



PAPER CODE	0	1	C	T	3	1	4	0	6	7
FORM NUMBER										

CLASSROOM CONTACT PROGRAMME
(ACADEMIC SESSION 2014-2015)

TARGET : JEE (Main) 2015

LEADER & ENTHUSIAST COURSE : SCORE

ALLEN JEE (Main) TEST

DATE : 18 - 03 - 2015

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.
कृपया इन निर्देशों को ध्यान से पढ़ें। आपको 5 मिनट विशेष रूप से इस काम के लिए दिये गये हैं।

IMPORTANT INSTRUCTIONS

Do not open this Test Booklet until you are asked to do so.

1. Immediately fill in the form number on this page of the Test Booklet with **Blue/Black Ball Point Pen**. Use of pencil is strictly prohibited.
2. The candidates should not write their Form Number anywhere else (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 **360**.
5. There are **three** parts in the question paper A,B,C consisting of **Physics, Chemistry and Mathematics** having **30 questions** in each part of equal weightage. Each question is allotted 4 (four) marks for **correct** response.
6. **One Fourth** mark will be deducted for indicated incorrect response of each question. **No deduction** from the total score will be made if no response is indicated for an item in the Answer Sheet.
7. Use **Blue/Black Ball Point Pen only** for writing particulars/markings responses on **Side-1** and **Side-2** of the Answer Sheet.
Use of pencil is strictly prohibited.
8. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone any electronic device etc, except the Identity Card inside the examination hall/room.
9. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
10. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Room/Hall. **However, the candidate are allowed to take away this Test Booklet with them.**
11. **Do not fold or make any stray marks on the Answer Sheet.**

महत्वपूर्ण निर्देश

इस परीक्षा पुस्तिका को तब तक न खोलें जब तक कहा न जाए।

1. परीक्षा पुस्तिका के इस पृष्ठ पर आवश्यक विवरण **नीले/काले बॉल पाइंट पेन** से तत्काल भरें। **पेन्सिल का प्रयोग बिल्कुल वर्जित है।**
2. परीक्षार्थी अपना फार्म नं. (निर्धारित जगह के अतिरिक्त) परीक्षा पुस्तिका / उत्तर पत्र पर कहीं और न लिखें।
3. परीक्षा की अवधि **3 घंटे** है।
4. इस परीक्षा पुस्तिका में **90** प्रश्न हैं। अधिकतम अंक **360** हैं।
5. इस परीक्षा पुस्तिका में तीन भाग A, B, C हैं, जिसके प्रत्येक भाग में **भौतिक विज्ञान, रसायन विज्ञान एवं गणित के 30 प्रश्न** हैं और सभी प्रश्नों के अंक समान हैं। प्रत्येक प्रश्न के **सही** उत्तर के लिए 4 (चार) अंक निर्धारित किये गये हैं।
6. प्रत्येक गलत उत्तर के लिए उस प्रश्न के कुल अंक का **एक चौथाई अंक** काटा जायेगा। उत्तर पुस्तिका में कोई भी उत्तर नहीं भरने पर कुल प्राप्तांक में से **ऋणात्मक अंकन** नहीं होगा।
7. उत्तर पत्र के **पृष्ठ-1** एवं **पृष्ठ-2** पर वांछित विवरण एवं उत्तर अंकित करने हेतु केवल **नीले/काले बॉल पाइंट पेन** का ही प्रयोग करें।
पेन्सिल का प्रयोग सर्वथा वर्जित है।
8. परीक्षार्थी द्वारा परीक्षा कक्ष / हॉल में परिचय पत्र के अलावा किसी भी प्रकार की पाठ्य सामग्री मुद्रित या हस्तलिखित कागज की पर्चियों, पेजर, मोबाइल फोन या किसी भी प्रकार के इलेक्ट्रॉनिक उपकरणों या किसी अन्य प्रकार की सामग्री को ले जाने या उपयोग करने की अनुमति नहीं है।
9. रफ कार्य परीक्षा पुस्तिका में केवल निर्धारित जगह पर ही कीजिये।
10. परीक्षा समाप्त होने पर, परीक्षार्थी कक्ष/हॉल छोड़ने से पूर्व उत्तर पत्र कक्ष निरीक्षक को अवश्य सौंप दें। **परीक्षार्थी अपने साथ इस परीक्षा पुस्तिका को ले जा सकते हैं।**
11. उत्तर पत्र को न मोड़ें एवं न ही उस पर अन्य निशान लगाएँ।

Corporate Office

ALLEN CAREER INSTITUTE

"SANKALP", CP-6, Indra Vihar, Kota (Rajasthan)-324005

☎ +91-744-2436001 ✉ info@allen.ac.in

www.allen.ac.in

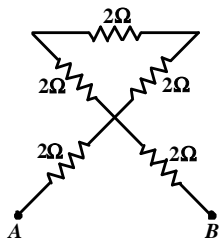
Your Target is to secure Good Rank in JEE 2015

HAVE CONTROL → HAVE PATIENCE → HAVE CONFIDENCE ⇒ 100% SUCCESS

BEWARE OF NEGATIVE MARKING

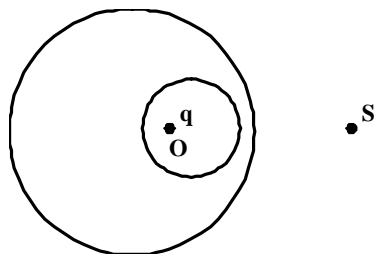
PART A - PHYSICS

1. For the circuit shown in the figure, the equivalent resistance between A and B is :-



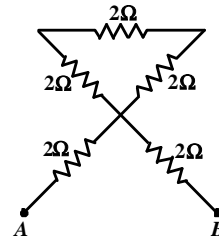
- (1) $10\ \Omega$ (2) $8\ \Omega$ (3) $6\ \Omega$ (4) $4\ \Omega$

2. A charge q is placed at O in the cavity in a spherical uncharged conductor. Point S is outside the conductor. If the charge is displaced from O towards S still remaining within the cavity,



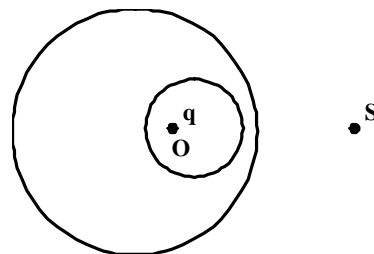
- (1) electric field at S will increase
 (2) electric field at S will decrease
 (3) electric field at S will first increase and then decrease
 (4) electric field at S will not change

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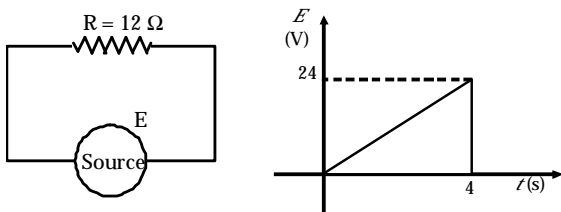
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SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

3. In a thermodynamic process helium gas obeys the law $TP^{-2/5} = \text{constant}$. The heat given to the gas when the temperature of 2 moles of the gas is raised from T to $4T$ (R is the universal gas constant) is :-

- (1) $9 RT$ (2) $18 RT$
(3) zero (4) data insufficient

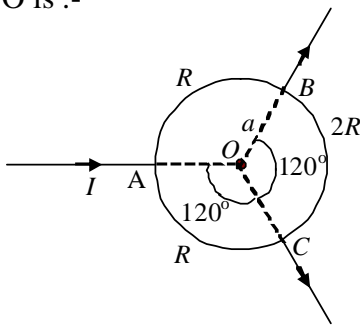
4. A resistance $R = 12 \Omega$ is connected across a source of emf as shown in the figure. Its emf changes with time as shown in the graph. What is the heat developed in the resistance in the first four seconds?



- (1) 72 J (2) 64 J (3) 108 J (4) 100 J

5. The resistances of three parts of a circular loop are as shown in the figure. The magnetic field at the centre O is :-

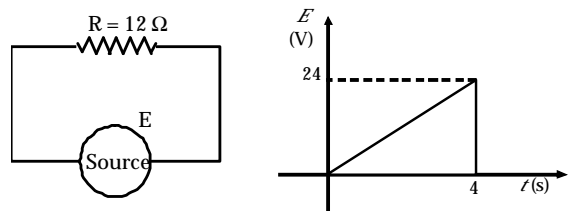
- (1) $\frac{\mu_0 I}{6a}$
(2) $\frac{\mu_0 I}{3a}$
(3) $\frac{2 \mu_0 I}{3 a}$
(4) zero



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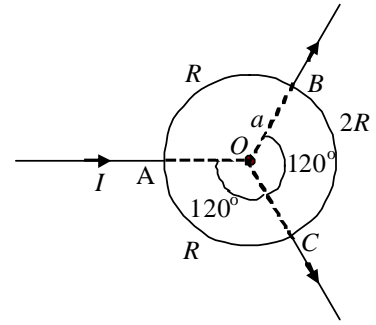
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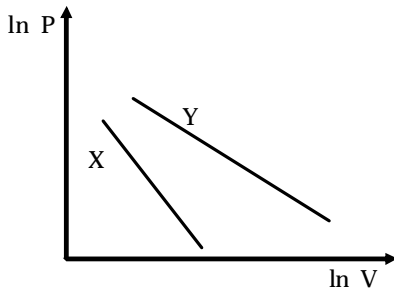
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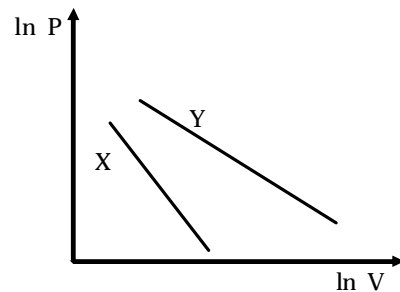
SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

6. Four sources of sound each of sound level 10dB are sounded together, the resultant intensity level will be :-
 (1) 40 dB (2) 26 dB (3) 16 dB (4) 13 dB
7. A plane wave of sound traveling in air is incident upon a plane surface of a liquid. The angle of incidence is 60° . The speed of sound in air is 300 m/s and in the liquid it is 600 m/s. Assume *Snell's law* to be valid for sound waves.
 (1) The wave will refract into liquid away from normal
 (2) The wave refract into liquid towards the normal
 (3) The wave will reflect back into air
 (4) none of these
8. For two different gases X and Y, having degrees of freedom f_1 and f_2 and molar heat capacities at constant volume C_{v_1} and C_{v_2} respectively, for adiabatic process, the $\ln P$ versus $\ln V$ graph is plotted as shown :-



- (1) $f_1 > f_2$ (2) $f_2 > f_1$
 (3) $C_{v_2} = C_{v_1}$ (4) $C_{v_1} > C_{v_2}$

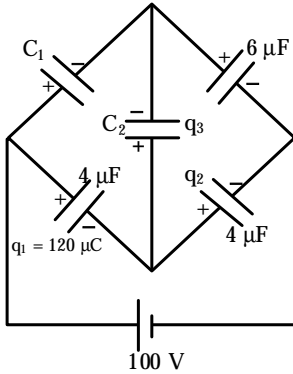
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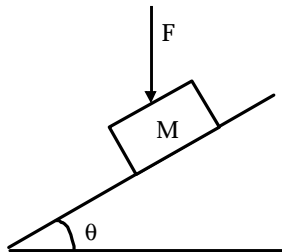
SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

11. In the circuit shown, q_2 and q_3 are respectively (Initially all capacitors are uncharged)



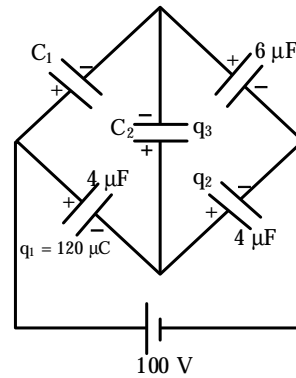
- (1) $q_2 = 120 \mu\text{C}$, $q_3 = 240 \mu\text{C}$
- (2) $q_2 = 280 \mu\text{C}$, $q_3 = -160 \mu\text{C}$
- (3) $q_2 = 120 \mu\text{C}$, $q_3 = \text{zero}$
- (4) It is impossible to find q_2 and q_3 unless C_1 and C_2 are known

12. A block of mass M is sliding down the plane. Coefficient of static friction is μ_s and kinetic friction is μ_k . Then friction force acting on the block is :-



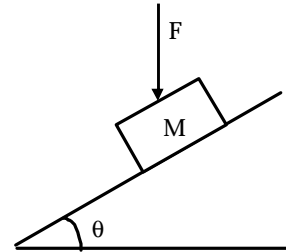
- (1) $\mu_s Mg \cos \theta$
- (2) $(F + Mg) \sin \theta$
- (3) $\mu_k (F + Mg) \cos \theta$
- (4) $(Mg + F) \tan \theta$

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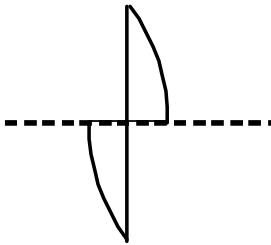
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- (3) $\mu_k (F + Mg) \cos \theta$
- (4) $(Mg + F) \tan \theta$

SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

13. Which of the following statements is correct?

- (1) In case of a wave, traveling in a string, oscillation energy of an elemental length remains constant.
- (2) In case of a wave, traveling in a string, oscillation energy of an elemental length varies periodically.
- (3) In case of a wave, traveling in a string, kinetic energy of all elemental parts having equal length is same.
- (4) none of these

14. An equiconvex lens of focal length f is cut into four equal parts and two parts are placed as shown in figure. The focal length of system shown in figure is :-

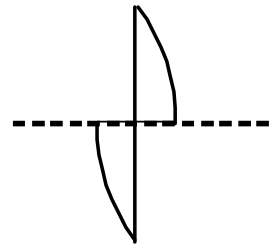


- (1) f
- (2) $2f$
- (3) $f/2$
- (4) $1.5 f$

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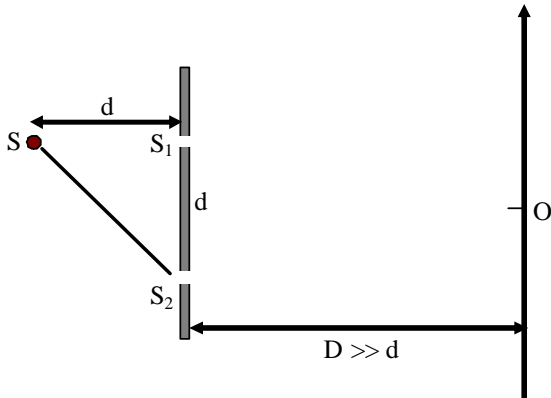
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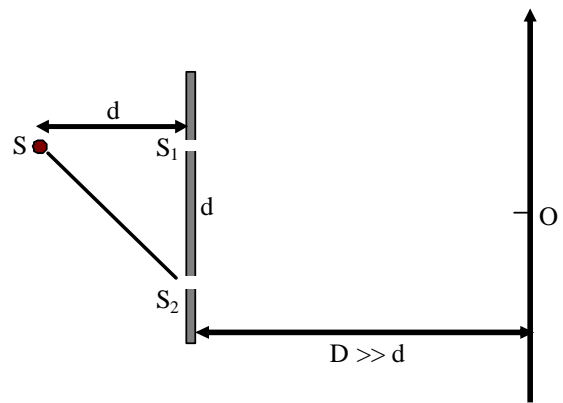
SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

15. To make the central fringe at the centre O, a mica sheet of refractive index 1.5 is introduced. Choose the correct statement :-



- (1) The thickness of sheet is $2(\sqrt{2}-1)d$ in front of S_1
- (2) The thickness of sheet is $(\sqrt{2}-1)d$ in front of S_2
- (3) The thickness of sheet is $2\sqrt{2}d$ in front of S_1
- (4) The thickness of sheet is $(2\sqrt{2}-1)d$ in front of S_1

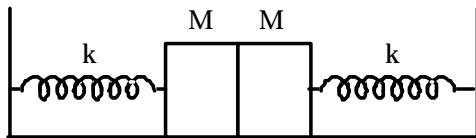
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- (4) The thickness of sheet is $(2\sqrt{2}-1)d$ in front of S_1

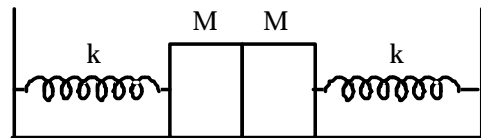
SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

16. The filament current in the electron gun of a Coolidge tube is increased while the potential difference used to accelerate the electrons is decreased. As a result, in the emitted radiation
- (1) the intensity decreases while the minimum wavelength increases
 - (2) the intensity increases while the minimum wavelength decreases
 - (3) the intensity as well as the minimum wavelength increase
 - (4) the intensity as well as the minimum wavelength decrease
17. An assembly of identical spring-mass systems is placed on a smooth horizontal surface as shown. Initially the springs are relaxed. The left mass is displaced to the left while the right mass is displaced to the right and released. The resulting collision is elastic. The time period of the oscillations of the system is :-



- (1) $2\pi \sqrt{\frac{2M}{k}}$
- (2) $2\pi \sqrt{\frac{M}{2k}}$
- (3) $2\pi \sqrt{\frac{M}{k}}$
- (4) $\pi \sqrt{\frac{M}{k}}$

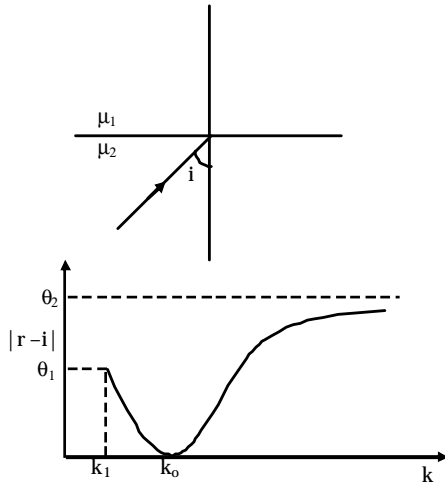
16. फिलामेंट करंट को बढ़ाया जाता है और एक्सीलेरेटिंग वोल्टेज को घटाया जाता है। परिणामस्वरूप, उत्सर्जित विकिरण
- (1) तीव्रता घटती है और न्यूनतम तरंगदैर्घ्य बढ़ता है
 - (2) तीव्रता बढ़ती है और न्यूनतम तरंगदैर्घ्य घटता है
 - (3) तीव्रता और न्यूनतम तरंगदैर्घ्य दोनों बढ़ते हैं
 - (4) तीव्रता और न्यूनतम तरंगदैर्घ्य दोनों घटते हैं
17. , दत्तसंयुक्त प्रणाली को एक चिकनी क्षैतिज सतह पर रखा जाता है। प्रारंभ में, स्प्रिंगें ऋणमूलक हैं। बाएँ द्रव्यमान को बाईं ओर और दाएँ द्रव्यमान को दाईं ओर से हटाया जाता है और छोड़ा जाता है। परिणामी टक्कर प्रत्यास्थ है। प्रणाली के दोलनों का काल है :-



- (1) $2\pi \sqrt{\frac{2M}{k}}$
- (2) $2\pi \sqrt{\frac{M}{2k}}$
- (3) $2\pi \sqrt{\frac{M}{k}}$
- (4) $\pi \sqrt{\frac{M}{k}}$

SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

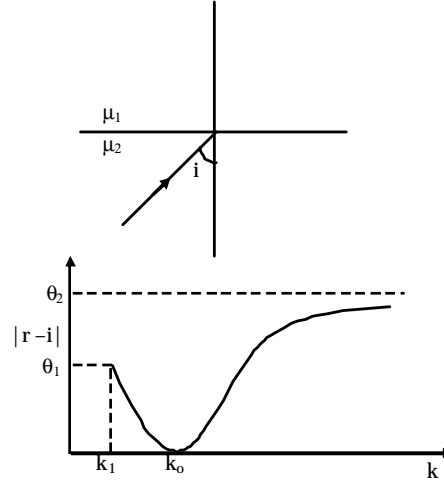
18. The figure shows a ray incident at an angle $i = \pi/3$. If the plot drawn shows the variation of $|r - i|$ versus $\frac{\mu_1}{\mu_2} = k$, (r = angle of refraction) choose the **wrong** alternative.



- (1) the value of k_1 is $\frac{2}{\sqrt{3}}$
- (2) the value of θ_1 is $\pi/6$
- (3) the value of θ_2 is $\pi/3$
- (4) the value of k_0 is 1

19. A radioactive element is disintegrating having half life 6.92 s. The fractional change in number of nuclei of the radioactive element during 10 s is :-
(1) 0.37 (2) 0.63 (3) 0.25 (4) 0.50

18. i n f k f p = e a d f d j . k i = \pi/3 d l s k i j v k f r r g s h g s ; f n i n f k f v k f k |r - i| r f k \frac{\mu_1}{\mu_2} = k , (r = v i o r \tilde{u} d l s k d e / ; i f j o r \tilde{u} n' k z k g s i s y r f o d Y i p f u , \%



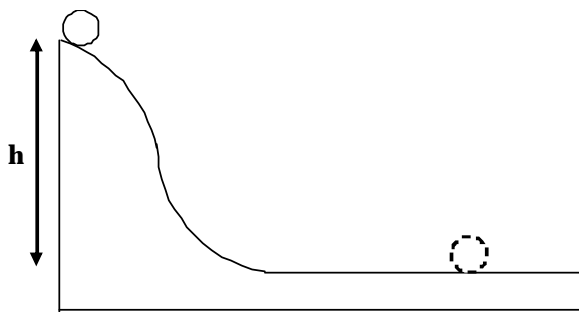
- (1) k_1 d k e u $\frac{2}{\sqrt{3}}$ g s
- (2) θ_1 d k e u $\pi/6$ g s
- (3) θ_2 d k e u $\pi/3$ g s
- (4) k_0 d k e u 1 g s

19. , d j s i f 0 ; r p 6.92 s v 1/2 v k q s f r o f r g s j g s 10 s d n f u j s i f 0 ; r p d s u k h l a d h l a ; k e s h u k e d i f j o r \tilde{u} g s k :-
(1) 0.37 (2) 0.63 (3) 0.25 (4) 0.50

SPACE FOR ROUGH WORK / j Q d k Z d s f y ; s t x g

20. Two sound waves of slightly different frequencies have amplitude ratio $\frac{11}{9}$. What is the difference of sound levels in decibels of maximum and minimum intensities heard at a point :-
 (1) 100 (2) 10 (3) 16 (4) 20

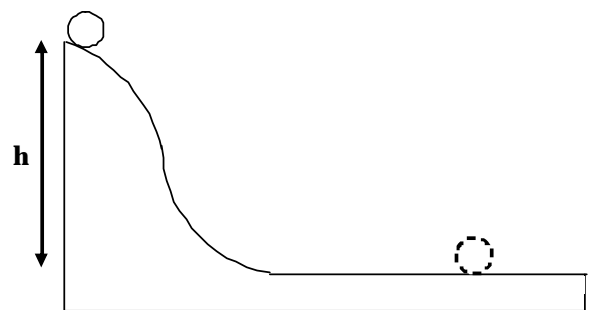
21. An object of mass m is sliding down a hill of arbitrary shape and after traveling a certain horizontal path stops because of friction. The friction coefficient is different for different segments of the entire path but it is independent of the velocity and direction of motion. The work done that a force must perform to return the object to its initial position along the same path would be :-



- (1) zero (2) mgh
 (3) $2 mgh$ (4) none of these

20. Two sound waves of slightly different frequencies have amplitude ratio $\frac{11}{9}$. What is the difference of sound levels in decibels of maximum and minimum intensities heard at a point :-
 (1) 100 (2) 10 (3) 16 (4) 20

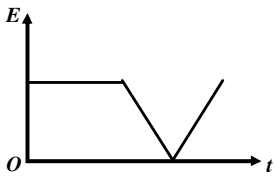
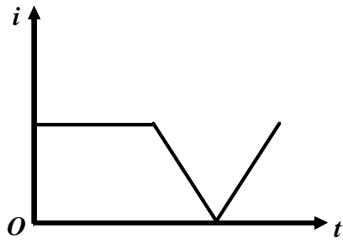
21. An object of mass m is sliding down a hill of arbitrary shape and after traveling a certain horizontal path stops because of friction. The friction coefficient is different for different segments of the entire path but it is independent of the velocity and direction of motion. The work done that a force must perform to return the object to its initial position along the same path would be :-



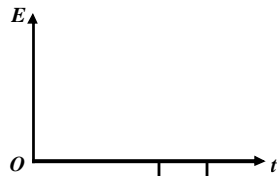
- (1) mgh (2) mgh
 (3) $2 mgh$ (4) $2 mgh$

SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

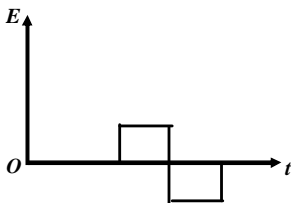
22. The current i in an induction coil varies with time t according to the graph shown in figure. Which of the following graphs shows the induced emf (e) in the coil with time?



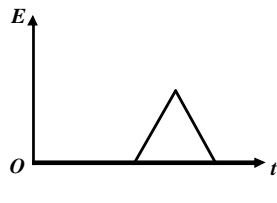
(1)



(2)



(3)



(4)

23. The frequency of K_{α} , K_{β} and L_{α} X-rays of a material are γ_1 , γ_2 and γ_3 respectively. Which of the following relations holds good ?

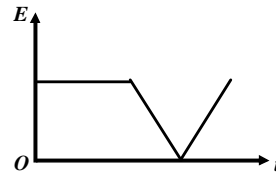
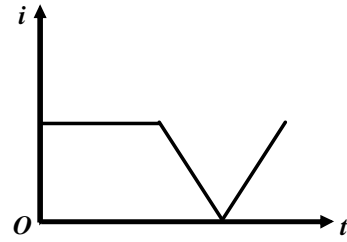
(1) $\gamma_2 = \sqrt{\gamma_1 \gamma_3}$

(2) $\gamma_2 = \gamma_1 + \gamma_3$

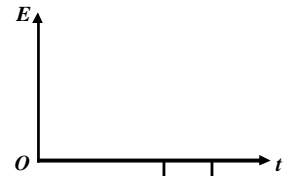
(3) $\gamma_2 = \frac{\gamma_1 + \gamma_3}{2}$

(4) $\gamma_3 = \sqrt{\gamma_1 \gamma_2}$

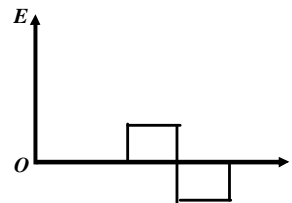
22. The current i in an induction coil varies with time t according to the graph shown in figure. Which of the following graphs shows the induced emf (e) in the coil with time?



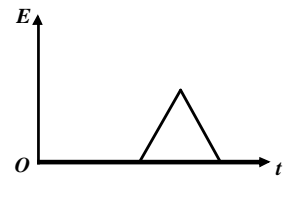
(1)



(2)



(3)



(4)

23. The frequency of K_{α} , K_{β} and L_{α} X-rays of a material are γ_1 , γ_2 and γ_3 respectively. Which of the following relations holds good ?

(1) $\gamma_2 = \sqrt{\gamma_1 \gamma_3}$

(2) $\gamma_2 = \gamma_1 + \gamma_3$

(3) $\gamma_2 = \frac{\gamma_1 + \gamma_3}{2}$

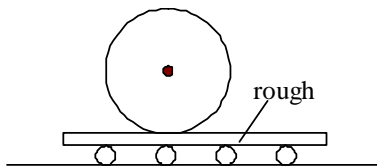
(4) $\gamma_3 = \sqrt{\gamma_1 \gamma_2}$

SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

24. A binary star system consists of two stars one of which has *double* the mass of the other. The stars rotate about their common centre of mass :-

- (1) both the stars have same angular momentum about centre of mass
- (2) star having the smaller mass has larger angular momentum about the centre of mass
- (3) the lighter star has smaller linear speed
- (4) the heavier star has higher kinetic energy

25. The plank in the figure moves a distance 100mm to the right while the centre of mass of the sphere of radius 150 mm moves a distance 75mm to the left. The angular displacement of the sphere (in radian) is (there is no slipping anywhere) :-

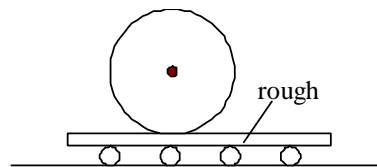


- (1) $\frac{1}{6}$ (2) $\frac{7}{6}$ (3) 1 (4) $\frac{1}{2}$

24. ns rjka s; rjka fudk ea d rjka eku nlys l snuk g; s rjka s; rjka fu' B ae eku d b; l k k rjka d rjka

- (1) ns rjka k; s; eku d b; l k k rjka l os l eku g
- (2) de ae eku o k s rjka eku d b; l k k v f/d d l k l os g
- (3) g d s rjka h j k p k y de g
- (4) H k rjka h v f/d x f r t A t k

25. fp= ea z r [r k r k h v l s 100mm d h r j m r; d j r k g s c f d 150 mm f=T; k o l y s l s k a e eku d b e c k h v l s 75mm d h r j m r; d j r k g s l s d k d l k f o l k u j m u e a g s k ; g j d g a h d k z f o l y u u g a h s :-



- (1) $\frac{1}{6}$ (2) $\frac{7}{6}$ (3) 1 (4) $\frac{1}{2}$

SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

26. The central fringe of the interference pattern produced by light of wavelength 6000 \AA is found to shift to the position of 4th bright fringe after glass plate of refractive index 1.5 is introduced. The thickness of the glass plate would be :

- (1) $4.8 \mu\text{m}$ (2) $8.23 \mu\text{m}$
 (3) $14.98 \mu\text{m}$ (4) $3.78 \mu\text{m}$

27. If $Q = \frac{X^n}{Y^m}$ and ΔX is absolute error in the measurement of X, ΔY is absolute error in the measurement of Y, then absolute error ΔQ in Q is :-

- (1) $\Delta Q = \pm \left(n \frac{\Delta X}{X} + m \frac{\Delta Y}{Y} \right)$
 (2) $\Delta Q = \pm \left(n \frac{\Delta X}{X} + m \frac{\Delta Y}{Y} \right) Q$
 (3) $\Delta Q = \pm \left(n \frac{\Delta X}{X} - m \frac{\Delta Y}{Y} \right) Q$
 (4) $\Delta Q = \pm \left(n \frac{\Delta X}{X} - m \frac{\Delta Y}{Y} \right)$

26. t c 1.5 vi or 6000 \AA okyhdhp dhlysi 4th bright fringe ki fr: i dhudha fya plate ki r g d k h g s d p dhlysi dh elkhgsh:-

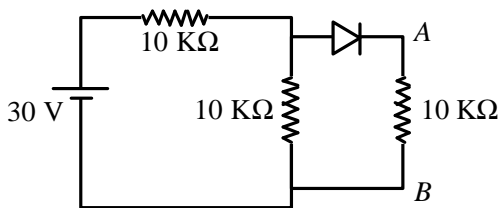
- (1) $4.8 \mu\text{m}$ (2) $8.23 \mu\text{m}$
 (3) $14.98 \mu\text{m}$ (4) $3.78 \mu\text{m}$

27. ; fn $Q = \frac{X^n}{Y^m}$ gsr ΔX , X d sek ue fji ΔX / ; ΔY , Y d sek ue fji ΔY / gsr Q d sek ue fji ΔQ / Q gsh:-

- (1) $\Delta Q = \pm \left(n \frac{\Delta X}{X} + m \frac{\Delta Y}{Y} \right)$
 (2) $\Delta Q = \pm \left(n \frac{\Delta X}{X} + m \frac{\Delta Y}{Y} \right) Q$
 (3) $\Delta Q = \pm \left(n \frac{\Delta X}{X} - m \frac{\Delta Y}{Y} \right) Q$
 (4) $\Delta Q = \pm \left(n \frac{\Delta X}{X} - m \frac{\Delta Y}{Y} \right)$

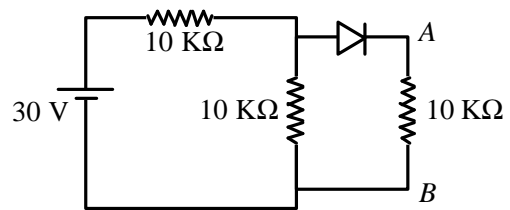
SPACE FOR ROUGH WORK / jQ dk Zdsfy; st xg

28. Water rises to a height of 16.3 cm in a capillary of height 18 cm above the water level. If the tube is cut at a height of 12 cm :-
- (1) water will come as a fountain from the capillary tube
 - (2) water will stay at a height of 12 cm in the capillary tube
 - (3) the height of water in the capillary will be 10.3 cm
 - (4) water will flow down the sides of the capillary tube
29. In the given figure potential difference between A and B is :-



- (1) 0 (2) 5 V (3) 10 V (4) 15 V
30. Thermocouple is an arrangement of two different metal to :-
- (1) convert heat energy into electrical energy
 - (2) produce more heat
 - (3) convert heat energy into chemical energy
 - (4) convert electrical energy into heat energy

28. fd l h 18 cm Å p k z k y h d s k y h e a t y l r j l s Å i j 16.3 cm d h Å p k z r d t y p a k g s ; f n u y h d l s 12 cm Å p k z j l s d l v f n k t k r k s &
- (1) t y d s k y h l s d o o k s d s i e a l j v k x l A
 - (2) t y d s k y h e a t 12 cm Å p k z j : d t k x l A
 - (3) d s k y h e a t y d h Å p k z i 10.3 cm g s l A
 - (4) t y d s k y h d h l k v A s u p s f j u s y x s l A
29. i n f l z f p = e a o B d e / ; f o h o k t j g s k &



- (1) 0 (2) 5 V (3) 10 V (4) 15 V
30. F e l z i y n s v y x & v y x k r u k e h , d , s h o d l f k g s t k s &
- (1) Å " e k Å t k z d l s f o l q Å t k z e i f j o f r z d j r h g s
 - (2) v f / d Å " e k n R l d j r h g s
 - (3) Å " e k Å t k z d l s j k k f u d Å t k z e i f j o f r z d j r h g s
 - (4) f o l q Å t k z d l s Å " e k Å t k z e i f j o f r z d j r h g s

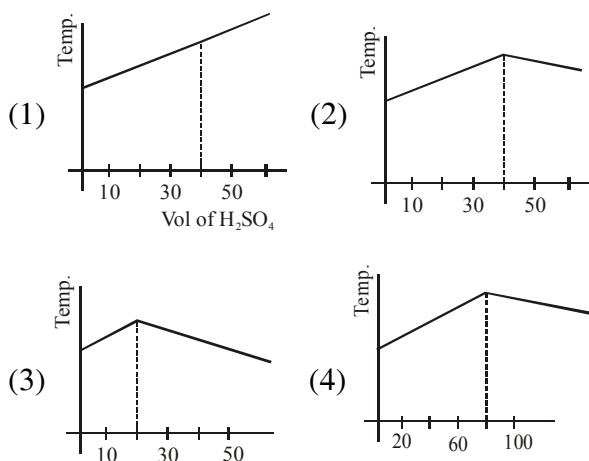
SPACE FOR ROUGH WORK / j Q d k Z d s f y ; s t x g

PART B - CHEMISTRY

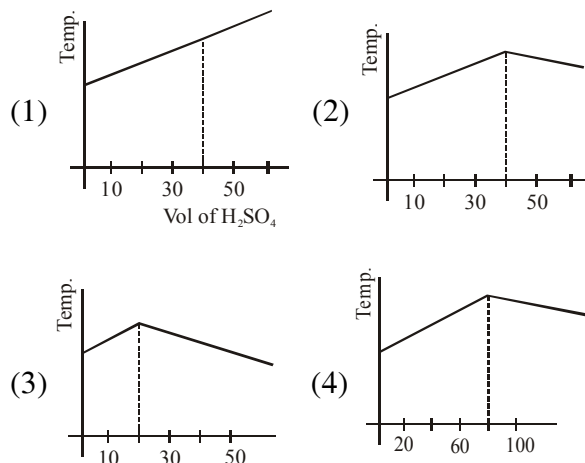
- | | |
|---|--|
| <p>31. Gold number is a measure of</p> <p>(1) Stability of colloidal system
 (2) Coagulating power of a colloid
 (3) Size of colloidal particles
 (4) Efficiency of the protective colloid</p> <p>32. For a first order reaction $A \rightarrow P$ the temperature (T) dependent rate constant (k) was found to follow the equation $\log_{10} k = -(2000) \frac{1}{T} + 6$. Then activation energy equation of reaction will be ($\ln x = 2.3 \times \log x$ and $R = 8 \text{ J/mole-K}$)</p> <p>(1) 9.2 kJ mol^{-1} (2) 16.2 kJ mol^{-1}
 (3) $116.6 \text{ kJ mol}^{-1}$ (4) 36.8 kJ mol^{-1}</p> <p>33. What will be C-H bond enthalpy if</p> <p>$\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}); \Delta H = -890 \text{ kJ}$
 $\text{CO}_2(\text{g}) \rightarrow \text{C}(\text{graphite}) + \text{O}_2(\text{g}); \Delta H = 393 \text{ kJ}$
 $2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{H}_2(\text{g}) + \text{O}_2(\text{g}); \Delta H = 571 \text{ kJ}$
 $2\text{H}_2(\text{g}) \rightarrow 4\text{H}(\text{g}); \Delta H = 871 \text{ kJ}$
 $\text{C}(\text{graphite}) \rightarrow \text{C}(\text{g}); \Delta H = 716 \text{ kJ}$</p> <p>(1) 1663.39 kJ/mol (2) 415.25 kJ/mol
 (3) 917.3 kJ/mol (4) 215.5 kJ/mol</p> <p>34. Two moles of an ideal monoatomic gas are allowed to expand adiabatically and reversibly from 300K to 200K. The work done in the process will be -</p> <p>(1) -12.5 kJ (2) -2.5 kJ
 (3) -625 kJ (4) 500 kJ</p> | <p>31. स्वर्ण संख्या मापन होता है</p> <p>(1) कोलाईडी तंत्र के स्थायित्व का
 (2) कोलाईड की स्कन्दन क्षमता का
 (3) कोलाईडी कण के आकार का
 (4) संरक्षी कोलाइडो की दक्षता का</p> <p>32. प्रथम कोटि अभिक्रिया $A \rightarrow P$ के लिए, ताप (T) पर निर्भर दर नियतांक (k) निम्न समीकरण का अनुसरण करता है $\log k = -(2000) \frac{1}{T} + 6$ तब अभिक्रिया समीकरण की सक्रियण ऊर्जा होगी</p> <p>($\ln x = 2.3 \times \log x$ और $R = 8 \text{ J/mole-K}$)</p> <p>(1) 9.2 kJ mol^{-1} (2) 16.2 kJ mol^{-1}
 (3) $116.6 \text{ kJ mol}^{-1}$ (4) 36.8 kJ mol^{-1}</p> <p>33. C-H बन्ध ऐन्थेल्पी क्या होगी, यदि</p> <p>$\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}); \Delta H = -890 \text{ kJ}$
 $\text{CO}_2(\text{g}) \rightarrow \text{C}(\text{ग्रेफाइट}) + \text{O}_2(\text{g}); \Delta H = 393 \text{ kJ}$
 $2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{H}_2(\text{g}) + \text{O}_2(\text{g}); \Delta H = 571 \text{ kJ}$
 $2\text{H}_2(\text{g}) \rightarrow 4\text{H}(\text{g}); \Delta H = 871 \text{ kJ}$
 $\text{C}(\text{ग्रेफाइट}) \rightarrow \text{C}(\text{g}); \Delta H = 716 \text{ kJ}$</p> <p>(1) 1663.39 kJ/mol (2) 415.25 kJ/mol
 (3) 917.3 kJ/mol (4) 215.5 kJ/mol</p> <p>34. एक आदर्श एकल परमाणुक गैस के दो मोल को 300K से 200K तक रूद्धोष्मीय तथा उत्क्रमणीय रूप से प्रसारित होने दिया गया। प्रक्रम में किया गया कार्य होगा -</p> <p>(1) -12.5 kJ (2) -2.5 kJ
 (3) -625 kJ (4) 500 kJ</p> |
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35. Which of the following statement is correct
- (1) At equilibrium, concentration of reactants and products become constant because forward & backward reaction ceases
 - (2) Addition of catalyst speeds up the forward reaction more then the backward reaction for every reaction
 - (3) Equilibrium constant of an exothermic reaction decreases with increases of temperture
 - (4) K_p is always greater than K_C
36. In an experiment the enthalpy of neutralisation of sodium hydroxide with sulphuric acid, 50cm^3 of 0.4M sodium hydroxide were titrated thermometrically with 0.25M sulphuric acid. Which of the following plots give the most probable correct representation of temperature of solution (initial temperature of NaOH & H_2SO_4 are same).



35. निम्न में से कौनसा कथन सही है
- (1) साम्य पर, क्रियाकारको तथा उत्पादों की सान्द्रता नियत होती है क्योंकि अग्र तथा पश्च् अभिक्रिया रूक जाती है
 - (2) प्रत्येक अभिक्रिया के लिए उत्प्रेरक को मिलाने पर पश्च् अभिक्रिया की तुलना में अग्र अभिक्रिया के वेग में अधिक वृद्धि होती है
 - (3) ताप में वृद्धि के साथ ऊष्माक्षेपी अभिक्रिया का साम्य नियतांक घटता है
 - (4) K_C की तुलना में K_p सदैव उच्च होता है
36. सल्फ्यूरिक अम्ल के साथ सोडियम हाइड्रोक्साइड के उदासीनीकरण की ऐन्थेल्पी, एक प्रयोग में जब 50cm^3 , 0.4M सोडियम हाइड्रोक्साइड को 0.25M सल्फ्यूरिक अम्ल के साथ तापमितीय रूप से अनुमापित किया गया हो, निम्न में से कौनसा वक्र विलयन के ताप का सम्भावित सर्वाधिक सही प्रदर्शन है (NaOH तथा H_2SO_4 के प्रारम्भीक ताप समान है).



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37. Y g of non-volatile organic substance of molecular mass M is dissolved in 250g benzene. Molal elevation constant of benzene is K_b . Elevations in it's boiling point is given by -

- (1) $\frac{M}{K_b Y}$ (2) $\frac{4K_b Y}{M}$
 (3) $\frac{K_b Y}{4M}$ (4) $\frac{K_b Y}{M}$

38. The specific conductivity of a saturated solution of silver chloride is $2 \times 10^{-6} \text{ Scm}^{-1}$ at 25°C . What will be the solubility of silver chloride at 25°C if molar conductivities at infinite dilution of Ag^+ and Cl^- ions are 60 and $80 \text{ Scm}^2\text{mol}^{-1}$ respectively -

- (1) $1.428 \times 10^{-5} \text{ M}$ (2) $2.382 \times 10^{-3} \text{ M}$
 (3) $2.33 \times 10^{-5} \text{ M}$ (4) $4.2 \times 10^{-3} \text{ M}$

39. In a cubic close packing, the unit cell has...

- (1) 4 tetrahedral voids each of which is shared by four unit cells.
 (2) 4 tetrahedral voids within the unit cell
 (3) 8 tetrahedral voids each of the which is shared by four unit cells
 (4) 8 tetrahedral voids within the unit cells

37. आण्विक द्रव्यमान M के एक अवाष्पशील कार्बनिक पदार्थ के Y g को 250g बेंजिन में घोला गया। बेंजिन का मोलल उन्नयन (Elevations) नियतांक K_b है इसके क्वथनांक में उन्नयन को किसके द्वारा दिया जा सकता है -

- (1) $\frac{M}{K_b Y}$ (2) $\frac{4K_b Y}{M}$
 (3) $\frac{K_b Y}{4M}$ (4) $\frac{K_b Y}{M}$

38. सिल्वर क्लोराइड के संतृप्त विलयन की 25°C पर विशिष्ट चालकता $2 \times 10^{-6} \text{ Scm}^{-1}$ है। यदि Ag^+ तथा Cl^- आयनों की अनन्त तनुता पर मोलर चालकताएँ क्रमशः 60 तथा $80 \text{ Scm}^2\text{mol}^{-1}$ है, तो 25°C पर सिल्वर क्लोराइड की विलेयता क्या होगी-

- (1) $1.428 \times 10^{-5} \text{ M}$ (2) $2.382 \times 10^{-3} \text{ M}$
 (3) $2.33 \times 10^{-5} \text{ M}$ (4) $4.2 \times 10^{-3} \text{ M}$

39. एक घनीय बन्द संकुलन में इकाई सैल में

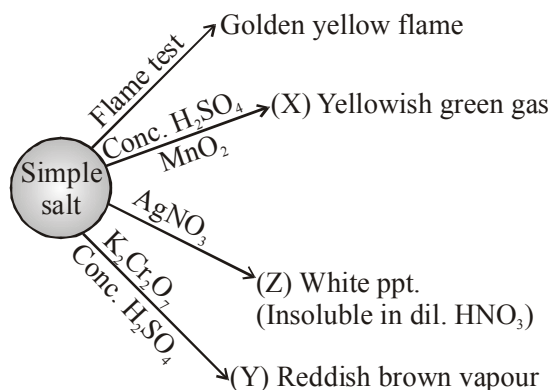
- (1) 4 चतुष्फलकीय रिक्तिकाएँ जिनमें से प्रत्येक को चार इकाई सैलों द्वारा साझीत किया जाता है
 (2) 4 चतुष्फलकीय रिक्तिकाएँ इकाई सैल में है
 (3) 8 चतुष्फलकीय रिक्तिकाएँ जिनमें से प्रत्येक को चार इकाई सैलो द्वारा साझीत किया जाता है
 (4) 8 चतुष्फलकीय रिक्तिकाएँ इकाई सैलों में है

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| <p>40. Select the incorrect option, when a lead storage battery is discharged -</p> <p>(1) SO_2 is evolved</p> <p>(2) Lead sulphate is produced at both electrodes</p> <p>(3) Sulphuric acid is consumed</p> <p>(4) Water is formed</p> <p>41. Which of the following statement is INCORRECT :</p> <p>(1) Mg is present in chlorophyll</p> <p>(2) Alkaline earth metals does not form super oxide with excess of O_2</p> <p>(3) NaHCO_3 is known as baking soda</p> <p>(4) Permanent hardness of water is removed by boiling</p> <p>42. Which of the following carbide on hydrolysis form methane :</p> <p>(1) Be_2C (2) CaC_2</p> <p>(3) SrC_2 (4) Mg_2C_3</p> | <p>40. जब सीसा संचायक सैल को निरावेशित किया जाता है तो निम्न में से कौनसा विकल्प गलत होगा -</p> <p>(1) SO_2 का उत्सर्जन होता है</p> <p>(2) दोनों इलेक्ट्रोडो पर लेड सल्फेट का निर्माण होता है</p> <p>(3) सल्फ्यूरिक अम्ल की खपत होती है</p> <p>(4) जल का निर्माण होता है</p> <p>41. निम्न में से कौनसा कथन गलत है :</p> <p>(1) क्लोरोफिल में Mg उपस्थित होता है</p> <p>(2) क्षारीय मृदा धातु, O_2 के आधिक्य के साथ सुपर ऑक्साइड नहीं बनाते हैं</p> <p>(3) NaHCO_3 को बेकिंग सोडा के रूप में जाना जाता है</p> <p>(4) जल की स्थायी कठोरता को उबाल कर हटाया जाता है</p> <p>42. निम्न में से कौनसा कार्बाइड जलअपघटन पर मेथेन बनाता है :</p> <p>(1) Be_2C (2) CaC_2</p> <p>(3) SrC_2 (4) Mg_2C_3</p> |
|--|---|

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43. Which of the statement is incorrect for the given paragraph

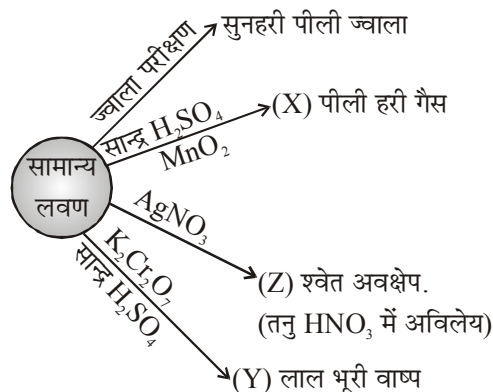


- (1) (X) when reacted with excess of NH_3 then one of the product is explosive in nature
- (2) When (Y) passed in NaOH solution yellow solution is formed
- (3) (Z) does not give chromyl chloride test
- (4) (X) can be formed by oxidation of HCl with O_2 in the presence of CuCl_2 as catalyst

44. Which of the following reaction does not form PCl_3 as one of the product

- (1) Reaction between P_4 & SOCl_2
- (2) Reaction between P_4 & SO_2Cl_2
- (3) Reaction between PH_3 & CaOCl_2
- (4) Reaction between Ag & PCl_5

43. दिये गये अनुच्छेद के सन्दर्भ में, निम्न में से कौनसा कथन गलत है



- (1) जब (X), NH_3 के आधिक्य के साथ क्रिया करता है तो एक उत्पाद, विस्फोटक प्रकृति का निर्मित होता है
- (2) जब (Y) को NaOH विलयन में प्रवाहित किया जाता है तो पीला विलयन बनता है
- (3) (Z) क्रोमाइल क्लोराइड परीक्षण नहीं देता है
- (4) CuCl_2 उत्प्रेरक की उपस्थिति में O_2 के साथ HCl के ऑक्सीकरण द्वारा (X) निर्मित किया जा सकता है

44. निम्न में से कौनसी अभिक्रिया में एक उत्पाद के रूप में PCl_3 , निर्मित नहीं होता है

- (1) P_4 तथा SOCl_2 के मध्य अभिक्रिया
- (2) P_4 तथा SO_2Cl_2 के मध्य अभिक्रिया
- (3) PH_3 तथा CaOCl_2 के मध्य अभिक्रिया
- (4) Ag तथा PCl_5 के मध्य अभिक्रिया

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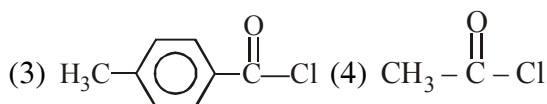
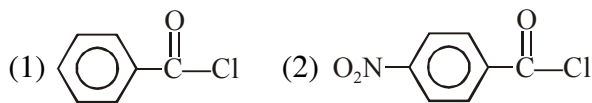
- | | |
|--|--|
| <p>45. Which of the following silver precipitate dissolve in dil. HNO_3 and produce clear solution.</p> <p>(1) AgCl (2) Ag_2S
 (3) AgI (4) Ag_2CO_3</p> <p>46. Which of the following process is not used for the extraction of spelter from zinc blende</p> <p>(1) Smelting
 (2) Distillation
 (3) Roasting
 (4) Froth flotation method</p> <p>47. H_2SO_4 can be dried by :</p> <p>(1) CaCl_2 anhydrous (2) CaO
 (3) P_2O_5 (4) None of these</p> <p>48. Which of the following form cyclic silicones on hydrolysis</p> <p>(1) R_2SiCl_2 (2) R_3SiCl
 (3) RSiCl_3 (4) None of these</p> <p>49. Which of the following complex is tetrahedral as well as diamagnetic</p> <p>(1) $[\text{Ni}(\text{CN})_4]^{2-}$ (2) $[\text{NiCl}_4]^{2-}$
 (3) $[\text{Ni}(\text{CO})_4]$ (4) $[\text{Fe}(\text{CO})_5]$</p> | <p>45. निम्न में से सिल्वर का कौनसा अवक्षेप तनु HNO_3 में विलेय होता है, तथा स्वच्छ विलयन बनाता है</p> <p>(1) AgCl (2) Ag_2S
 (3) AgI (4) Ag_2CO_3</p> <p>46. जिंक ब्लेन्ड से स्पेल्टर के निष्कर्षण के लिये, निम्न में से कौनसे प्रक्रम का प्रयोग नहीं किया जाता है</p> <p>(1) प्रगलन
 (2) आसवन
 (3) भर्जन
 (4) झाग प्लावन विधि</p> <p>47. H_2SO_4 को शुष्क किया जा सकता है :</p> <p>(1) निर्जलीय CaCl_2 द्वारा (2) CaO द्वारा
 (3) P_2O_5 द्वारा (4) इनमें से कोई नहीं</p> <p>48. निम्न में से कौन, जलअपघटन पर चक्रीय सिलिकॉन निर्मित करता है</p> <p>(1) R_2SiCl_2 (2) R_3SiCl
 (3) RSiCl_3 (4) इनमें से कोई नहीं</p> <p>49. निम्न में से कौनसा संकुल चतुष्फलकीय के साथ-साथ प्रतिचुम्बकीय है</p> <p>(1) $[\text{Ni}(\text{CN})_4]^{2-}$ (2) $[\text{NiCl}_4]^{2-}$
 (3) $[\text{Ni}(\text{CO})_4]$ (4) $[\text{Fe}(\text{CO})_5]$</p> |
|--|--|

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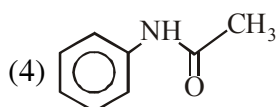
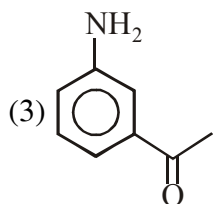
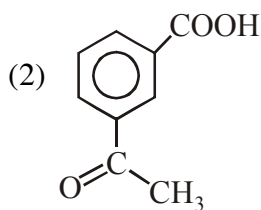
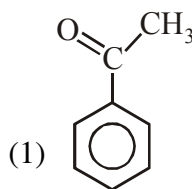
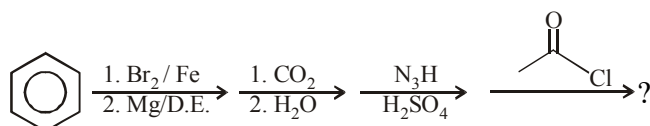
50. The hybridisation and structure of XeF_6 is :

- (1) sp^3d^2 , distorted octahedral
- (2) sp^3d^3 , distorted octahedral
- (3) sp^3d^2 , octahedral
- (4) None of these

51. Which of the following shows fastest rate of hydrolysis :



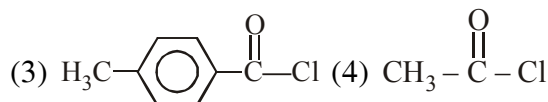
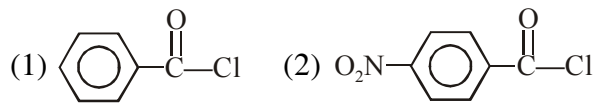
52. The final product of the given sequence is :



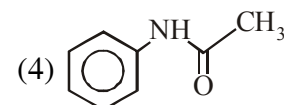
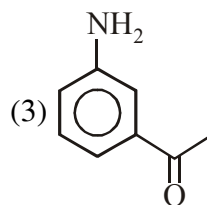
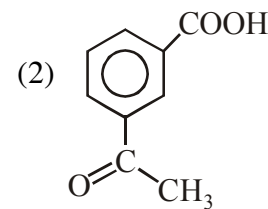
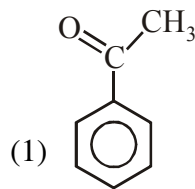
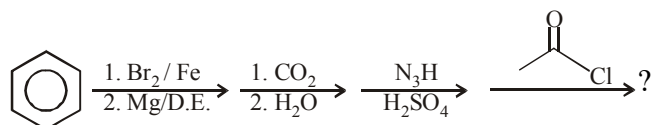
50. XeF_6 का संकरण तथा संरचना क्रमशः है :

- (1) sp^3d^2 , विकृत अष्टफलकीय
- (2) sp^3d^3 , विकृत अष्टफलकीय
- (3) sp^3d^2 , अष्टफलकीय
- (4) इनमें से कोई नहीं

51. निम्न में से कौन जल अपघटन की तीव्रतम दर दर्शाता है-



52. दिये गये अभिक्रिया क्रम का अन्तिम उत्पाद है-



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53. Which of the following is addition and homopolymer.

- (1) Buna-S (2) Gutta parcha
(3) Nylon-6,10 (4) Nylon-6,6

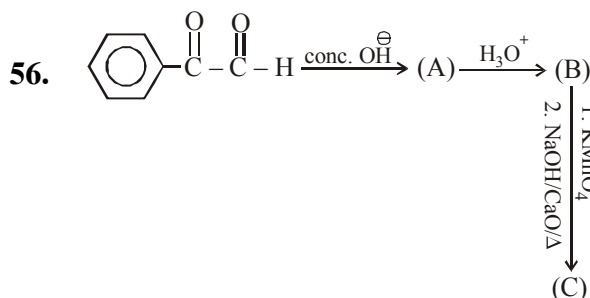
54. Which is optically inactive amino acid :

- (1) Glycine (2) Alanine
(3) Lysine (4) Lucine


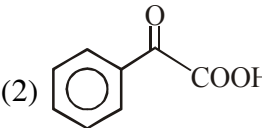
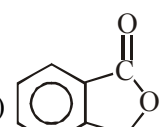
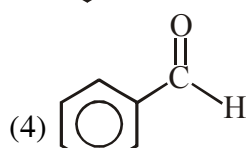
55. How many aldol products (excluding stereoisomers) are obtained in given reaction-



- (1) 2 (2) 3 (3) 4 (4) 1



Product (C) is :

- (1)  (2) 
(3)  (4) 

53. निम्न में से कौन योगात्मक तथा समबहुलक है-

- (1) ब्युना-S (2) गट्टा पर्चा
(3) नायलॉन-6,10 (4) नायलोन-6,6

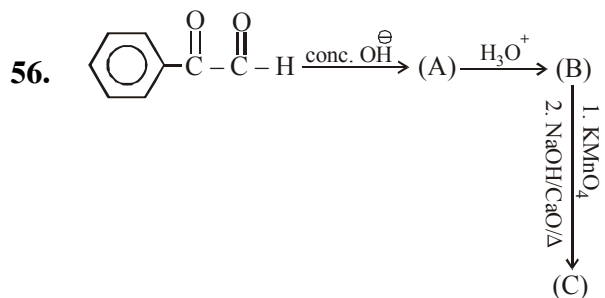
54. निम्न में से कौन प्रकाशिक अक्रिय अमीनों अम्ल है-

- (1) ग्लाइसीन (2) ऐलानीन
(3) लाइसीन (4) ल्युसीन


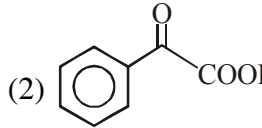
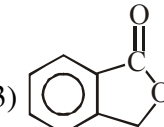
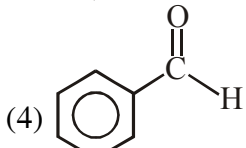
55. दी गयी अभिक्रिया में कितने ऐल्डॉल उत्पाद (त्रिविम् समावयवियों को छोड़कर) प्राप्त होते हैं-



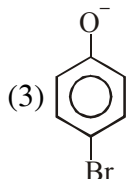
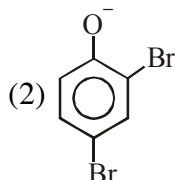
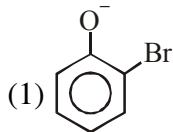
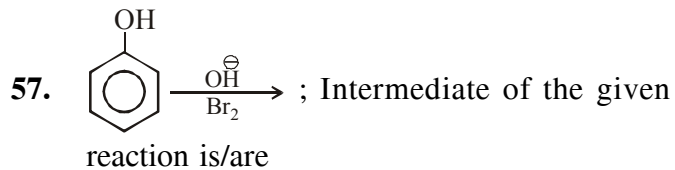
- (1) 2 (2) 3 (3) 4 (4) 1



उत्पाद (C) है-

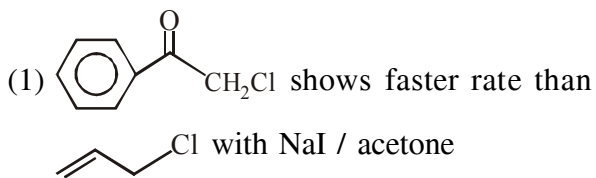
- (1)  (2) 
(3)  (4) 

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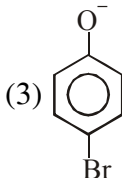
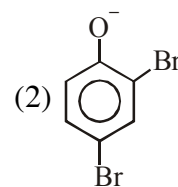
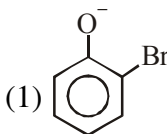
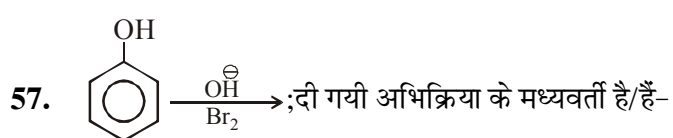
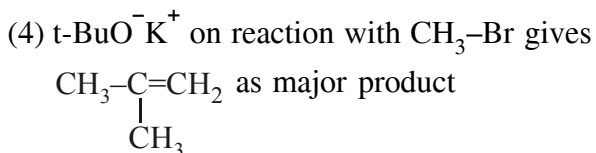
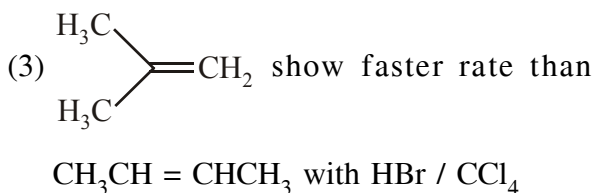


(4) All of these

58. Incorrect statement is :

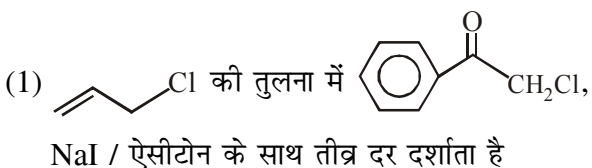


(2) $\text{CH}_3\text{CH}_2\text{OH}$ on reaction with NaOI gives yellow ppt.



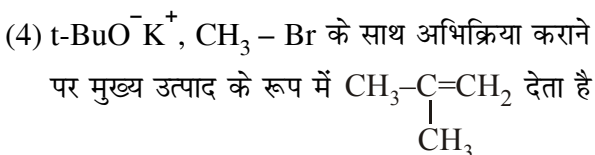
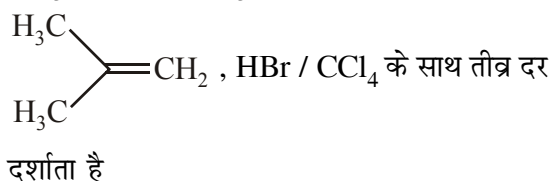
(4) उपरोक्त सभी

58. गलत कथन है-



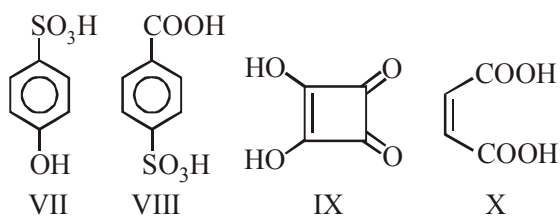
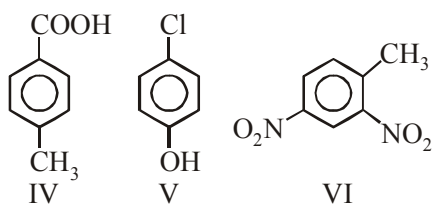
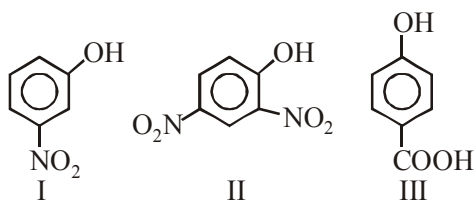
(2) $\text{CH}_3\text{CH}_2\text{OH}$, NaOI के साथ अभिक्रिया कराने पर पीला अवक्षेप देता है

(3) $\text{CH}_3\text{CH}=\text{CHCH}_3$ की तुलना में



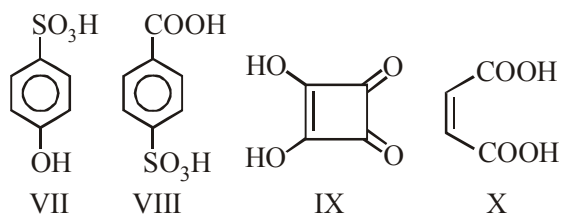
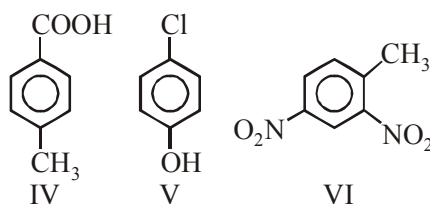
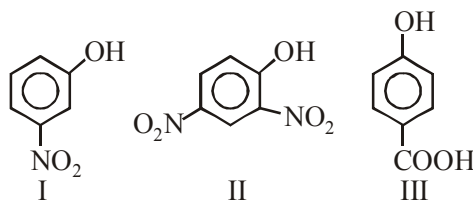
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59. How many compounds gives CO_2 with NaHCO_3 ?



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

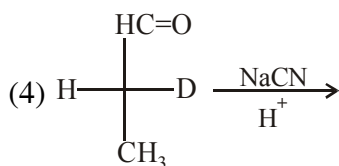
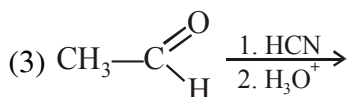
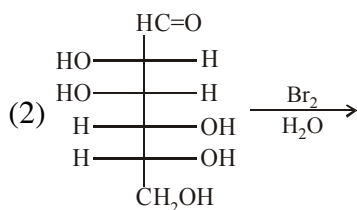
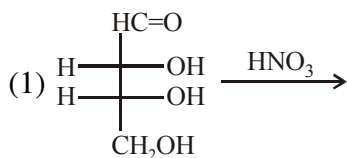
59. कितने यौगिक NaHCO_3 के साथ CO_2 देते हैं-



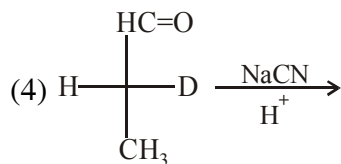
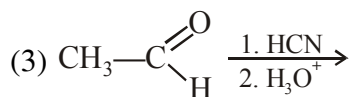
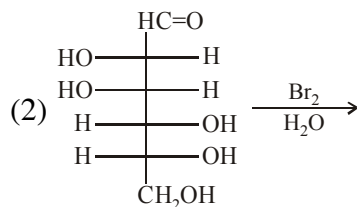
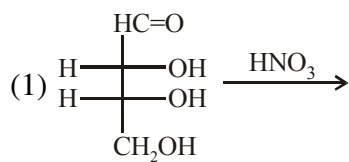
- (1) 5
(2) 6
(3) 7
(4) 8

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60. Which of the following reaction gives diastereomers



60. निम्न में से कौनसी अभिक्रिया विवरिम समावयवी देती है-



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PART C - MATHEMATICS

61. $\sum_{\lambda=1}^{10} \sin^{-1} \left(\sin \left(\lambda\pi - \frac{\pi}{6} \right) \right)$ is equal to-

- (1) $\frac{5\pi}{3}$ (2) $\frac{\pi}{2}$ (3) 0 (4) 5π

62. If $f(x) = \frac{\sin \frac{\pi x}{4}}{x+1}$, then $\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h^2 + 2h}$ is-

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

63. Number of solutions of the equation $2^x + x = 2^{\sin x} + \sin x$ in $[0, 10\pi]$ is-

- (1) 5 (2) 6
(3) 11 (4) 1

64. Let ABCD is a parallelogram where $\overline{AB} = \vec{a}, \overline{AD} = \vec{b}, |\vec{a}| = |\vec{b}| = 2$ and

$|\vec{a} \times \vec{b}| + \vec{a} \cdot \vec{b} = \sqrt{2} |\vec{a}| |\vec{b}|$ ($\vec{a} \cdot \vec{b} > 0$), then area of this parallelogram, is (in square units)-

- (1) $2\sqrt{2}$ (2) 2 (3) $\sqrt{2}$ (4) $8\sqrt{2}$

61. $\sum_{\lambda=1}^{10} \sin^{-1} \left(\sin \left(\lambda\pi - \frac{\pi}{6} \right) \right)$ बराबर होगा-

- (1) $\frac{5\pi}{3}$ (2) $\frac{\pi}{2}$ (3) 0 (4) 5π

62. यदि $f(x) = \frac{\sin \frac{\pi x}{4}}{x+1}$ हो, तो $\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h^2 + 2h}$ होगा-

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

63. अन्तराल $[0, 10\pi]$ में समीकरण $2^x + x = 2^{\sin x} + \sin x$ के हलों की संख्या होगी -

- (1) 5 (2) 6
(3) 11 (4) 1

64. माना ABCD एक समान्तर चतुर्भुज जहाँ $\overline{AB} = \vec{a}, \overline{AD} = \vec{b}, |\vec{a}| = |\vec{b}| = 2$ एवं

$|\vec{a} \times \vec{b}| + \vec{a} \cdot \vec{b} = \sqrt{2} |\vec{a}| |\vec{b}|$ ($\vec{a} \cdot \vec{b} > 0$) हो, तो समान्तर चतुर्भुज का क्षेत्रफल होगा (वर्ग इकाई में)-

- (1) $2\sqrt{2}$ (2) 2 (3) $\sqrt{2}$ (4) $8\sqrt{2}$

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65. Let the volume of tetrahedron ABCD is 81 cubic units & G_1, G_2, G_3 are centroids of triangular faces ABC, ABD & ACD respectively, then volume of tetrahedron $AG_1G_2G_3$, is (in cubic units)

- (1) 3 (2) 6 (3) $\frac{81}{4}$ (4) 54

66. Equation of plane containing the line $x + 2y + 3z - 5 = 0 = 3x + 2y + z - 5$ which is parallel to line $x - 1 = 2 - y = z - 3$, is-

- (1) $x + 2y + z = 0$ (2) $x - z = 0$
(3) $2y + 2z = 1$ (4) $x + 4y + 3z = 0$

67. Let A & B are two non singular matrices of order 3 such that $A + B = I$ & $A^{-1} + B^{-1} = 2I$, then $|\text{adj}(4AB)|$, is (where $\text{adj}(A)$ is adjoint of matrix A)-

- (1) 4 (2) 16 (3) 64 (4) 128

68. If $r, k, p \in W$, then $\sum_{r+k+p=10} {}^{30}C_r \cdot {}^{20}C_k \cdot {}^{10}C_p$ is equal to-

- (1) $\binom{60}{50}$ (2) $\binom{60}{30}$
(3) $\binom{60}{20}$ (4) $\binom{30}{10} \binom{30}{20}$

65. माना चतुष्फलक ABCD का आयतन 81 घन इकाई तथा G_1, G_2, G_3 क्रमशः ABC, ABD एवं ACD के त्रिकोणीय फलकों के केन्द्रक हो, तो चतुष्फलक $AG_1G_2G_3$ का आयतन होगा (घन इकाई में)

- (1) 3 (2) 6 (3) $\frac{81}{4}$ (4) 54

66. रेखा $x + 2y + 3z - 5 = 0 = 3x + 2y + z - 5$ को रखने वाले समतल का समीकरण, जो रेखा $x - 1 = 2 - y = z - 3$ के समान्तर है, होगा-

- (1) $x + 2y + z = 0$ (2) $x - z = 0$
(3) $2y + 2z = 1$ (4) $x + 4y + 3z = 0$

67. माना A तथा B कोटि 3 के दो व्युत्क्रमणीय आव्यूह इस प्रकार हैं कि $A + B = I$ तथा $A^{-1} + B^{-1} = 2I$ हो, तो $|\text{adj}(4AB)|$ होगा (जहाँ $\text{adj}(A)$ आव्यूह A के सहखण्डज को दर्शाता है) -

- (1) 4 (2) 16 (3) 64 (4) 128

68. यदि $r, k, p \in W$ हो, तो $\sum_{r+k+p=10} {}^{30}C_r \cdot {}^{20}C_k \cdot {}^{10}C_p$ बराबर होगा-

- (1) $\binom{60}{50}$ (2) $\binom{60}{30}$
(3) $\binom{60}{20}$ (4) $\binom{30}{10} \binom{30}{20}$

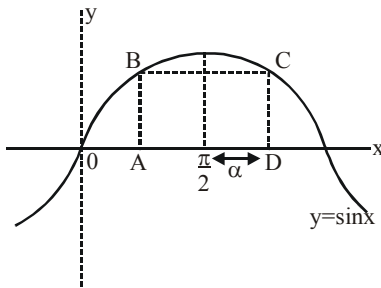
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69. Function $f(x) = \begin{cases} \operatorname{sgn}([x]) & ; x \neq I \\ [\operatorname{sgn}(x)] & ; x = I \end{cases}$ is

{where $\operatorname{sgn}(\)$ denotes signum function & $[.]$ denotes greatest integer function}

- (1) Continuous but not differentiable at $x = 2$
- (2) Discontinuous at every integer
- (3) Non differentiable at $x = 0$ & 1 only
- (4) Non differentiable at every natural number

70. A rectangle ABCD is inscribed in the region bounded by $y = \sin x$, x -axis where $x \in [0, \pi]$ (as shown in figure), then area of rectangle is maximum when ' α ' satisfies



- (1) $\tan \alpha = \alpha$
- (2) $\cot \alpha = \alpha$
- (3) $\sin \alpha = \alpha$
- (4) $\cos \alpha = \alpha$

71. If $f(0) = 2$, then $\lim_{x \rightarrow 0} \frac{\int_0^x (tf(x) + xf(t)) dt}{x^2}$ is equal to-

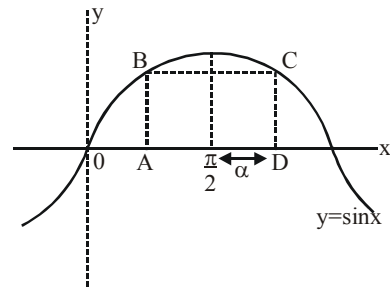
- (1) 1
- (2) 2
- (3) 3
- (4) 4

69. फलन $f(x) = \begin{cases} \operatorname{sgn}([x]) & ; x \neq I \\ [\operatorname{sgn}(x)] & ; x = I \end{cases}$ होगा

{जहाँ $\operatorname{sgn}(\)$ सिग्नम फलन तथा $[.]$ महत्तम पूर्णांक फलन को दर्शाता है}

- (1) $x = 2$ पर संतत परन्तु अवकलनीय नहीं
- (2) प्रत्येक पूर्णांक पर असंतत
- (3) केवल $x = 0$ एवं 1 पर अवकलनीय नहीं
- (4) प्रत्येक प्राकृत संख्या पर अवकलनीय नहीं

70. आयत ABCD, जो $y = \sin x$, x -अक्ष द्वारा परिबद्ध क्षेत्रफल के अन्तर्गत, जहाँ $x \in [0, \pi]$ (चित्रानुसार) हो, का क्षेत्रफल अधिकतम होगा जब ' α ' निम्न प्रतिबन्ध को सन्तुष्ट करेगा -



- (1) $\tan \alpha = \alpha$
- (2) $\cot \alpha = \alpha$
- (3) $\sin \alpha = \alpha$
- (4) $\cos \alpha = \alpha$

71. यदि $f(0) = 2$ हो, तो $\lim_{x \rightarrow 0} \frac{\int_0^x (tf(x) + xf(t)) dt}{x^2}$ का मान होगा -

- (1) 1
- (2) 2
- (3) 3
- (4) 4

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72. If $f(x)$ & $g(x)$ are inverse functions of each other such that $f(1) = 3$ & $f(3) = 1$, then

$$\int_1^3 \left(g(x) + \frac{x}{f'(g(x))} \right) dx \text{ is equal to-}$$

- (1) 0 (2) 8 (3) -8 (4) 3

73. If solution of differential equation $\frac{dy}{dx} = \frac{1+x}{2y}$

is a conic passing through point (1,1), then its eccentricity, is-

- (1) 0 (2) $\sqrt{\frac{3}{2}}$ (3) 1 (4) $\sqrt{\frac{5}{3}}$

74. Let tangents drawn from point $C(0,-b)$ to

hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ touches hyperbola at

points A & B. If ΔABC is a right angled

triangle, then $\frac{a^2}{b^2}$ is equal to-

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

75. If normal at point $P(t)$ to parabola $y^2 = 16x$ meets it again at point $Q(36,-24)$, then maximum possible focal distance of point P is-

- (1) 8 (2) 16 (3) 32 (4) 20

72. यदि $f(x)$ तथा $g(x)$ एक दूसरे के प्रतिलोम फलन इस प्रकार हैं कि $f(1) = 3$ एवं $f(3) = 1$ हो, तो

$$\int_1^3 \left(g(x) + \frac{x}{f'(g(x))} \right) dx \text{ बराबर होगा -}$$

- (1) 0 (2) 8 (3) -8 (4) 3

73. यदि अवकल समीकरण $\frac{dy}{dx} = \frac{1+x}{2y}$ का हल एक शांकव

है, जो बिन्दु (1,1) से गुजरता है, तो इसकी उत्केन्द्रता होगी -

- (1) 0 (2) $\sqrt{\frac{3}{2}}$ (3) 1 (4) $\sqrt{\frac{5}{3}}$

74. माना बिन्दु $C(0,-b)$ से अतिपरवलय $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ पर

खींची गई स्पर्शरेखायें अतिपरवलय को बिन्दु A एवं B पर स्पर्श करती हैं। यदि त्रिभुज ABC समकोण त्रिभुज हो, तो

$\frac{a^2}{b^2}$ बराबर होगा -

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

75. यदि परवलय $y^2 = 16x$ के बिन्दु $P(t)$ पर अभिलम्ब इसको पुनः बिन्दु $Q(36,-24)$ पर मिलता है, तो बिन्दु P की अधिकतम सम्भव नाभीय दूरी होगी -

- (1) 8 (2) 16 (3) 32 (4) 20

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76. If curves $y = ax^2 + bx + c$ and $y = px^2 + qx + r$ do not intersect each other and $a, b, c, p, q, r \in \{1, 2, 3, 4, \dots, 10\}$, then maximum value of $(aq - bp)^2 + (c - r)^2$ is-
 (1) 81 (2) 200 (3) 162 (4) 100
77. Let $n(A) = 3$, $n(B) = 3$ (where $n(S)$ denotes number of elements in set S), then number of subsets of $(A \times B)$ having odd number of elements, is-
 (1) 64 (2) 128 (3) 256 (4) 512
78. Let A & B are two independent events such that $P(A) + P(B) = \frac{3}{4}$ & $P(\bar{A}/B) = \frac{2}{5}$, then $P(A \cap B)$ is-
 (1) $\frac{9}{20}$ (2) $\frac{9}{100}$ (3) $\frac{5}{17}$ (4) $\frac{6}{20}$
79. If complex numbers z_1 and z_2 both satisfy $z + \bar{z} = 2|z - 1|$ and $\arg(z_1 - z_2) = \frac{\pi}{3}$, then value of $\text{Im}(z_1 + z_2)$ is, where $\text{Im}(z)$ denotes imaginary part of z -
 (1) $\sin \frac{\pi}{3}$ (2) $\text{cosec} \frac{\pi}{3}$
 (3) $\tan \frac{\pi}{3}$ (4) $\cot \frac{\pi}{3}$
76. यदि वक्र $y = ax^2 + bx + c$ तथा $y = px^2 + qx + r$ एक दूसरे को प्रतिच्छेद नहीं करते हैं तथा $a, b, c, p, q, r \in \{1, 2, 3, 4, \dots, 10\}$ हों, तो $(aq - bp)^2 + (c - r)^2$ का अधिकतम मान होगा -
 (1) 81 (2) 200 (3) 162 (4) 100
77. माना $n(A) = 3$, $n(B) = 3$ (जहाँ $n(S)$, समुच्चय S में अवयवों की संख्या को दर्शाता है), तो $(A \times B)$ के उपसमुच्चयों की संख्या जिनमें अवयवों की संख्या विषम है, होगी -
 (1) 64 (2) 128 (3) 256 (4) 512
78. माना A एवं B दो स्वतन्त्र घटनायें इस प्रकार हैं कि $P(A) + P(B) = \frac{3}{4}$ एवं $P(\bar{A}/B) = \frac{2}{5}$ हो, तो $P(A \cap B)$ होगा -
 (1) $\frac{9}{20}$ (2) $\frac{9}{100}$ (3) $\frac{5}{17}$ (4) $\frac{6}{20}$
79. यदि सम्मिश्र संख्यायें z_1 तथा z_2 दोनों $z + \bar{z} = 2|z - 1|$ को सन्तुष्ट करते हैं तथा $\arg(z_1 - z_2) = \frac{\pi}{3}$ हो, तो $\text{Im}(z_1 + z_2)$ का मान होगा, जहाँ $\text{Im}(z)$, z के काल्पनिक भाग को दर्शाता है -
 (1) $\sin \frac{\pi}{3}$ (2) $\text{cosec} \frac{\pi}{3}$
 (3) $\tan \frac{\pi}{3}$ (4) $\cot \frac{\pi}{3}$

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80. If ω is complex cube root of unity whose imaginary part is positive & $|z - \omega| = |z + \omega|$, then $\arg(z)$ can be-

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

81. A variable circle is drawn passing through the origin 'O'. It intersects X & Y axis respectively at points A & B such that $OA + 2OB = K$ (non zero constant), then circle always passes through a fixed point P other than origin. P lies on -

- (1) the x-axis (2) the line $y = 2x$
(3) the line $x = 2y$ (4) the y-axis

82. Area bounded by curves $x = \sqrt{2-y^2}$ and $|x| = |y|$, is -

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

83. The angle of elevation of a tower from point P due north of it is 30° and from a point Q due east of point P is θ . If distance of foot of tower from point P is 3m & $PQ = \sqrt{3}m$, then ' θ ' is equal to-

- (1) $\tan^{-1}2$ (2) $\cot^{-1}2$
(3) $\frac{\pi}{6}$ (4) $\frac{\pi}{4}$

80. यदि ω इकाई का सम्मिश्र घनमूल जिसका काल्पनिक भाग धनात्मक है तथा $|z - \omega| = |z + \omega|$ हो, तो $\arg(z)$ हो सकता है -

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

81. मूलबिन्दु O से गुजरने वाला एक चर वृत्त बनाया जाता है। यह X तथा Y अक्ष को क्रमशः बिन्दु A एवं B पर इस प्रकार काटती है कि $OA + 2OB = K$ (अशून्य अचर) हो, तो वृत्त सदैव अचर बिन्दु P से गुजरता है। (मूलबिन्दु के अलावा)। तो P स्थित होगा -

- (1) x-अक्ष पर (2) रेखा $y = 2x$ पर
(3) रेखा $x = 2y$ पर (4) y-अक्ष पर

82. वक्र $x = \sqrt{2-y^2}$ एवं $|x| = |y|$ द्वारा परिबद्ध क्षेत्रफल होगा -

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

83. एक मीनार का इसके उत्तर में स्थित बिन्दु P से उन्नयन कोण 30° तथा बिन्दु P के पूर्व में स्थित बिन्दु Q से उन्नयन कोण θ है। यदि बिन्दु P से मीनार के पाद की दूरी 3m तथा $PQ = \sqrt{3}m$ हो, तो θ बराबर होगा -

- (1) $\tan^{-1}2$ (2) $\cot^{-1}2$
(3) $\frac{\pi}{6}$ (4) $\frac{\pi}{4}$

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84. Let M denotes set of all 3×3 non singular matrices. Define the relation R by $R = \{(A,B) \in M \times M : AB = BA\}$, then R is-
- (1) Reflexive, symmetric but not transitive
 (2) Reflexive, symmetric & transitive
 (3) Reflexive, transitive but not symmetric
 (4) Neither reflexive nor symmetric nor transitive
85. Interval in which function $y = |x^2 - |x| - 2|$ is non monotonic, can be-
- (1) $x \in (-2,-1)$ (2) $x \in (-4,-2)$
 (3) $x \in (0,2)$ (4) $x \in (2,10)$
86. If $f(x) = x^4 + \lambda x^3 + x^2$ ($\lambda \in \mathbb{R}$) has local maximum at $x = \frac{1}{2}$, then absolute minimum value of $f(x)$ is -
- (1) -4 (2) 0 (3) 4 (4) -16
87. Let x_1, x_2, \dots, x_{100} are 100 observations such that $\sum x_i = 0$, $\sum_{1 \leq i < j \leq 100} |x_i x_j| = 80000$ & mean deviation from their mean is 5, then their standard deviation, is-
- (1) 10 (2) 30 (3) 40 (4) 50
88. If statement $(p \rightarrow q) \rightarrow (q \rightarrow r)$ is false, then truth values of statements p, q, r respectively, can be-
- (1) FTF (2) TTT (3) FFF (4) FTT
84. माना M सभी 3×3 के व्युत्क्रमणीय आव्यूहों के समुच्चय को दर्शाता है। सम्बन्ध $R, R = \{(A,B) \in M \times M : AB = BA\}$ द्वारा परिभाषित हो, तो R होगा -
- (1) स्वतुल्य, सममित परन्तु संक्रामक नहीं
 (2) स्वतुल्य, सममित तथा संक्रामक
 (3) स्वतुल्य, संक्रामक परन्तु सममित नहीं
 (4) ना तो स्वतुल्य ना ही सममित और ना ही संक्रामक
85. अन्तराल जिसमें फलन $y = |x^2 - |x| - 2|$ एकदिष्ट नहीं है, हो सकता है -
- (1) $x \in (-2,-1)$ (2) $x \in (-4,-2)$
 (3) $x \in (0,2)$ (4) $x \in (2,10)$
86. यदि $f(x) = x^4 + \lambda x^3 + x^2$ ($\lambda \in \mathbb{R}$) का स्थानीय उच्चिष्ठ $x = \frac{1}{2}$ पर हो, तो $f(x)$ का निरपेक्ष न्यूनतम मान होगा -
- (1) -4 (2) 0 (3) 4 (4) -16
87. माना x_1, x_2, \dots, x_{100} , 100 प्रेक्षण इस प्रकार है कि $\sum x_i = 0$, $\sum_{1 \leq i < j \leq 100} |x_i x_j| = 80000$ तथा इनके माध्य से माध्य विचलन 5 हो, तो इनका मानक विचलन होगा -
- (1) 10 (2) 30 (3) 40 (4) 50
88. यदि कथन $(p \rightarrow q) \rightarrow (q \rightarrow r)$ असत्य हो, तो क्रमशः कथनों p, q, r के सत्य मान हो सकते हैं -
- (1) FTF (2) TTT (3) FFF (4) FTT

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89. Let $f(x) = \max(\sin x, \cos x)$,
 $g(x) = \min(\cos x, \sin x)$
 $h(y) = f(x)y^2 + ay + g(x)$.

If equation $h(y) = 0$ has real roots $\forall x \in \mathbb{R}$, then complete set of values of a is-

(1) $a \in (-\infty, -\sqrt{2}] \cup [\sqrt{2}, \infty)$

(2) $a \in [-\sqrt{2}, \sqrt{2}]$

(3) $a \in \mathbb{R}$

(4) None of these

90. Let x_n, y_n, z_n, w_n denotes n^{th} terms of four different arithmetic progressions with positive terms. If $x_4 + y_4 + z_4 + w_4 = 8$ and $x_{10} + y_{10} + z_{10} + w_{10} = 20$, then maximum value of $x_{20} \cdot y_{20} \cdot z_{20} \cdot w_{20}$ is-

(1) 10^4 (2) 10^6

(3) 10^8 (4) 10^{10}

89. माना $f(x) = \text{अधिकतम}(\sin x, \cos x)$,
 $g(x) = \text{न्यूनतम}(\cos x, \sin x)$
 $h(y) = f(x)y^2 + ay + g(x)$ है।

यदि समीकरण $h(y) = 0$ के सभी $x \in \mathbb{R}$ के लिए वास्तविक मूल हो, तो a के मानों का पूर्ण समुच्चय होगा -

(1) $a \in (-\infty, -\sqrt{2}] \cup [\sqrt{2}, \infty)$

(2) $a \in [-\sqrt{2}, \sqrt{2}]$

(3) $a \in \mathbb{R}$

(4) इनमें से कोई नहीं

90. माना x_n, y_n, z_n, w_n धनात्मक पदों वाली चार भिन्न समान्तर श्रेणियों के $n^{\text{वें}}$ पद को दर्शाती है। यदि $x_4 + y_4 + z_4 + w_4 = 8$ तथा $x_{10} + y_{10} + z_{10} + w_{10} = 20$ हो, तो $x_{20} \cdot y_{20} \cdot z_{20} \cdot w_{20}$ का अधिकतम मान होगा -

(1) 10^4 (2) 10^6

(3) 10^8 (4) 10^{10}

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