 10. The projection of $\vec{a} = 3\hat{i} \hat{j} + 5\hat{k}$ on $\vec{b} = 2\hat{i} + 3\hat{j} + \hat{k}$ is
 - 1) $\frac{8}{\sqrt{35}}$

 $\frac{3}{\sqrt{39}}$

3) $\frac{8}{\sqrt{14}}$

4) $\sqrt{14}$

11. If $f: R \to R$ is defined by $f(x) = x^3$ then $f^{-1}(8) =$

1) {2}

 $\{2, 2w, 2w^2\}$

3) $\{2, -2\}$

4) {2, 2}

12. R is a relation on N given by $R = \{(x, y) \mid 4x + 3y = 20\}$. Which of the following belongs to R?

1) (-4, 12)

2) (5, 0)

3) (3, 4)

4) (2, 4)

13. If $Log_{10}7 = 0.8451$ then the position of the first significant figure of 7^{-20} is

1) 16

2) 17

3) 20

4) 15

14. $\frac{1}{2.5} + \frac{1}{5.8} + \frac{1}{8.11} + \dots$ upto *n* terms =

1) $\frac{n}{4n+6}$

2) $\frac{1}{6n+4}$

3) $\frac{n}{6n+4}$

4) $\frac{n}{3n+7}$

15. The ten's digit in 1!+4!+7!+10!+12!+13!+15!+16!+17! is divisible by

1) 4

2) 3!

3) 5

4) 7

16. The equation $\frac{x^2}{2-\lambda} - \frac{y^2}{\lambda - 5} - 1 = 0$ represents an ellipse if

1) $\lambda > 5$

2) $\lambda < 2$

3) 2 < λ < 5</p>

4) $2 > \lambda > .5$

17. The equation to the normal to the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ at (-4, 0) is

 $1) \quad 2x - 3y = 1$

2) x = 0

3) x = 1

4) y = 0

18. The converse of the contrapositive of the conditional $p \rightarrow -q$ is

1) $p \rightarrow q$

2) $\sim p \rightarrow \sim q$

3) $\sim q \rightarrow p$

4) $\sim p \rightarrow q$

19. The perimeter of a certain sector of a circle is equal to the length of the arc of the semicircle.

Then the angle at the centre of the sector in radians is

1) $\pi - 2$

2) $\pi + 2$

3) $\frac{\pi}{3}$

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

20. The value of $Tan \ 67\frac{1}{2}^{0} + Cot \ 67\frac{1}{2}^{0}$ is

1) $\sqrt{2}$

2) $3\sqrt{2}$

3) $2\sqrt{2}$

4) $2-\sqrt{2}$

21.	If e_1	and e_2	are the eccentricities of	f a hyperbola	$3x^2 - 3y^2 = 25$	and its conjugate,	the
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1)
$$e_1^2 + e_2^2 = 2$$

2)
$$e_1^2 + e_2^2 = 4$$

3)
$$e_1 + e_2 = 4$$

4)
$$e_1 + e_2 = \sqrt{2}$$

22. If p and q are prime numbers satisfying the condition $p^2 - 2q^2 = 1$, then the value of $p^2 + 2q^2$ is

23. If A(adj A) = 5I where I is the identity matrix of order 3, then |adj A| is equal to

1) 125

2) 25

3) 5

4) 10

24. The number of solutions for the equation Sin 2x + Cos 4x = 2 is

1) 0

2)

3) 2

4) Infinite

25. $\int e^x \cdot x^5 \, dx$ is

1)
$$e^{x} \left[x^{5} + 5x^{4} + 20x^{3} + 60x^{2} + 120x + 120 \right] + C$$

2)
$$e^{x} \left[x^{5} - 5x^{4} - 20x^{3} - 60x^{2} - 120x - 120 \right] + C$$

3)
$$e^x \left[x^5 - 5x^4 + 20x^3 - 60x^2 + 120x - 120 \right] + C$$

4)
$$e^{x} \left[x^{5} + 5x^{4} + 20x^{3} - 60x^{2} - 120x + 120 \right] + C$$

26. If f(x) is an even function and f'(x) exists, then f'(e)+f'(-e) is

1) > 0

2)

 $3) \geq 0$

4) < 0

27. If α is a complex number satisfying the equation $\alpha^2 + \alpha + 1 = 0$ then α^{31} is equal to

1) \alpha

2) α^2

3) 1

4) i

28. The derivative of $Sin(x^3)$ w.r.t. $Cos(x^3)$ is

1) $-Tan(x^3)$

2) $Tan(x^3)$

3) $-Cot\left(x^3\right)$

4) $Cot(x^3)$

29. A unit vector perpendicular to both the vectors $\hat{i} + \hat{j}$ and $\hat{j} + \hat{k}$ is

 $1) \quad \frac{-\hat{i} - \hat{j} + \hat{k}}{\sqrt{3}}$

 $2) \quad \frac{\hat{i} + \hat{j} - \hat{k}}{3}$

3) $\frac{\hat{i} + \hat{j} + \hat{k}}{\sqrt{3}}$

 $4) \quad \frac{\hat{i} - \hat{j} + \hat{k}}{\sqrt{3}}$

30. If $A = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ and $B = \begin{vmatrix} c_1 & c_2 & c_3 \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix}$ then

1) A = -B

2) A = B

3) B = 0

 $4) \quad B = A^2$

- 31. The locus of a point which moves such that the sum of its distances from two fixed points is a constant is
 - 1) a circle 2) a parabola
 - 3) an ellipse 4) a hyperbola
- 32. The centroid of the triangle ABC where $A \equiv (2, 3)$, $B \equiv (8, 10)$ and $C \equiv (5, 5)$ is
 - 1) (5, 6) 2) (6, 5)
 - 3) (6, 6) 4) (15, 18)
- 33. If $3x^2 + xy y^2 3x + 6y + K = 0$ represents a pair of lines, then K =
 - 1) 0 2) 9
 - 3) 1 4) -9
- 34. The equation of the smallest circle passing through the points (2, 2) and (3, 3) is
- 34. The equation of the smallest circle passing through the points (2, 2) and (3, 3) is
 - 1) $x^2 + y^2 + 5x + 5y + 12 = 0$ 2) $x^2 + y^2 5x 5y + 12 = 0$
 - 3) $x^2 + y^2 + 5x 5y + 12 = 0$ 4) $x^2 + y^2 5x + 5y 12 = 0$
 - The characteristic roots of the matrix $\left[egin{array}{ccc} 1 & 0 & 0 \\ 2 & 3 & 0 \\ 4 & 5 & 6 \end{array} \right]$ are
 - 1) 1, 3, 6
 - 3) 4, 5, 6

35.

36. If
$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$
, then $A^{-1} =$

 $1) \quad \frac{-1}{2} \begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$

 $\begin{array}{ccc} 2) & \frac{1}{2} \begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix} \end{array}$

 $3) \quad \left[\begin{array}{cc} -2 & 4 \\ 1 & 3 \end{array} \right]$

 $4) \quad \left[\begin{array}{cc} 2 & 4 \\ 1 & 3 \end{array} \right]$

37. The set {-1, 0, 1} is not a multiplicative group because of the failure of

1) Closure law

2) Associative law

3) Identity law

4) Inverse law

38 The angle of elevation of the top of a TV tower from three points A, B and C in a straight line through the foot of the tower are α , 2α and 3α respectively. If $AB = \alpha$, the height of the tower is

1) a Tan α

2) a Sin α

3) a Sin 2 a

4) a Sin 3α

39. The angles A, B and C of a triangle ABC are in A.P. If $b:c=\sqrt{3}:\sqrt{2}$, then the angle A is

1) 300

2) 150

3) 75^{0}

4) 450

40. $Sin\left(2Sin^{-1}\sqrt{\frac{63}{65}}\right) =$

1) $\frac{2\sqrt{126}}{65}$

2) $\frac{4\sqrt{65}}{65}$

3) $\frac{8\sqrt{63}}{65}$

4) $\frac{\sqrt{63}}{65}$

41. The general solution of |Sin x| = Cos x is (when $n \in \mathbb{Z}$) given by

1)
$$n \pi + \frac{\pi}{4}$$

2)
$$2n \pi \pm \frac{\pi}{4}$$

3)
$$n \pi \pm \frac{\pi}{4}$$

4)
$$n \pi - \frac{\pi}{4}$$

42. The real root of the equation $x^3 - 6x + 9 = 0$ is

$$1) -6$$

$$4) -3$$

43. The digit in the unit's place of 5834 is

The remainder when $3^{100} \times 2^{50}$ is divided by 5 is

45. $\int \frac{\sin x \cos x}{\sqrt{1-\sin^4 x}} dx =$

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

2)
$$\frac{1}{2} Cos^{-1} \left(Sin^2 x \right) + C$$

3)
$$Tan^{-1}(Sin^2x)+C$$

4)
$$Tan^{-1}(2 Sin x) + C$$

46. The value of $\int_{0}^{2} (ax^3 + bx + c) dx$ depends on the

1) value of b

2) value of c

3) value of a

4) values of a and b

The area of the region bounded by $y = 2x - x^2$ and the x-axis is

1) $\frac{8}{3}$ sq. units

2) $\frac{4}{3}$ sq. units

3) $\frac{7}{3}$ sq. units

4) $\frac{2}{3}$ sq. units

The differential equation $y \frac{dy}{dx} + x = c$ represents

- a family of hyperbolas
- a family of circles whose centres are on the y-axis
- 3) a family of parabolas
- a family of circles whose centres are on the x-axis

49. If $f(x^5) = 5x^3$, then f'(x) =

1) $\frac{3}{\sqrt[5]{x^2}}$

2) $\frac{3}{\sqrt[5]{x}}$

3) $\frac{3}{7}$

50. f(x) = 2a - x in -a < x < a=3x-2a in $a \le x$.

Then which of the following is true?

- 1) f(x) is discontinuous at x = a 2) f(x) is not differentiable at x
- 3) f(x) is differentiable at all $x \ge a$ 4) f(x) is continuous at all x < a

51.	The maximum area of a	rectangle tha	t can be	inscribed	in a	circle	of radius	2 uni	ts i
	(in square units)								
	1) 4		2)	8π					

- 3) 8 4) 5

If
$$Z$$
 is a complex number such that $Z = -\overline{Z}$, then

- 1) Z is purely real
- 2) Z is purely imaginary
- 3) Z is any complex number 4) Real part of Z is the same as its imaginary part

The value of
$$\sum_{K=1}^{6} \left[Sin \frac{2K \Pi}{7} - i Cos \frac{2K \Pi}{7} \right]$$
 is

- 1) i
- **54.** $\underset{x \to \infty}{Lt} x Sin\left(\frac{2}{x}\right)$ is equal to

1)

3) 2

- is given by $x = 80t 16t^2$. The stone reaches the maximum height in

A stone is thrown vertically upwards and the height x ft. reached by the stone in t seconds

- 1) 2 seconds 2) 2.5 seconds
- 3) 3 seconds 4) 1.5 seconds

56. The maximum value of $\frac{Log \ x}{x}$ in $(2, \infty)$ is

1) 1

 $2) \frac{2}{e}$

3) e

4) $\frac{1}{a}$

57. If $f(x) = be^{ax} + ae^{bx}$, then f''(0) =

()

2) 2ab

3) ab(a+b)

4) ab

58. If $\sqrt{\frac{1+\cos A}{1-\cos A}} = \frac{x}{y}$, then the value of Tan A =

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

 $\frac{2xy}{x^2+y^2}$

3) $\frac{2xy}{x^2 - y^2}$

4) $\frac{2xy}{y^2 - x^2}$.

 $59. \quad \int \frac{Sec \, x}{Sec \, x + Tan \, x} \, dx =$

1) Tan x - Sec x + C

2) Log(1+Sinx)+C

3) Sec x + Tan x + C

4) Log Sin x + Log Cos x + C

60. If $\int f(x) dx = g(x)$, then $\int f(x) g(x) dx =$

1) $\frac{1}{2}f^2(x)$

2) $\frac{1}{2}g^{2}(x)$

3) $\frac{1}{2} \left[g'(x) \right]^2$

4) f'(x) g(x)