SRI CHAITANYA EDUCATIONAL INSTITUTIONS, A.P

CENTRAL OFFICE MADHAPUR-HYDERABAD

AIEEE MODEL QUESTION PAPER-1

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INSTRUCTIONS TO THE CANDIDATES

1) Out of four alternatives for each question, only one circle for the correct answer is to be darkened completely with blue/black ball point pen only. Use of pencil is strictly prohibited. If any candidate use the pencil for darkening the answer sheet, his/her answer sheet will be rejected.

2) Rough work: The candidate will not do any rough work on the answer sheet. All rough work is to be done in the test booklet itself.

3) Changing an answer is NOT ALLOWED: The candidate must fully satisfy themselves about the accuracy of the answer before dakening the appropriate circle as no charge in answer once marked is allowed. Use of eraser or white/correction fluid on answer sheet is not permissible as the answer sheet is machine gradable and it may lead to wrong evaluation.

   If more than one circle is darkened or if the response is marked in any other manner it shall be treated as wrong way of marking.

4) The examinee is permitted to carry the text booklet.

   Physics: Question numbers 1 to 20 consist of 3 marks each. Negative (-1). Question numbers 21 to 28 consist of 4.5 marks each. Negative (-1.5). Question numbers 29 to 34 consist of 6 marks each and negative (-2).

   Chemistry: Questions 35 to 54 consist of 3 marks each.Negative (-1). Question numbers 55 to 62 consist of 4.5 makrs each. Negative (-1.5). Question numbers 63 to 68 consist of 6 marks each and negative (-2).

   Mathematics: Questions 69 to 88 consist of 3 marks each.Negative (-1). Question numbers 89 to 96 consist of 4.5 makrs each. Negative (-1.5). Question numbers 97 to 102 consist of 6 marks each and negative (-2).

PHYSICS

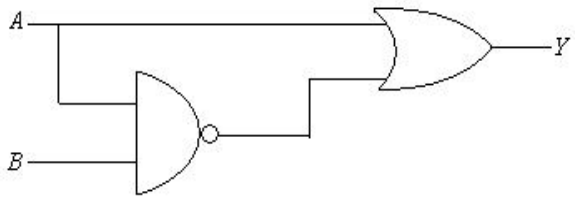
01. When the incident wave lengths are λ and $\lambda/2$, the kinetic energies of the emitted photo electrons are E and 2E. The work function of the metal is

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

02. In a sample of radioactive material, what fraction of initial number of active nucleii will remain undisintegrated after half of half-life of sample.

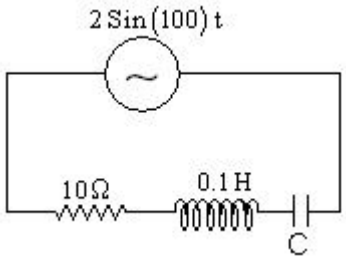
1) $\frac{1}{4}$ 2) $\frac{1}{2\sqrt{2}}$ 3) $\frac{1}{\sqrt{2}}$ 4) $\sqrt{2}-1$

03. The out put of the combination of the gates shown in the figure is



1) $A+\overline{A.B}$ 2) $A.B+\overline{A}.\overline{B}$ 3) $(A+B)\bullet(\overline{A.B})$ 4) $(A+B)\bullet(\overline{A+B})$

04. The power factor of the circuit is $1/\sqrt{2}$. The capacitance of the circuit is equal to



1) 400 μF 2) 300 μF 3) 500 μF 4) 200 μF

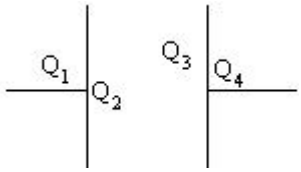
05. A copper wire having resistance 0.01 Ω in each meter is used to wind a 400 turn solenoid of radius 1 cm and length 20 cm. The emf of the battery which when connected across the solenoid will cause a magnetic field of 10^{-2} T near the centre of the solenoid is

1) 1v 2) 2v 3) 3v 4) 4v

06. The power of achromatic convergent lens of two lenses is +2D. The power of convex lens is +5D. The ratio of dispersive power of convex and concave lense will be

1) 5 : 3 2) 3 : 5 3) 2 : 5 4) 5 : 2

07. In an isolated parallel plate capacitor of capacitance C, the four surfaces have charges Q_1, Q_2, Q_3 and Q_4 as shown. The potential difference between the plates is



1) $\frac{Q_1+Q_2+Q_3+Q_4}{2C}$ 2) $\frac{Q_2+Q_3}{2C}$ 3) $\frac{Q_2-Q_3}{2C}$ 4) $\frac{Q_1+Q_4}{2C}$

08. In an experiment to measure the internel resistance of a cell it is found that the balence point is 3m, when the cell is shunted with 10 Ω. When shunt resistance is changed to R Ω, Balencing length is 2m. If internel resistance of cell is 2 Ω, the value of `R` is

1) 5 Ω 2) 10 Ω 3) 15 Ω 4) 2.5 Ω

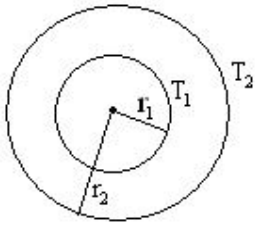
09. Initial momentum of a body is 2.01 kgm/sec and final momentum is 4.1259 kgm/sec. The change in momentum is (in kgm/sec).

1) 2.116 2) 2.117 3) 2.12 4) 2.1

10. A carnot engine whose low temparature reservoir is at 7^0C has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how many degrees should the temparature of high temparature reservoir be increased.

1) 840 k 2) 280 k 3) 560 k 4) 380 k

11. The figure shows a system of two concentric sphere of radii r_1 and r_2 and kept at temparatures T_1 and T_2 respectively. The radial rate of flow of heat in a substance between the concentric spheres is proportional to



1) $\frac{r_1 r_2}{r_2-r_1}$ 2) (r_2- r_1) 3) $\frac{r_2-r_1}{r_1 r_2}$ 4) $\ln\left(\frac{r_2}{r_1}\right)$

12. The temparature of a gas is -68^0C. To what temparature should it be heated so that ,
(a) The average translational KE of molecules be double, (b). The root mean square velocity of the molecules be doubled.

1) 237^0C, 547^0C 2) 137^0C, 547^0C 3) 140^0C, 240^0C 4) 210^0C, 220^0C

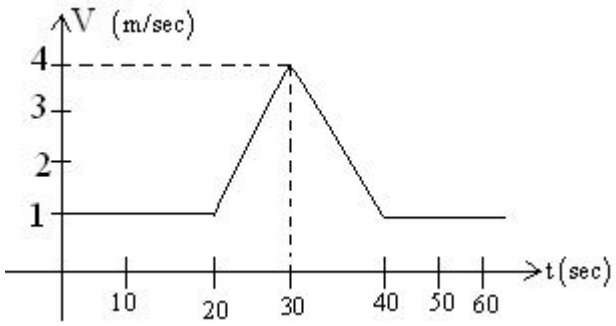
13. A body is projected up with a velocity equal to $\frac{3}{4}$ th of the escape velocity from the surface of the earth. The height it reaches is

1) $\frac{10R}{9}$ 2) $\frac{9R}{7}$ 3) $\frac{9R}{8}$ 4) $\frac{10R}{3}$

14. A lorry and a car of mass ratio 4 : 1 are moving with KE in the ratio 3 : 2 on a horizontal road. Now brakes are applied and breaking forces produced are in the ratio 1 : 2, then the ratio of stoping timings of lorry and car is

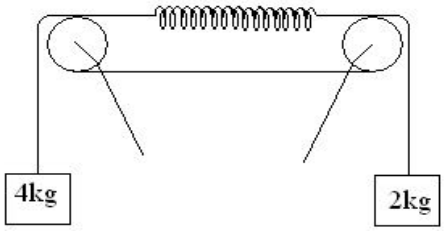
1) 1 : 1 2) 1 : 3 3) $2\sqrt{6}:1$ 4) $6\sqrt{2}:1$

15. Velocity time graph for a moving object shown in the figure. Total displacement of object during time interval when there is non-zero acceleration and retardation is



1) 60 m 2) 50 m 3) 30 m 4) 40 m

16. The reading in the spring balance is



1) 2.6 kgwt 2) 2 kgwt 3) 6 kgwt 4) 4.3 kgwt

17. Two soap bubbles of radii R_1 and R_2 are in atmosphere of pressure Po at constant temparature. Ratio of masses of air inside them is

1) $\dfrac{\left(Po+\dfrac{4T}{R_1^{\,2}}\right)R_1^{\,3}}{\left(Po+\dfrac{4T}{R_2^{\,2}}\right)R_2^{\,3}}$ 2) $\dfrac{\left(Po+\dfrac{4T}{R_1}\right)R_1^{\,3}}{\left(Po+\dfrac{4T}{R_2}\right)R_2^{\,3}}$ 3) $\dfrac{\left(Po+\dfrac{4T}{R_1}\right)}{\left(Po+\dfrac{4T}{R_2}\right)}$ 4) $\dfrac{R_1^{\,3}}{R_2^{\,3}}$

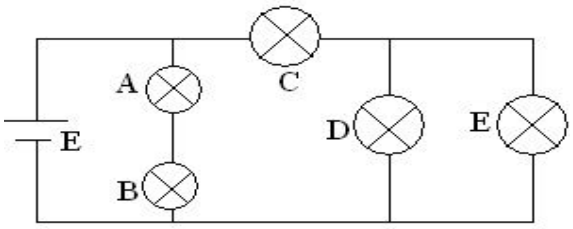
18. Two capillary tubes of same length but different radii r_1 and r_2 are fitted in parallel to the bottom of a vessel. The pressure head is P. What should be the radius of a single tube that can replace the two tubes so that the rate of flow is same as before.

1) $r_1^{\,4}+r_2^{\,4}$ 2) $\left(r_1^{\,2}+r_2^{\,2}\right)^{1/4}$ 3) $\left(r_1^{\,4}+r_2^{\,4}\right)^{1/4}$ 4) $r_1 + r_2$

19. A person is listening to two trains one approaching him while the other moving away from him. The speed of both the trains is 5 m/sec. If both trains give off whistle of their natural frequency of 280 Hz, then the observer hear -------- no.of beats (V_{sound} = 350 m/sec)

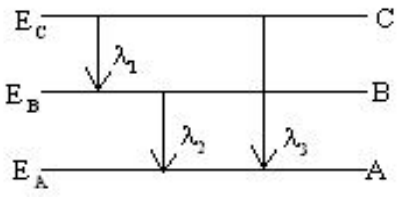
1) 6 2) 7 3) 5 4) 8

20. The circuit below is made up using identical bulbs. The bulb of maximum brightness of the following will be



1) A 2) C 3) D 4) E

21. Energy levels A, B, C of an atom are shown below if $E_A < E_B < E_C$, then corect statement of the following is

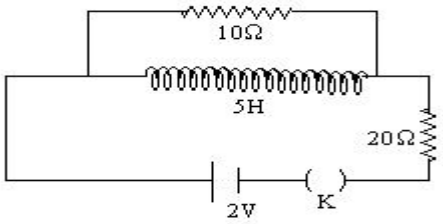


1) $\lambda_3 = \lambda_1 + \lambda_2$ 2) $\lambda_3 = \frac{\lambda_1\lambda_2}{\lambda_2 + \lambda_1}$ 3) $\lambda_1 + \lambda_2 + \lambda_3 = 0$ 4) $\lambda_3^{\,2} = \lambda_2^{\,2} + \lambda_1^{\,2}$

22. The binding energy per nucleon for deutron ${}_1H^2$ and ${}_2He^4$ are 1.1 Mev and 7 Mev respectively. The energy released when two deutrons fuse to form a helium nucleus is

1) 1.1 Mev 2) 7 Mev 3) 23.6 Mev 4) 6 Mev

23. Two resistances of $10\,\Omega$ and $20\,\Omega$ and an ideal inductor of inductance 5H are connected to a 2V battery, through a key K, as shown in figure. The key inserted at t = 0 what is final value of current in the $10\,\Omega$ resistor ?



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

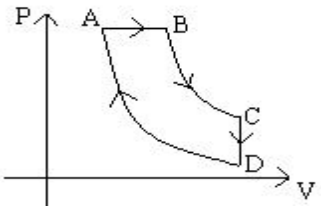
24. In a series LCR circuit the frequency of a 10V AC source is adjusted in such a fashion that the reactance of the inductor meassures $15\,\Omega$ and that of the capacitor $11\,\Omega$. If R = $3\,\Omega$, the potential difference across the series combination of L and C will be ----------

1) 8 V 2) 10 V 3) 22 V 4) 52 V

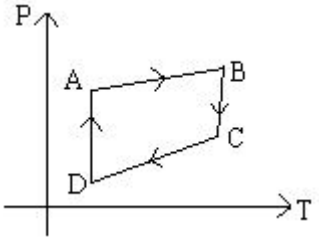
25. A ray of light is incident at 60^0 on prism of refracting angle 30^0 the emerging ray is at an angle of 30^0 with the incident ray. The value of refracitve index of prism is

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

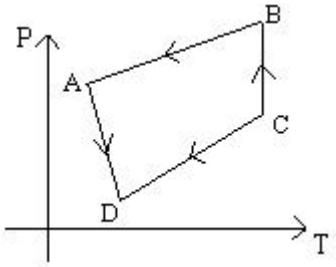
26. A cyclic process ABCD is shown below in the given P-V diagram. In the following answers the one that represents the same process as in P-V diagram



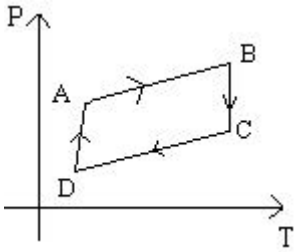
1)



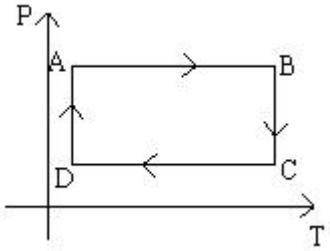
2)



3)



4)



27. 3 equal resistors connected in series across a source of emf together dissipate 10 watt of power. If they are all connected in parallel to the same source of emf, the power disspated is --------

1) 30 w 2) $\frac{10}{3}$ w 3) 10 w 4) 90 w

28. One end of a long metallic wire of length L is tied to the ceiling. The other end is tied to massless spring of spring constant k. A mass (m) hanges freely from the free end of the spring. The area of cross-section and Young`s modulus of the wire are A and Y. If mass is slightly pulled down and replaced, it will oscillate with time period T is -------

1) $2\pi\sqrt{\frac{m}{k}}$ 2) $2\pi\sqrt{\frac{m(YA+KL)}{YAK}}$ 3) $2\pi\sqrt{\frac{mYA}{KL}}$ 4) $2\pi\sqrt{\frac{mL}{YA}}$

Passage-I:

A beam of light containing of two wavelengths 6500^0A and 5200^0 A, is used to obtain interference fringes in young`s double slit experiment. The distance between the slits is 2 mm and the distance between the plane of slits and the screen is 120 cm .

29. Find the distance of third bright fringe on the screen from the central maximum for wavelength 6500^0A.

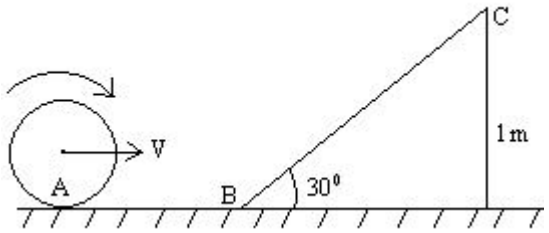
1) 1.17 x 10^{-3} m 2) 1.56 x 10^{-3} m 3) 1.17 x 10^{-4} m 4) 1.56 x 10^{-4} m

30. What is the least distance from the central maximum where the bright fringes due to both wavelengths coincide.

1) 1.17 x 10^{-3} m 2) 1.56 x 10^{-3} m 3) 1.17 x 10^{-4} m 4) 1.56 x 10^{-4} m

Passege-II :

A small sphere of mass 1 kg is rolling without slipping with linear speed $v = \sqrt{\frac{200}{7}}$ m/sec. It leaves the inclined plane at point C.



31. Its linear speed at point C

1) $\sqrt{\frac{100}{7}}$ m/sec 2) $\sqrt{\frac{50}{7}}$ m/sec 3) $\sqrt{\frac{100}{35}}$ m/sec 4) $\sqrt{\frac{200}{35}}$ m/sec

32. The ratio of rotational and translational kinetic energy of sphere when it strikes the ground after leaving from point C.

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

33. **Assertion :** The work done by the tension in the string of a simple pendulum in one complete oscillation is zero

Reason : No work is done by the tension in the string since tension is always at right angles to the motion of the bob.

1) Both `A` and `R` are true and `R` is correct explanation of `A`

2) Both `A` and `R` are true and `R` is not the correct explanation of `A`.

3) `A` is true and `R` is false 4) `A` is false and `R` is true

34. **Assertion :** A wooden cube of side `a` floats in a non-viscous liquid of density `$\rho$`. When it is slightly pressed and released it executes SHM.

Reason : The net force responsible for SHM is the resultant of buoyancy force and true weight of the body.

1) Both `A` and `R` are true and `R` is correct explanation of `A`

2) Both `A` and `R` are true and `R` is not correct explanation of `A`

3) `A` is true and `R` is false 4) `A` is false and `R` is true

35. An electron in an atom jumps in such a way that its kinetic energy changes from x to $\frac{x}{4}$. The change in potential energy will be:

1) $+\frac{3}{2}x$ 20 $-\frac{3}{8}x$ 3) $+\frac{3}{4}x$ 4) $-\frac{3}{4}x$

36. The ionization potential for the electron in the ground state of the hydrogen atom is 13.6 eV atom^{-1}. Whatwould be the ionization potential for the electron in the first excited state of Li^{2+}?

1) 3.4 eV 2) 10.2 eV 3) 30.6 eV 4) 6.8 eV

37. 2 mole of zinc is dissolved in HCl at 25^{0}C. The work done in open vessel in:

1) -2.477 kJ 2) -4.955 kJ 3) 0.0489 kJ 4) None

38. $\triangle S$ for freezing of 10 g of $H_2O(l)$ (enthalpy of fusion is 80 cal/g) at 0^{0}C and 1 atm is:

1) 12.25 J/K 2) -0.244 J/K 3) -2.93 J/K 4) -12.25 J/K

39. For an elementary reaction $2A+B \rightarrow A_2B$ if the volume of vessel is quikly reduced to half of it's original volume then rate of reaction will

1) unchange 2) increase for four times 3) increase eight times 4) decrease eight time

40. The decomposition of azo methane, at certain temperature according to the equation $(CH_3)_2N_2 \rightarrow C_2H_6+N_2$ is a first order reaction. After 40 minutes from the start, the total pressure developed is found to be 350 mm Hg in place of initial pressure 200 mm Hg of azo methane. The value of rate constant k is;

1) 2.88×10^{-4} sec^{-1} 2) 1.25×10^{-4} sec^{-1} 3) 5.77×10^{-4} sec^{-1} 4) None of these

41. What is $\left[NH_4^+\right]$ in a solution that contain 0.02 M NH_3 $\left(K_b = 1.8\times10^{-5}\right)$ and 0.01 M KOH?

1) 9×10^{-6} 2) 1.8×10^{-5} 3) 3.6×10^{-5} 4) None of these

42. Which of the following pair the EAN of central metal atom is not same?

1) $\left[Fe(CN)_6\right]^{3-}$ and $\left[Fe(NH_3)_6\right]^{3+}$ 2) $\left[Cr(NH_3)_6\right]^{3+}$ and $\left[Cr(CN)_6\right]^{3-}$

3) $\left[FeF_6\right]^{3-}$ and $\left[Fe(CN_6)\right]^{3-}$ 4) $\left[Ni(CO)_4\right]$ and $\left[Ni(CN)_4\right]^{2-}$

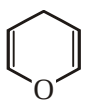
43. Froth floatation process for the concentration of sulphide ores is an illustration of the practical application of:

1) adsorption 2) absorption 3) sedimentation 4) coagulation

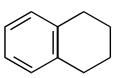
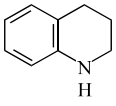
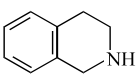
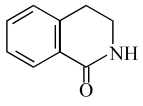
44. Which of the following compounds liberate(s) oxygen on heating?

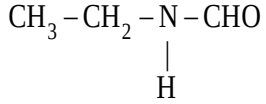
1) Li_2CO_3 2) LiOH 3) $LiNO_3$ 4) NaOH

45. Which of the following is a cyclic ether possessing the characteristics of aromatic compounds?

1)  2)  3)  4) 

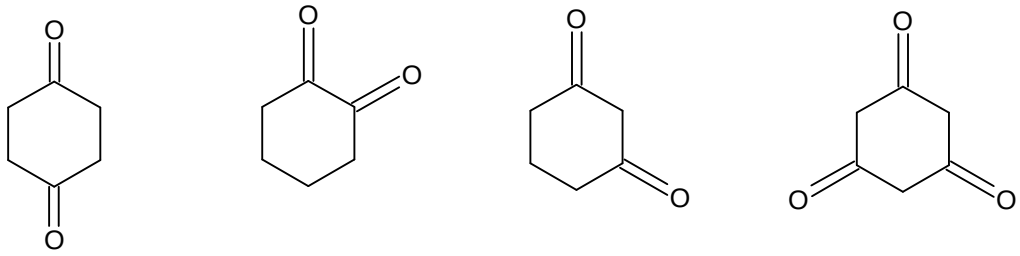
46. Which one of the following compounds undergoes bromination of its aromatic ring (electrophilic aromatic substitution) at the fastest rate?

1)  2)  3)  4) 

47. IUPAC name of  is

1) N-ethyl aminoethanol
2) N-formyl aminoethane
3) N-ethyl methanamide
4) ethanaminal

48. Which of the following will give more enol contents?



(I) (II) (III) (IV)

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

49. In the given reaction $C_6H_5-C\equiv C-CH_3 \xrightarrow{Na/NH_3(l)}$ [X]..... [X] will be

1)1-phenylpropane 2)1-phenylpropene 3) trans-1-phenyl propene 4) cis-1-phenylpropene

50. Which pair of species will have similar geometry

1) $SO_3.SO_3^{2-}$ 2) $SO_3.SO_4^{2-}$ 3) $SO_3.CO_3^{2-}$ 4) $SO_4^{2-}.CO_3^{2-}$

51. Which of the following order regarding bond order is correct?

1) $O_2^- < O_2 < O_2^+$ 2) $O_2^- > O_2 > O_2^+$ 3) $O_2^- > O_2 < O_2^+$ 4) $O_2^- < O_2 > O_2^+$

52. The second ionisation potentials of the following elements are in the order

1) F>O>N>C 2) C>N>O>F 3) O>F>N>C 4) O>N>F>C

53. Which of the following is an outer orbital complex?

1) $\left[Fe(CN)_6\right]^{4-}$ 2) $\left[Mn(CN)_6\right]^{4-}$ 3) $\left[Co(NH_3)_6\right]^{3+}$ 4) $\left[Ni(NH_3)_6\right]^{2+}$

54. H_2S gas when passed through a solution of cations containing HCl precipitates the cations of second group of qualitative analysis but not those belonging to the fourth group. It is because

1) presence of HCl decreases the sulphide ion concentration
2) solubility product of group II sulphides is more than that of group IV sulphides
3) presence of HCl increases the sulphide ions concentration
4) sulphides of group IV cations are unstable in HCl.

55. The density of a pure sybstance 'A' whose atoms pack in cubic close pack arrangement is 1 g/cc. If B atoms can occupy tetrahedral void and if all the tetrahedral voids are occupied by 'B' atom. What is the density of resulting solid in g/cc. [Atomic mass (A)=30 g/mol and atomic mass (B)=50 g/mol]

1) 3.33 2) 4.33 3) 2.33 4) 5.33

56. How many gm of solid KOH must be added to 100 mL of a buffer solution?
Which is 0.1 M each with respect to acid HA and salt K A to make the pH of solution 6.0.

[Given: $pK_a(HA) = 5$]

1) 0.458 2) 0.327 3) 5.19 4) None of these

57. The correct sequence of polarity of the following molecule

a) Benzene b) Inorganic Benzene c) PCl_3F_2 d) PCl_2F_3

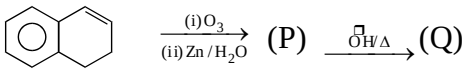
	a	b	c	d		a	b	c	d
1)	P	NP	NP	P	2)	NP	NP	NP	P
3)	NP	P	NP	P	4)	NP	P	P	NP

(Where, P=polar, NP=non-polar)

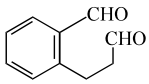
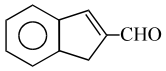
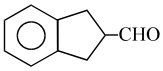
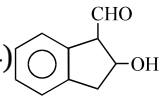
58. Consider the following complex: $[Co(NH_3)_5CO_3]ClO_4$ The coordination number, oxidation number, number of d-electrons and number of unpaired d-electrons on the metal are respectively:

1) 6,2,7,3 2) 7,2,7,1 3) 5,3,6,4 4) 6,3,6,0

59. Consider the following



(P) (Q) compound(Q) is

1)  2)  3)  4) 

60. Which of the following order are correct ?

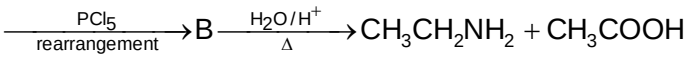
(I) Acidity order : o-nitrobenzoic acid > p-nitrobenzoic acid > m-nitrobenzoic acid

(II) Basicity order : NH_2—> EtO—> OH—> RCOO—> Cl—

(III) Heat of hydrogenation: cis-2-butene > trans-2-butene

(IV) Ease of decarboxylation : = $C_6H_5COCOOH$ =

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

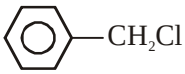
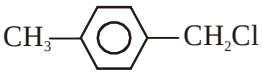
61. Organic compound (A) 

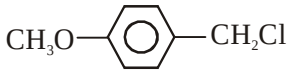
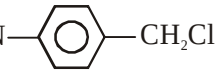
The compound A is:

1) Syn-ethylmethyl ketoxime 2) Anti-Ethyl methyl ketoxime

3) N-Methyl propionamide 4) N-Ethyl acetamide

62. Consider the following chlorides

A)  B) 

C)  D) 

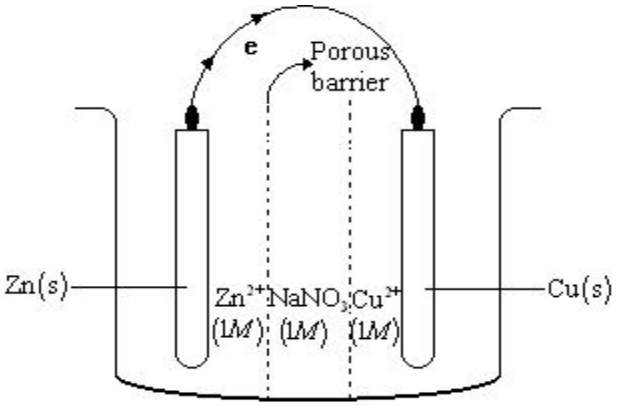
The order of reactivity of A, B, C and D towards hydrolysis by S_N1 mechanism is

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

Passage-I:

A Galvanic cell consist of three compartments as shown in figure. The first compartment contain $ZnSO_4$(1M) and III compartment contain $CuSO_4$(1M). The mid compartment contain $NaNO_3$(1M). Each. compartment contain 1 L solution:

$$E^o_{Zn^{2+}/Zn} = -0.76;\quad E^o_{Cu^{2+}/Cu} = +0.34$$



63. The concentration of Zn^{2+} in first compartment after passage of 0.1 F charge will be:

1) 1 M 2) 1.05 M 3) 1.025 M 4) 0.5 M

64. The concentration of NO_3^- in mid compartment after passage of 0.1 F of charge will be:

1) 0.95 M 2) 0.90 M 3) 0.975 M 4) 0.5 M

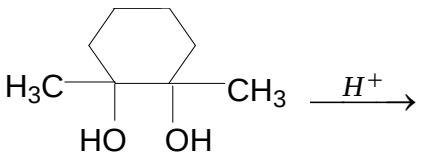
65. The concentration of SO_4^{2-} ion in III compartment will be:

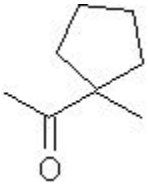
1) 1.05 M 2) 1.025 M 3) 0.95 M 4) 0.975 M

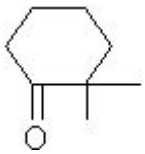
Passage-II:

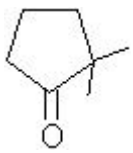
The pinnacol rearrangements is formally a dehydration. The reaction is acid catalysed, and the first step is protonation of one of the hydroxyl oxygens. Loss of water gives a tertiary carbocation, as expected for any tertiary alcohol. Migration of Methyl group places the positive charge on the carbon atom bearing the second $-OH$ group, where oxygen's non-bonding electrons help to stabilize the charge through resonance. This extra stability is the driving force for the rearrangement. Deprotonation of the resonance stabilized cation gives the product, pinnacolone.

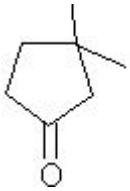
66. Which of the following is a major product of the reaction :



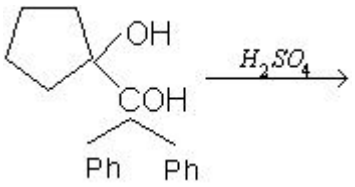
1) 

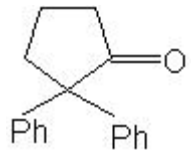
2) 

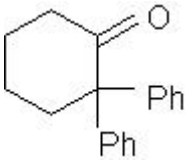
3) 

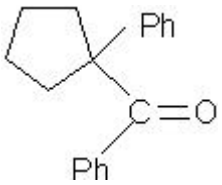
4) 

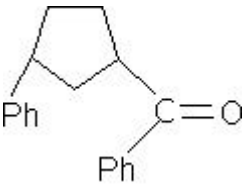
67. Predict the major product of the reaction:



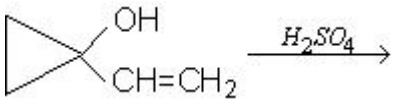
1) 

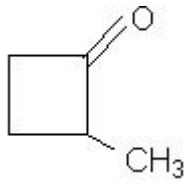
2) 

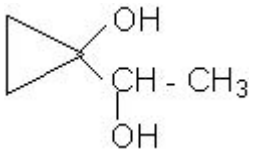
3) 

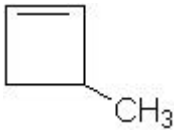
4) 

68. The major product of the following reaction would be:



1) 

2) 

3) 

4) All

MATHEMATICS

69. If f:R $\rightarrow$ R is real valued function given by $f(x)=\left|x^2-4|x|+12\right|$, then f(x) =a. Which of the following is not true

1) has two distinct real roots if a>12
2) has four distinct real roots it 12>a>8
3) can have at most 8 real roots
4) have sum of real roots to be zero, if a<4

70. The number of 4 digit numbers that can be formed with non-zero digit in which no two consecutive digits are same is__

1) $3^2\times 2^9$
2) $3^2\times 2^6$
3) $3^3\times 2^4\times 7$
4) $3^2\times 2\times 7$

71. The area of the region of the argand plane discribed by the z satisfying, $\frac{\pi}{6}\le Argz\le\frac{2\pi}{3}$ and $3\le|z|\le 5$ is

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

72. A normal to the parabola $y^2=4ax$ with slope m touches the rectangular hyperbola $x^2-y^2=a^2$ if

1) $m^6+4m^4-3m^2+1=0$
2) $m^6-4m^4+3m^2-1=0$
3) $m^6+4m^4+3m^2+1=0$
4) $m^6-4m^4-3m^2+1=0$

73. Let A and B be two sets. If $A\cap X=B\cap X=\phi$ and $A\cup X=B\cup X$ for some set x then

1) A=B
2) $A\subset B$
3) $B\subset A$
4) none

74. If $\frac{a+bx}{a-bx}=\frac{b+cx}{b-cx}=\frac{c+dx}{c-dx}(x\neq 0)$, then a,b,c and d are in

1) AP 2) GP 3) HP 4) none

75. Let N denote teh set of all natural numbers and R be the relation an NxN defined by (a,b) R (c,d) if ad(b+c)=bc(a+d), then R is

1) Symmetric only 2) Reflexive only 3) Transitive only 4) An equivalance relation

76. The equation $\cos^8 x+b\cos^4 x+1=0$ will have a solution if 'b' belongs to

1) $(-\infty,2)$ 2) $[2,\infty)$ 3) $(-\infty,-2]$ 4) $(-2,2)$

77. Let $f(n)=2\cos nx\ \forall n\in N$, then $f(1)f(n+1)-f(n)$ is equal to

1) f(n+3) 2) f(n+2) 3) f(n+1) f(2) 4) f(n+2) f(2)

78. If vectors $\bar{a}$ and $\bar{b}$ are two adjacet sides of a paralallogram then the vector representing the altitude of the parallologram which is perpendicular to $\bar{a}$ is

1) $\bar{b}+\frac{\bar{b}\times\bar{a}}{|\bar{a}|^2}$ 2) $\frac{\bar{a}\cdot\bar{b}}{|\bar{b}|^2}\bar{b}$ 3) $\bar{b}-\frac{\bar{b}\cdot\bar{a}}{|\bar{a}|^2}\bar{a}$ 4) $\frac{\bar{a}\times(\bar{b}\times\bar{a})}{|\bar{a}|^2}$

79. The value of 'a' so that the volume of the parallelopriped formed by the vectors $i+aj+k$, $j+ak$ and $ai+k$ is minium is

1) $\sqrt{3}$ 2) $\frac{1}{\sqrt{3}}$ 3) 3 4) 0

80. The points on y-axis whose perpendicular distance from the line 4x-3y-12=0 is 3 are

1) (0,1), (0,-9) 2) (0,1), (0,9) 3) (1,0), (-9,0) 4) none

81. Statement1: The sum of coefficients in the expansion of $\left(3^{-x/4}+3^{5x/4}\right)^n$ is 2^n

Statement2: The sum of coefficient in the expansion of $(x+y)^n$ is 2^n when we put x=y=1

1) Both the statements are true and statement2 is the correct explanation of statement1
2) Both the statements are true and statement2 is the not correct explanation of statement1
3) Statement1 is true, statement2 is false
4) Statement1 is false, statement2 is true

82. If $f(x)=\max\left\{\sin x,\cos x,\frac{1}{2}\right\}$, then the number of critical points in the $(O,2\pi)$

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

83. Consider the sequence 1,2,2,4,4,4,4,8,8,8,8,8,8,8,8,.....then 2011th term will be

1) 2^9 2) 2^{11} 3) 2^{10} 4) 20^{12}

84. The shortest distance from the plane $12x+4y+3z=327$ to the sphere

$x^2+y^2+z^2+4x-2y-6z=155$ is

1) 39 2) 26 3) $11\frac{4}{13}$ 4) 13

85. The area bounded by circle $x^2 + y^2 = 4$, curve $y = \left[\sin^2 \frac{x}{4} + \cos\frac{x}{4}\right]$, where [ ] denotes the greatest integer function less or equal to x and the x-axis is

1) $\frac{\pi}{3} + \sqrt{3}$ sq.units 2) $\frac{2\pi}{3} + \sqrt{3}$ sq.units 3) $\frac{\pi}{4} + \sqrt{3}$ sq.units 4) none

86. The value of $\sum_{r=1}^{\infty} \cot^{-1}\left(r^2 + \frac{3}{4}\right)$ equal to

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

87. The sum $\int_{-3}^{-7} Tan\left(x^2 - 6\right)dx + \int_{-6}^{-2} Tan\left(x^2 + 18x + 75\right)dx$

1) 0 2) 1 3) 2 4) none

88. $\underset{\theta\to 0}{Lt}\left\{\left[\frac{2011\sin\theta}{\theta}\right] + \left[\frac{2010Tan\theta}{\theta}\right]\right\}$, where [x] denotes G.I.F $\leq$ x, is equal to___

1) 4020 2) 4021 3) 4019 4) 2010

89. If t_1 and t_2 are roots of the equation $t^2 + \lambda t + 1 = 0$, where λ is an arbitrary constant, then the line joining the points $\left(at_1^2, 2at_1\right)$ and $\left(at_2^2, 2at_2\right)$ always passes through a fixed point whose coordinates are

1) (a, 0) 2) (0, 0) 3) (-a, 0) 4) (a, a)

90. The mean and variance of 7 observations are 8 and 16 respectively. If five of them are 2,4,10,12,14 then the remaining two observations are

1) 6,8 2) 6,9 3) 8,9 4) 3.6

91. The plane $lx + my = 0$ is rotated about its line of intersection with the plane z=0 through an angle α. The equation of the plane in the new position is

1) $lx + my \pm z\sqrt{l^2 + m^2}Tan\alpha = 0$. 2) $lx + my \pm z\sqrt{l^2 - m^2}Tan\alpha = 0$

3) $lx + my \pm z\sqrt{l^3 - m^3}Tan\alpha = 0$ 4) $lx + my \pm z\sqrt{l^3 + m^3}Tan\alpha = 0$

92. If f(x) is continuous such that $|f(x)| \leq 1 \ \forall x \in R$ and $g(x) = \frac{e^{f(x)} - e^{|f(x)|}}{e^{f(x)} + e^{|f(x)|}}$, then range of g(x) is

1) [0, 1] 2) $\left[0, \frac{e^2+1}{e^2-1}\right]$ 3) $\left[0, \frac{e^2-1}{e^2+1}\right]$ 4) $\left[\frac{1-e^2}{1+e^2}, 0\right]$

93. Let A and B be the sets {1,2,3,.....10} and {1,2,.....20} respectively. A function is selected randomly from A to B the probability that the function is non-decreasing is

1) $\frac{20c_{10}}{(20)^{10}}$ 2) $\frac{29c_{20}}{(20)^{10}}$ 3) $\frac{29c_{19}}{(20)^{10}}$ 4) none

94. The value of $\left[\sin^{-1}(\sin 5)+\cos^{-1}(\cos 10)+\tan^{-1}(\tan(-6))+\cot^{-1}(\cot(-10))\right]$ is ([.] denotes greatest integer function)

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

95. The value of $C_3+C_7+C_{11}+\ldots\ldots\ldots$ is (C_0, C_1, C_2,.....denotes binomial coefficiants)

1) $\frac{1}{2}\left(2^{n-1}-2^{n/2}\sin\frac{n\pi}{4}\right)$ 2) $\frac{1}{2}\left(2^{n-1}+2^{n/2}\sin\frac{n\pi}{4}\right)$

3) $\frac{1}{4}\left(2^{n+1}-2^{n/2}\sin\frac{n\pi}{4}\right)$ 4) none

96. If α is a root of the equation $x^2-20x+64=0$ and $\alpha=e^{\left(1+|\cos\theta|+\cos^2\theta+|\cos^2\theta|+\cos^4\theta+\ldots\ldots\ldots\ldots\infty\right)\log_e^4}$

1) $\frac{\pi}{3},\frac{2\pi}{3}$ only 2) $\frac{\pi}{3},\frac{\pi}{2},\frac{2\pi}{3}$ only 3) $\frac{\pi}{6},\frac{\pi}{2},\frac{5\pi}{6}$ only 4) $\frac{\pi}{3},\frac{\pi}{2}$ only

97. A square ABCD of diagonal is folded along the diagonal AC, so that plane DAC, BAC are right angles. Then shortest distance between DC and AB is

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

98. A point P moves inside a triangle formed by A(0,0), B(1, $\sqrt{3}$), C(2,0) such that min{PA, PB, PC}=1, then the area bounded by the curve traced by P is

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

99. If $f(x)=x+\int_0^1\left(xy^2+x^2y\right)f(y)\,dy$, then f(x) attains an minimum at

1) $x=9/8$ 2) x=-9/8 3) x=0 4) x=1

100. If exactly one root of the equation $x^2-(k-1)x+k(k+4)=0$ lies between the roots of the equation $x^2-(k+3)x+k+2=0$ then

1) $k\in(-6-3)$ 2) (3, 6) 3) $k\in[-3,1]$ 4) $[1,6]$

101. If $f(x)=\begin{vmatrix}4\sin^2 x & 1 & 1\\ (1-\sin x)^2 & (2+\sin x)^2 & (1-\sin x)^2\\ (1+\sin x)^2 & (1+\sin x)^2 & \sin^2 x\end{vmatrix}$ then $\int_{-\pi/2}^{\pi/2}f(x)\,dx+k\pi=0$ then k is____

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

102. If a>0, b>0 and a+b=1 then the least value of $\left(a+\frac{1}{a}\right)^2+\left(b+\frac{1}{b}\right)^2$ is

1) 8 2) 12 3) $\frac{25}{2}$ 4) $\frac{17}{2}$