Atomic Energy Central School No 4

Rawatbhata

CLASS 12 - ENGLISH CORE

Confidence Examination-I (2019-20)

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

1. This paper is divided into three sections: A, B and C. All the sections are compulsory.
2. Separate instructions are given with each section and question, wherever necessary. Read these instructions very carefully and follow them faithfully.
3. Do not exceed the prescribed word limit while answering the questions.

Section A

1. **Read the passage given below:** **[12]**

1. Nuclear capability gives a status to the country in the community of nations. No nation can afford to make destructive use of the nuclear energy without risking a World War. That is why America did not make use of nuclear weapon in the Vietnam War though it had become a matter of prestige for her. Similarly Russia preferred to pull out her missile bases from Cuba instead of coming in direct conflict with a nuclear power, America. But India, since she started adopting nuclear technology, had decided to make only peaceful use of nuclear energy. The fear expressed by Pakistan and the comments made in the Chinese press are more for the sake of propaganda than for the projection of truth.
2. India needs nuclear energy in order to meet her power shortage. She has been depending upon hydroelectric power which is undependable because of the uncertainty of rainfall. Good quality of coal which is another source of energy cannot be extracted commercially because it lies very deep and the cost of extraction is very high. India is not producing much of oil, rather she has to import nearly 74 percent of her total consumption. So the only alternative with India is to have a cheaper and more dependable source of energy. The known reserves of thorium in India are sufficient to last many hundred years. That is why India has already commissioned two nuclear power stations, one at Tarapur and the other at Rana Pratap Sagar. Each one has the installed capacity of producing 420 M.W. of electricity. Two other at Kalpakkam, are operational. This energy will be able to meet the power shortage throughout the country. If industries work at their full capacity, production will be higher and so per capita income will increase and inflation will be neutralized.
3. With the help of controlled nuclear explosions, artificial dams can be made. In fact for building a dam there should be two huge mountain walls enclosing a deep valley just near the course of a river. These conditions are not available at all the places. So with the help of controlled nuclear explosions mountains can be blown up. This can also help in laying roads in the mountainous areas. In fact, some of the borders of India have mountainous

terrain and the movement of the army is quite difficult. So even for the sake of national security it is necessary to have roads in those areas.

4. With the help of radiation, the shelf life of vegetables and fruits can be increased. In the tropical countries like India, it is necessary that the perishable fruit stuffs are preserved for a long time. Radiation can check the sprouting of onions and potatoes which are much in demand in foreign countries. Similarly, fruits like bananas and mangoes which have much export potential can be preserved for a very long time. The texture and taste of the fruit do not undergo any change.
5. Nuclear technology can also be harnessed for medical purposes. It is said that radioactive iodine is used for detecting the disease of the thyroid glands. Similarly, India of U.N. experts, radiated vaccine which can immunize sheep from lungworm disease, which used to take a heavy toll of sheep every year.
6. Properly processed nuclear fuel is also used for artificial satellite in space. Weather satellites can predict cyclones and the rainfall with extreme accuracy. Communication satellites can help in conveying the messages to very long distances. In a huge country like India, communication satellites are necessary.
7. Radiation is also used for preparing the mutant seeds. Many varieties of rice and some cereals have been prepared at Tarapur laboratory. This will increase our agricultural production and help India to become economically better off. So for India it is necessary to make peaceful uses of nuclear energy.

1.1 On the basis of your understanding of the above passage, answer any five of the questions given below by choosing the most appropriate option (1x5=5):

i. India needs nuclear energy in order to _____
   a. gain status in the community of nations
   b. meet her power shortage
   c. increase her might
   d. frighten the hostile countries

ii. Coal, another source of energy, cannot be extracted commercially because _____
   a. it lies very deep
   b. the cost of extraction is very high
   c. it lies very deep and the cost of extraction is very high
   d. it is risky for the miners to extract it

iii. India is not producing much oil, so she has to import nearly
   a. 74 percent of her total consumption
   b. 80 percent of total consumption
   c. 25 percent of total consumption
   d. 90 percent of total consumption

iv. India has decided to use nuclear energy for
   a. Destructive use
   b. World war
   c. Prestige

d. Peaceful purposes

v. If industries work at their full capacity,

a. Production will be higher and so per capita income will increase
b. Production will be lower and so per capita income will decrease
c. There will be power shortage
d. There will be shortage of labour

vi. artificial _____ can be made with the help of controlled nuclear explosions,

a. mountains
b. rivers
c. dams
d. houses

1.2 Answer the following questions briefly: (1×5=5)

i. Why does India need nuclear energy?
ii. How can radiation be helpful?
iii. How does nuclear technology help in the field of medicine?
iv. In what way can nuclear energy boost our communication?
v. How radiation can be helpful in the agriculture sector?

1.3 Pick out the words/phrases from the passage which are similar in meaning to the following: (1×2=2)

i. withdraw (para 1)
ii. Publicity (para1)

2. **Read the following passage carefully:** **[8]**

To date happiness has defied definition. Most people tend to equate happiness with fun, good living and plenty of money. If happiness was synonymous with all this, rich people with all their luxuries and countless parties would be perpetually happy. But actually, they are, frequently, acutely unhappy, despite their riches and ability to indulge in fun activities at will. Fun is what we experience during an act; happiness is that intangible something we experience after an act. We may have fun watching a movie, going shopping, meeting friends — these are all fun activities that afford us fleeting moments of relaxation and enjoyment. Happiness, on the other hand, is a much stronger, deeper and more abiding emotion. The founding father of positive psychology, Martin Seligman, describes happiness as experiencing frequent positive emotions, such as joy, excitement and contentment, combined with deeper feelings of meaning and purpose. It implies a positive mindset in the present and an optimistic outlook for the future. Importantly, happiness experts have argued that happiness is not a stable, unchangeable trait but something flexible that we can work on and ultimately strive towards. However, happiness workshops have been running for the last four years based on the evidence from the above field of psychology. The workshops are fun and they have earned a reputation as “Mrs. Happy”, but the last thing that anyone would want to believe is that people are happy all the time. Striving for a happy life is one thing, but striving to be happy all the time is unrealistic.

If we perceive happiness as the ultimate goal, we must also devise a way to achieve that goal. The way to happiness is not a smooth, broad highway along which we can cruise at a comfortable speed. It is a path through rocky and rugged terrain and the going can become very tough at times. At these times we have to roll up our sleeves and with pitchfork and shovel makes our way onwards. This pursuit of happiness lasts a lifetime. Great happiness is earned only by great effort and effort not in spurts but diligent, constant effort.

In this connection, we are confronted with another fallacy, that fun and pleasure mean happiness and thus pain, its corollary, must be synonymous with unhappiness. But in fact, the truth is quite different. Things that bring us happiness, more often than not, involve some amount of pain. It is because of the misconception that people avoid the very endeavor that is the source of true happiness. Difficult endeavors — such as the raising of children, establishing deeper relationships with loved ones, trying to do something worthwhile in life — hold the promise of a world of happiness. Recent research indicates that psychological flexibility is the key to greater happiness and well-being. For example, being open to emotional experiences and the ability to tolerate periods of discomfort can allow us to move towards a richer, more meaningful existence. Studies have demonstrated that the way we respond to the circumstances of our lives has more influence on our happiness than the events themselves. Experiencing stress, sadness and anxiety in the short term does not mean we cannot be happy in the long term. In studies of people facing trauma, many describe their experience as a catalyst for profound change and transformation, leading to a phenomenon known as “post-traumatic growth”. Often when people have faced difficulty, illness or loss, they describe their lives as happier and more meaningful as a result.

Happiness is not a permanent vacation. Another prevalent belief is that if one were rich enough not to have to work, one would be blissfully happy. But, a job is more than just a pay-cheque. Almost all religions teach us that work is worship. Work holds the key to happiness as doing something which increases confidence and self-worth. It brings on a feeling of satisfaction, of doing something, of contributing. Job satisfaction comes less from how much one earns than from the challenges of the job. Of course, the pay-cheques count. It would be unrealistic to suggest that one could be happy without a basic shelter, roaming the streets on an empty stomach.

Unlike feeling happy, which is a transient state, leading a happier life is about individual growth through finding meaning. It is about accepting our humanity with all its ups and downs, enjoying the positive emotions, and harnessing painful feelings in order to reach our full potential.

A secret ingredient of happiness is contentment. Contentment here does not mean apathy or lack of ambition, just as commitment does not mean curtailment of freedom. Commitment teaches us to give so that we may receive and contentment helps us to cherish the gifts we have received. These things are worth a try even if they don’t promise access to the pinnacle of success. Success, after all, has been described as getting what one wants, whereas happiness likes what one gets.

a. On the basis of your understanding of the above passage, make notes on it using headings and sub-headings. Use recognizable abbreviations (wherever necessary-minimum four)

and a format you consider suitable. Also supply an appropriate title to it.

b. Write a summary of the passage in about 80 words.

Section B

3. Fireworks and crackers are known to create pollution during festivals. As an environmentalist design a poster in about 50 words to create awareness of their ill effects. **[4]**

OR

The Literary Club of your school is putting up the play 'Waiting for Godot'. As Secretary of the club, draft an invitation inviting the famous writer Sudeesh Gupta to be the guest of honour at the function. Write the invitation in not more than 50 words. You are Govind/Gauri.

4. You are Keshav/Karuna, living at 1, MG Road, Bengaluru. You are very much concerned about the bad state of roads in the city. Write a letter to the editor of a newspaper expressing your concern over the problems faced by the commuters and giving suitable suggestions to solve the problem. **[6]**

OR

Write a letter to the Manager (Publications) of Little Flower Company, Hyderabad, placing an order for 4 books on Management and Administration recently published by them. You are Ronit/Rohini, Librarian, HP Engineering College, Tirupathi.

5. It is due to cable television that programmes are brought to our homes day and night for all the seven days in a week. It has brought a lot of change in the lifestyle of the people. Write an article in 150-200 words on 'Cable TV - A Boon or A Bane'. **[10]**

OR

You witnessed a fire accident in a slum area near your colony on Saturday night. You were very much disturbed at the pathetic sight. Write a report in 100-125 words for your school magazine. You are Lakshmi/Lakshman, a student of PDK International School, Madurai.

6. A recent health check-up in your school revealed that many among your classmates were suffering from weak eyesight. You feel concerned. Write a speech in 150-200 words to be delivered in the morning assembly on how to protect your eyesight. Make use of the following clues **[10]**

- reading in bad light
- bad posture
- wrong direction, from which light is coming
- excessive TV viewing
- regular washing of eyes
- eat more green vegetables
- enough sleep

OR

The government has banned the use of animals in the laboratories for the purpose of dissection. Write a debate in 150-200 words either for or against this decision.

Section C

7. Read the extracts given below and briefly answer the questions that follow each: **[8]**

a) **Read the following extract and answer the following questions briefly:(1 $\times$ 4 = 4)**

"The polished traffic passed with a mind ahead,

Or if ever aside a moment then out of sorts
At having the landscape marred with the artless paint
Of sings that with N turned wrong and S turned wrong
Offered for sale wild berries in wooden quarts,
Or crook-necked golden squash with silver warts,
Or beauty rest in a beautiful mountain scence,
You have the money, but if you want to be mean,
Why keep your money (this crossly) and go along."

i. How did the traffic pass?
ii. Why did one turn out of sorts?
iii. What are the two things that were sold in that stand?
iv. What should one do if one wants to be mean?

b) **Read the extract and answer the questions that follow:**

My introduction to the Y.M.C.A. swimming pool revived unpleasant memories and stirred childish fears. But in a little while, I gathered confidence. I paddled with my new water wings, watching the other boys and trying to learn by aping them. I did this two or three times on different days and was just beginning to feel at ease in the water when the misadventure happened.

a. Which unpleasant memories were revived?
b. What was he trying to learn?
c. How was he learning how to do it?
d. Which misadventure is being referred to?

8. Answer any five of the following questions in 30 -40 words each: **[10]**

a) What words did M Hamel write on the blackboard before dismissing the last class? What did they mean?
b) A young man in Firozabad is burdened under the baggage of two worlds. What are they?
c) What were the contents of the package left by the peddler as Christmas gift for Edla Willmansson?
d) What is the theme of the poem(Aunt jennifers tigers)?
e) How did the psychiatrist explain Charley's flight to the non-existent third level?
f) What part of the story did Jack himself enjoy the most? Why?
g) Why did the servants leave Dr. Sadao's house?

9. Why did Rajkumar Shukla invite Gandhiji to Champaran? How did Gandhiji solve the problem of the indigo farmers? **[6]**

OR

How can you say that Gemini Studios had been the favourite haunt of people?

10. A physical disability brings about a sense of alienation in the mind of a person more than it causes pain or inconvenience. Can he be treated in the same fashion as a normal person? **[6]**

OR

"Between crime and punishment it is mainly a battle of wits". Justify the statement based on the lesson Evans tries an O-level.

Atomic Energy Central School No 4

Rawatbhata

PHYSICS

Confidence Examination-I (2019-20)

Time Allowed: 3 hours **Maximum Marks: 70**

General Instructions:

1. All questions are compulsory. There are 37 questions in all.
2. This question paper has four sections: Section A, Section B, Section C and Section D.
3. Section A contains twenty questions of one mark each, Section B contains seven questions of two marks each, Section C contains seven questions of three marks each, and Section D contains three questions of five marks each.
4. There is no overall choice. However, internal choices have been provided in two questions of one mark each, two questions of two marks, one question of three marks and three questions of five marks weightage. You have to attempt only one of the choices in such questions.

Section A

1. An oil drop of 12 excess electrons is held stationary under a constant electric field of $2.55 \times 10^4\ N/C$ in Millikan's oil drop experiment. The density of the oil is 1.26 $g\ cm^{-3}$. Estimate the radius of the drop. (g = 9.81 ms^{-2}; e = $1.6 \times 10^{-19}\ C$. **[1]**

   a) 7.81×10^{-4} mm
   b) 10.81×10^{-4} mm
   c) 8.81×10^{-4} mm
   d) 9.81×10^{-4} mm

2. The amount of charge a capacitor can store when a potential diffrence of 1V is applied across it is called its **[1]**

   a) resistance
   b) capacitance
   c) reactance
   d) inductance

3. Current density of a conductor is **[1]**

   a) Is always zero
   b) the net charge flowing through the area
   c) the net current flowing through the area normally per unit time
   d) the net charge flowing through the area per unit time

4. A potentiometer has a uniform wire of length 10m and resistance 5 ohms. The potentiometer is connected to an external battery of emf of 10V and negligible internal resistance and a resistance of 995 ohms in series. The potential gradient along the wire is: **[1]**

   a) 1 mV/cm
   b) 5 mV/cm
   c) 1 mV/m
   d) 5 mV/m

5. A circular coil of radius R carries an electric current. The magnetic field due to the coil at a **[1]**

point on the axis of the coil located at a distance r from the center of the coil such that r >> R, varies as

a) $\frac{1}{r^{\frac{3}{2}}}$ b) $\frac{1}{r}$

c) $\frac{1}{r^2}$ d) $\frac{1}{r^3}$

6. The resolving power of a telescope whose lens has a diameter of 1.22 m for a wavelength of $5000\mathring{A}$ is: **[1]**

a) 2×10^4 b) 2×10^5

c) 2×10^6 d) 2×10^2

7. In a wave, the path difference corresponding to a phase difference of ϕ is: **[1]**

a) $\frac{\pi}{\lambda}\phi$ b) $\frac{2\pi}{\lambda}\phi$

c) $\frac{\lambda}{2\pi}\phi$ d) $\frac{\lambda}{\pi}\phi$

8. The focal length (f) of spherical mirror of radius curvature R is: **[1]**

a) $\frac{3}{2R}$ b) 2 R

c) R d) $\frac{R}{2}$

9. If the earth did not have an atmosphere, would its average surface temperature be higher or lower than what it is now ? **[1]**

a) Higher as the heating is better b) Lower because the Greenhouse effect of the atmosphere would be absent

c) None of these d) Higher as earth has poor reflectivity

10. If work function of a metal surface is 3.45 eV ,then maximum wavelength of a photon required to eject a photoelectron is **[1]**

a) 3.6 $\times 10^{-7}$ m b) 3.9 $\times 10^{-7}$ m

c) 3.4 $\times 10^{-7}$ m d) 4.0 $\times 10^{-7}$m

11. Fill in the blanks: **[1]**

If M is magnetic moment and B is magnetic field, then the torque is given by _____.

12. Fill in the blanks: **[1]**

Domain formation is the necessary feature of _____.

13. Fill in the blanks: **[1]**

Two inductors each of inductance 'L' are joined in parallel. Their equivalent inductance is _____.

OR

Fill in the blanks:

The emf induced across the ends of a conductor due to its motion in a magnetic field is called _____.

14. Fill in the blanks: **[1]**

_____ of an element are the atoms of the element which have the same atomic number that different atomic weights.

15. Fill in the blanks: **[1]**

The refractive index of a substance if critical angle is 45° is _____.

16. How is the radius of a nucleus related to its mass number? **[1]**

17. Draw a graph showing the variation of potential energy between a pair of nucleons as a function of their separation. Indicate the function in which the nuclear force is (i) attractive, (ii) repulsive. **[1]**

18. What is the main cause of electron's diffusion from n-type region to p-type region, even when there is no external supply used? **[1]**

19. A proton and an electron have same kinetic energy. find ratio of their de-Broglie wavelength ? **[1]**

20. Is the ratio of the number of holes and the number of conduction electrons in an n-type extrinsic semiconductor more than, less than or equal to one? **[1]**

OR

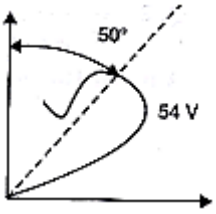
State the relation between the frequency ν of radiation emitted by LED and the band gap energy E of the semiconductor used to fabricate it.

Section B

21. A heating element is marked 210 V, 630 W. What is the value of the current drawn by the element when connected to a 210 V DC source? **[2]**

22. Draw a plot showing the variation of (i) electric field (E) and (ii) electric potential (V) with distance r due to a point charge Q. **[2]**

23. Name the experiment for which the following graph, showing the variation of intensity of scattered electrons with the angle of scattering, was obtained. Also, name the important hypothesis that was confirmed by this experiment. **[2]**



24. Find the wavelength of electromagnetic waves of frequency 5×10^{19} Hz in free space. Give its two applications. **[2]**

25. Two bar magnets placed together in a vibration magnetometer take 3 second for 1 vibration. If one magnet is reversed, the combination takes 4 second for 1 vibration. Find the ratio of their magnetic moments. **[2]**

26. In the study of Geiger-Marsden experiment on the scattering of particles by a thin foil of gold, draw the trajectory of α-particles in the Coulomb field of the target nucleus. Explain briefly how one gets the information on the size of the nucleus from this study. **[2]**

OR

The wavelength of the first member of Lyman series is $1216 \mathring{A}$. Calculate the wavelength of second member of Balmer series.

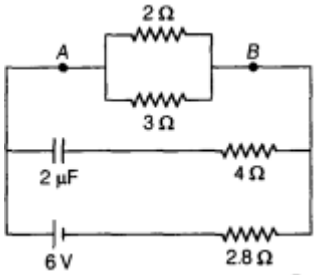
27. The current in the forward bias is known to be more (-mA) than the current in the reverse bias (-μA). What is the reason, to operate the photodiode in reverse bias? **[2]**

OR

What is the main cause of Zener breakdown?

Section C

28. Calculate the steady current through the 2Ω resistor in the circuit shown in the figure below. **[3]**



29. Write the relation for current sensitivity and voltage sensitivity of a moving coil galvanometer? Using these relations, explain the fact that increasing the current sensitivity may not necessary increase the voltage sensitivity. **[3]**

30. An ac circuit consists of a series combination of circuit elements X and Y. The current is ahead of the voltage in phase by $\frac{\pi}{4}$. If element X is a pure resistor of 100 Ω. **[3]**

i. Name the circuit element Y.

ii. Calculate the rms value of current, if rms value of voltage is 141 V.

iii. What will happen if the ac source is replaced by a dc source?

31. Answer the following questions: **[3]**

i. Show, by giving a simple example, how e.m. waves carry energy and momentum.

ii. How are microwaves ovens to select the frequency of microwaves to match the resonance frequency of water molecules?

iii. Write two important uses of infrared waves.

32. A beam of light consisting of two wavelengths 560 nm and 420 nm is used to obtain interference fringes in a Young's double slit experiment. Find the least distance from the central maximum, where the bright fringes, due to both the wavelengths coincide. The distance between the two slits is 4.0 mm and the screen is at a distance of 1.0 m from the slits. **[3]**

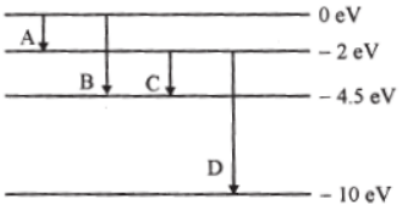
OR

State clearly how an unpolarised light get linearly polarised, when passed through a polaroid.

i. Unpolarised light of intensity I_0 is incident on a polaroid P_1 which is kept near polaroid P_2 whose pass axis is parallel to that of P_1. How will the intensities of light, I_1 and I_2 transmitted by the polaroids P_1 and P_2, respectively, change on rotating P_1 without disturbing P_2?

ii. Write the relation between the intensities I_1 and I_2.

33. The energy levels of hydrogen atoms are as shown in figure. Which of the shown transition will result in the emission of a photon of wavelength 275 nm? Which of the transition corresponds to emission of radiation of (i) maximum and (ii) minimum wavelength? **[3]**

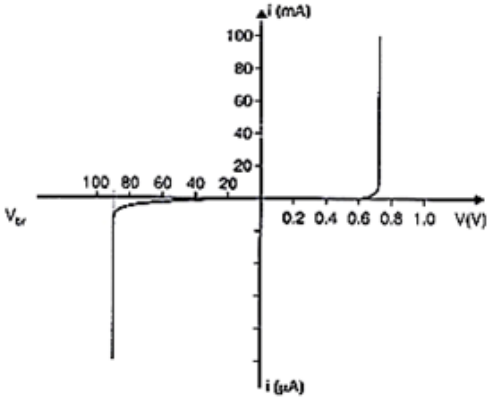


34. The following figure shows the V-I characteristics of a semiconductor diode **[3]**

i. Identify the semiconductor diode used.

ii. Draw the circuit diagram to obtain the given characteristics of this device.

iii. Briefly explain how this diode can be used as a voltage regulator



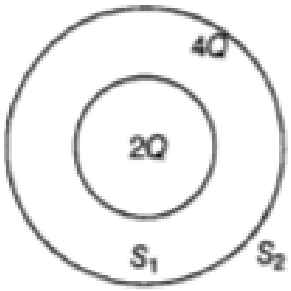
Section D

35. a. Deduce the expression for the torque acting on a dipole of dipole moment p in the presence of uniform electric field E. **[5]**

b. Consider two hollow concentric spheres S_1 and S_2 enclosing charges 2Q and 4Q respectively as shown in the figure.

i. Find out the ratio of the electric flux through them.

ii. How will the electric flux through the sphere S_1 changes, if a medium of dielectric constant $\in_r$ is introduced in the space inside S_1 in place of air? Deduce the necessary expression?



OR

i. Derive the expression for the energy stored in parallel plate capacitor. Hence, obtain the expression for the energy density of the electric field.

ii. A fully charged parallel plate capacitor is connected across an uncharged identical capacitor. Show that the energy stored in the combination is less than the energy stored initially in the single capacitor.

36. i. State the principle on which AC generator works. Draw a labelled diagram and explain its working. **[5]**

ii. A conducting rod held horizontally along East-West direction is dropped from rest from a certain height near the Earth's surface. Why should there be an induced emf across the ends of the rod? Draw a plot showing the instantaneous variation of emf as a function of time from the instant it begins to fall.

OR

a. Using Biot-Savart's law, derive an expression for the magnetic field at the centre of a circular coil of radius R, number of turns N, carrying current i.

b. Two small identical circular coils marked 1, 2 carry equal currents and are placed with their geometric axes perpendicular to each other as shown in the figure. Derive an expression for the resultant magnetic field at 0.

37. i. Draw a ray diagram for the formation of the image of a point object by a thin double convex lens having radii of curvatures R_1 and R_2 and hence, derive lens maker's formula. **[5]**

ii. Define power of a lens and give its SI unit. If a convex lens of length 50 cm is placed in contact coaxially with a concave lens of focal length 20 cm, what is the power of the combination?

OR

a. Draw the ray diagram showing the refraction of light through a glass prism and hence obtain the relation between the refractive index μ of the prism, angle of prism and angle of minimum deviation.

b. Determine the value of the angle of incidence for a ray of light travelling from a medium of refractive index $\mu_1 = \sqrt{2}$ into the medium of refractive index μ_2 = 1, so that it just grazes along the surface of separation.

Atomic Energy Central School No 4

Rawatbhata

CHEMISTRY

Confidence Examination-I (2019-20)

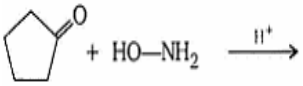
Time Allowed: 3 hours **Maximum Marks: 70**

General Instructions:

1. All questions are compulsory.
2. Section A: Q.no. 1 to 16 are very short answer questions (objective type) and carry 1 mark each.
3. Section B: Q.no. 17 to 23 are short answer questions and carry 2 marks each.
4. Section C: Q.no. 24 to 30 are long answer questions and carry 3 marks each.
5. Section D: Q.no. 31 to 33 are also long answer questions and carry 5 marks each.
6. There is no overall choice. However an internal choice has been provided in two questions of two marks, two questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.
7. Use log tables if necessary, use of calculators is not allowed.

Section A

1. Fill in the blanks: **[1]**
   The sum of mole fractions of solute and solvent of a solution is _____.
2. Fill in the blanks: **[1]**
   Colligative properties of a dilute solution depend upon _____ of solute present in the solution.
3. Fill in the blanks: **[1]**
   Azeotropic mixtures boil without changing in their _____
4. What is meant by the term pyrometallurgy? **[1]**
5. Which of the two components of starch is water soluble? **[1]**
6. Why are polysaccharides considered non-sugars? **[1]**
7. Give one example of biodegradable polymer. **[1]**
8. Predict the products of the following reaction: **[1]**



9. A hydrocarbon C_5H_{10} does not react with chlorine in dark but gives a single monochloro compound C_5H_9Cl in bright sunlight. The hydrocarbon is **[1]**

   a) Cyclopentene b) Cyclosporine

   c) Cycloalkyne d) Cyclopentane

10. Which of the following chemical is used as a depressant in separating ZnS from PbS in froth floatation process? **[1]**

a) $ZnSO_2$

b) NaCl

c) NaCN

d) $BaCl_2$

11. DMG test is used for the detection of **[1]**

a) Cu

b) Ti

c) Co

d) Ni

12. Blue solution of $CuSO_4$ becomes darker when treated with ammonia because **[1]**

a) Ammonia is stronger ligand than water

b) Ammonia is highly soluble in water

c) Ammonia is a Lewis acid

d) Ammonia molecule replaces water molecule in solution

13. Which of the following complex ions/molecules of nickel is paramagnetic? **[1]**

a) $[Ni(CO)_4]$

b) $[Ni(CN)_4]^{2-}$

c) $[Ni(NH_3)_4]^{2+}$

d) Ni(dimethylglyoxime)$_2$

14. The commercial name of polyacrylonitrile is _____. **[1]**

a) Orlon (acrilan)

b) Bakelite

c) PVC

d) Dacron

15. **Assertion:** Except glycine, all naturally occurring α-amino acids are optically active. **[1]**
Reason: All α-amino acids occurring naturally except glycine has at least one asymmetric carbon.

a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.

c) Assertion is CORRECT but, reason is INCORRECT.

d) Assertion is INCORRECT but, reason is CORRECT.

16. **Assertion:** Vitamin A and D are not absorbed in the body unless fat digestion and absorption proceed normally. **[1]**
Reason: Vitamin A and D are fat soluble vitamins.

a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.

c) Assertion is CORRECT but, reason is INCORRECT.

d) Assertion is INCORRECT but, reason is CORRECT.

17. **Assertion:** Addition of Br_2 to but-1-ene gives two optical isomers. **[1]**

Reason: The product contains one asymmetric carbon atom.

a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.

c) Assertion is CORRECT but, reason is INCORRECT.

d) Assertion is INCORRECT but, reason is CORRECT.

OR

Tetrachloromethane (Carbon tetrachloride) is a

a) antiseptic drug

b) degreasing agent

c) pesticide

d) insecticide

18. **Assertion:** F_2 has low reactivity. **[1]**

Reason: F-F bond has low bond dissociation enthalpy.

a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.

c) Assertion is CORRECT but, reason is INCORRECT.

d) Assertion is INCORRECT but, reason is CORRECT.

19. **Assertion:** The boiling points of alcohols are higher than those of hydrocarbons of comparable molecular mass. **[1]**

Reason: Alcohols show intramolecular hydrogen bonding.

a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.

c) Assertion is CORRECT but, reason is INCORRECT.

d) Assertion is INCORRECT but, reason is CORRECT.

20. **Assertion:** Activity of an enzyme is pH-dependent. **[1]**

Reason: Changes in pH affects the solubility of the enzyme in water.

a) Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

b) Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.

c) Assertion is CORRECT but, reason is INCORRECT.

d) Assertion is INCORRECT but, reason is CORRECT.

OR

Hardening of leather in tanning industry is based on

a) Thermosetting

b) Mutual coagulation

c) Electro – osmosis

d) Electrophoresis

Section B

21. Write the names and structure of the monomers of the following polymers: **[2]**
    i. Buna - S
    ii. Buna - N
    iii. Dacron
22. Mention the various factors that effect the rate of a chemical reaction. **[2]**
23. Calculate the emf of the cell in which the following reaction takes place. **[2]**
    $Ni(s) + 2Ag^+ (0.002M) \rightarrow Ni^{2+} (0.160M) + 2Ag(s)$
    Given that $E^0_{cell} = 1.05V$
24. Using the valence bond approach, predict the shape and magnetic character of **[2]**
    $[Fe(CN)_6]^{3-}$ ion.
25. What are t_{2g} and $e_g$orbitals? **[2]**

    OR

    i. Draw the structure and write the hybridization state of Co in cis - $[Co(NH_3)_4Cl_2]^+$
    ii. Using the IUPAC norms name the following complex: $[Co(NH_3)_4Cl(ONO)]Cl$ -$[Co(NH_3)_4Cl_2]^+$
26. Copper can be extracted by hydrometallurgy but not zinc. Explain. **[2]**

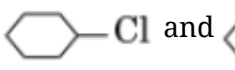
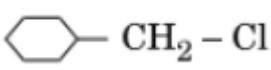
    OR

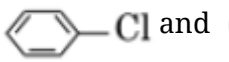
    The reaction, $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$ $(\Delta G^\circ = -421kJ)$ is thermodynamically feasible as is apparent from Gibbs energy change. Then why does it not take place at room temperature?
27. Explain a chemical test to distinguish between primary, secondary and tertiary alcohols. **[2]**

Section C

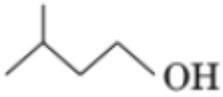
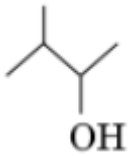
28. State Kohlrausch's law of independent migration of ions. How can the degree of dissociation of acetic acid in a solution be calculated from its molar conductivity data? **[3]**
29. The rate of a particular reaction triples when temperature changes from 50°C to 100°C. Calculate the activation energy of the reaction. **[3]**
    [Given log 3 = 0.4771; R = 8.314 K^{-1} mol^{-1}]

    OR

    The decomposition of phosphine, $2PH_3(g) \rightarrow P_4(g) + 6H_2(g)$ has the rate law $= k[PH_3]$. The rate constant is $6.0 \times 10^{-4} s^{-1}$ at 300 K and activation energy is $3.05 \times 10^5 J\, mol^{-1}$. Calculate the value of rate constant at 310 K.
    [Given: $R = 8.314\ Jmol^{-1}K^{-1}$]
30. On the basis of the following data, explain why Co -(III) is not stable in aqueous solution? **[3]**
    $Co^{3+} + e^- \rightarrow Co^{2+}$, E^0 = +1.82V
    $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$, E^0 = 1.23V
31. Justify the placement of O, S, Se, Te and Po in the same group of the periodic table in terms of electronic configuration oxidation state and hydride formation. **[3]**
32. a. Out of  and  **[3]**
    which one is more reactive towards S_N2 reaction and why?

b. Out of  and 

which one is more reactive towards nucleophilic substitution reaction and why?

c. Out of  and 

which one is optically active and why?

33. Two moles of compound (A) on treatment with a strong base gives two compounds (B) and (C). The compound (B) on dehydrogenation with Cu gives (A) while acidification of (C) gives carboxylic acid (D) having molecular formula CH_2O_2. Identify (A) to (D). **[3]**

OR

An organic compound (A) (molecular formula $C_8H_{16}O_2$) was hydrolysed with dilute sulphuric acid to give a carboxylic acid (B) and an alcohol (C). Oxidation of (C) with chromic acid produced (B). (C) on dehydration gives but-1-ene. Write equations for the reactions involved.

34. Give one important use of each of the following: (i) Bithional (ii) Chloramphenicol (iii) Streptomycin (iv) Paracetamol **[3]**

Section D

35. What is the difference between multimolecular and macromolecular colloids? Give one example of each. How are associated colloids different from these two types of colloids? **[5]**

OR

The molar conductivity of 0.025 mol L^{-1} methanoic acid is 46.1 S cm^2 mol^{-1}. Calculate its degree of dissociation and dissociation constant.

Given $\lambda^{\circ}_{H^+} = 349.6\ S\ cm^2\ mol^{-1}$ and $\lambda^{\circ}_{HCOO^-} = 54.6\ S\ cm^2\ mol^{-1}$.

36. A. Account for the following: **[5]**

i. Aniline is a weaker base than methylamine.

ii. Aryl cyanides cannot be formed by the reaction of aryl halides and sodium cyanide.

B. How will you convert 4-nitrotoluene to 2-bromobenzoic acid?

OR

i. Tert-Butylamine cannot be prepared by the action of NH_3 on tert-butyl bromic. Explain why?

ii. Suggest a convenient method for the preparation of tert-butylamine.

37. a. Write the steps involved in the preparation of: **[5]**

i. $K_2Cr_2O_7$ from $Na_2Cr_2O_7$

ii. $KMnO_4$ from K_2MnO_4

b. What is meant by lanthanoid contraction? What effect does it have on the chemistry of the elements which follow lanthanoids?

OR

Explain giving reasons:

i. Transition metals and many of their compounds show paramagnetic behaviour.

ii. The melting point of transition metals are high.

iii. The transition metals generally form coloured compounds.

iv. Transition metals and their many compounds act as good catalyst.

Atomic Energy Central School No 4

Rawatbhata

CLASS 12 - MATHEMATICS

Confidence Examination-I (2019-20)

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

- All the questions are compulsory.
- The question paper consists of 36 questions divided into 4 sections A, B, C, and D. Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 6 questions of 4 marks each. Section D comprises of 4 questions of 6 marks each.
- There is no overall choice. However, an internal choice has been provided in three questions of 1 mark each, two questions of 2 marks each, two questions of 4 marks each, and two questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.
- Use of calculators is not permitted.

Section A

1. Two matrices A and B are multiplicative inverse of each other only if **[1]**

   a) AB = BA = O

   b) AB = O, BA = I

   c) AB = BA

   d) AB = BA = I

2. If $A = \begin{vmatrix} -1 & 2 & 4 \\ 3 & 1 & 0 \\ -2 & 4 & 2 \end{vmatrix}$ and $B = \begin{vmatrix} -2 & 4 & 2 \\ 6 & 2 & 0 \\ -2 & 4 & 8 \end{vmatrix}$, then B is given by **[1]**

   a) B = 4A

   b) B = –4A

   c) B = 6A

   d) B = – A

3. The derivate of an odd function is **[1]**

   a) an odd function

   b) an even function

   c) None of these

   d) negative

4. If E_1, E_2,.....,E_n are mutually exclusive and exhaustive events associated with a samplespace, and A is any event of non zero probability, then **[1]**

   a) $P(E_i|A) = \frac{P(E_i)P(A|E_i)}{\sum_{i=1}^{n} P(E_i)P(A|E_i)}$

   b) $P(E_i|A) = \frac{P(E_i)P(A|E_i)}{\sum_{i=1}^{n} P(E_{i-1})P(A|E_i)}$

   c) $P(E_i|A) = \frac{P(E_i)P(E_i|A)}{\sum_{i=1}^{n} P(E_i)P(A|E_i)}$

   d) $P(E_i|A) = \frac{P(E_i)P(A|E_i)}{\sum_{i=1}^{n} P(E_i)P(A|E_{i-2})}$

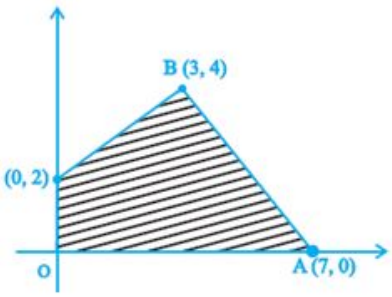
5. Five cards are drawn successively with replacement from a well – shuffled deck of 52 cards. **[1]**

What is the probability that only 3 cards are spades?

a) $\frac{77}{512}$ b) $\frac{45}{512}$

c) $\frac{57}{512}$ d) $\frac{41}{512}$

6. Feasible region (shaded) for a LPP is shown in Figure. Maximize Z = 5x + 7y. **[1]**



a) 45 b) 49

c) 47 d) 43

7. $\cos^{-1}\left(\cos\left(-\frac{\pi}{3}\right)\right)$ is equal to **[1]**

a) $\frac{2\pi}{3}$ b) $\frac{-\pi}{3}$

c) None of these d) $\frac{\pi}{3}$

8. $\int_0^{\pi/2} \frac{1}{1+\sqrt{\cot x}} dx$ is equal to **[1]**

a) $\frac{\pi}{4}$ b) $-\pi$

c) π d) $\frac{3\pi}{4}$

9. The distance d from a point P(x1, y1, z1) to the plane Ax + By + Cz + D = 0 is **[1]**

a) $d = \left|\frac{Ax_1+By_1+Cz_1+D}{\sqrt{A^2+B^2+C^2}}\right|$ b) $d = \left|\frac{Ax_1+By_1+2Cz_1+D}{\sqrt{A^2+B^2+C^2}}\right|$

c) $d = \left|\frac{Ax_1+2By_1+Cz_1+D}{\sqrt{A^2+B^2+C^2}}\right|$ d) $d = \left|\frac{Ax_1+By_1+Cz_1+2D}{\sqrt{A^2+B^2+C^2}}\right|$

10. Find the value of x for which $x\left(\hat{i}+\hat{j}+\hat{k}\right)$ is a unit vector **[1]**

a) $\pm\frac{1}{\sqrt{2}}$ b) $\pm\frac{1}{\sqrt{3}}$

c) $\pm\frac{1}{\sqrt{7}}$ d) $\pm\frac{1}{\sqrt{5}}$

11. Fill in the blanks: **[1]**

If n(A) = p and n(B) = q, then the number of relations from set A to set B = _____.

12. Fill in the blanks: **[1]**

If y = A sin x + B cos x, then $\frac{d^2y}{dx^2} + y =$ _____.

13. Fill in the blanks: **[1]**

If A and B are symmetric matrices, then AB - BA is a _____ matrix.

14. Fill in the blanks: **[1]**

If a line makes an angle $\frac{\pi}{4}$ with each of y and z axis, then the angle which it makes with x-axis is _____.

OR

Fill in the blanks:

The distance of a point P(a, b, c) from x-axis is _____.

15. Fill in the blanks: **[1]**

The value of the expression $\left|\vec{a} \times \vec{b}\right|^2 + \left(\vec{a} . \vec{b}\right)^2$ is _____.

OR

Fill in the blanks:

The unit vector perpendicular to the vectors $\hat{i} - \hat{j}$ and $\hat{i} + \hat{j}$ forming a right handed system is _____.

16. Find values of x for which $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$. **[1]**

17. Evaluate $\int \sqrt{\frac{1-\cos 2x}{1+\cos 2x}} dx$. **[1]**

OR

Evaluate $\int \frac{x^3-x^2+x-1}{x-1} dx$.

18. Evaluate $\int \frac{x^3-1}{x^2} dx$. **[1]**

19. Find the slope of tangent to the curve y = $3x^2$ - 6 at the point on it whose x-coordinate is 2. **[1]**

20. Verify that the function is a solution of the corresponding differential equation. y = x^2 + 2x+ c; **[1]**

y^1 - 2x - 2 = 0

Section B

21. Prove that: $2\sin^{-1}\frac{3}{5} = \tan^{-1}\frac{24}{7}$ **[2]**

OR

Prove that the function f given by f(x) = x^2 - x + 1 is neither strictly increasing nor strictly decreasing on (-1, 1).

22. Find two positive integers x and y such that $x + y = 60$ and xy^3 is maximum. **[2]**

23. Differentiate the function with respect to x : $\cos x^3 \sin^2\left(x^5\right)$ **[2]**

24. If $\vec{a} = 2\hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = -\hat{i} + \hat{2}j + \hat{k}$ and $\vec{c} = 3\hat{i} + \hat{j}$ are such that $\vec{a} + \lambda\vec{b}$ is $\perp$ to $\vec{c}$ is then find the value of λ. **[2]**

OR

Three vectors $\vec{a}, \vec{b}$ and $\vec{c}$ satisfy the condition $\vec{a} + \vec{b} + \vec{c} = 0$ Evaluate the quantity $\mu = \vec{a}.\vec{b} + \vec{b}.\vec{c} + c.\vec{a}$ if $|\vec{a}| = 1, \left|\vec{b}\right| = 4, |\vec{c}| = 2$

25. Find the angle between the lines whose direction ratios are a,b,c and $b - c, c - a, a - b$ **[2]**

26. In a multiple choice examination with three possible answers for each of the five questions, what is the probability that a candidate would get four or more correct answers just by guessing? **[2]**

Section C

27. If f : R $\rightarrow$ R is the function defined by f(x) = $4x^3$ + 7, then show that f is a bijection. **[4]**

28. If $f(x) = \frac{\sqrt{2}\cos x - 1}{\cot x - 1}, x \neq \frac{\pi}{4}$ find the value of $f\left(\frac{\pi}{4}\right)$ so that f(x) becomes continuous at $x = \frac{\pi}{4}$ **[4]**

OR

Differentiate the following function with respect to x: $(\log x)^{\cos x}$

29. Find the particular solution of the following differential equation, given that x = 2, y = 1 **[4]**

$x\frac{dy}{dx} + 2y = x^2, (x \neq 0)$.

30. Evaluate $\int \frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha} dx$. **[4]**

31. An urn contains 5 red and 5 black balls. A ball is drawn at random, its colour is noted and is returned to the urn. Moreover, 2 additional balls of the colour drawn are put in the urn and then a ball is drawn at random. What is the probability that the second ball is red? **[4]**

OR

Find the mean number of heads in three tosses of a coin.

32. Solve the following LPP graphically: **[4]**

Maximize and Minimize Z = 3x + 5y

Subject to 3x - 4y + 12 $\geq$ 0

2x - y + 2 $\geq$ 0

2x + 3y - 12 $\geq$ 0

0 $\leq$ x $\leq$ 4

y $\geq$ 2

Section D

33. If $A = \begin{bmatrix} 0 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 0 \end{bmatrix}$, Prove I + A = (I - A) $\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ **[6]**

OR

If A + B + C = 0, then prove that $\begin{vmatrix} 1 & \cos C & \cos B \\ \cos C & 1 & \cos A \\ \cos B & \cos A & 1 \end{vmatrix} = 0$

34. Find the area enclosed by the parabola $4y = 3x^2$ and the line 2y = 3x + 12. **[6]**

35. Prove that the volume of the largest cone that can be inscribed in a sphere of radius R is $\frac{8}{27}$ of the volume of the sphere. **[6]**

OR

Show that the height of the cylinder of greatest volume which can be inscribed in a right circular cone of height h and having semi-vertical angle α is one third that of the cone and the greatest volume of cylinder is $\frac{4}{27}\pi^3 h \tan\alpha$.

36. A variable plane which remains at a constant distance 3p from the origin cut the coordinate axes at A, B, C. Show that the locus of the centroid of triangle ABC is **[6]**

$x^{-2} + y^{-2} + z^{-2} = p^{-2}$.

Atomic Energy Central School No 4

Rawatbhata

CLASS 12 - BIOLOGY

Confidence -I (2019-20)

Time Allowed: 3 hours **Maximum Marks: 70**

General Instructions:

1. There are a total of 27 questions and five sections in the question paper. All questions are compulsory.
2. Section A contains question numbers 1 to 5, multiple choice questions of one mark each. Section B contains question numbers 6 to 12, short answer type I questions of two marks each. Section C contains question numbers 13 to 21, short answer type II questions of three marks each. Section D contains question number 22 to 24, case-based short answer type questions of three marks each. Section E contains question numbers 25 to 27, long answer type questions of five marks each.
3. There is no overall choice in the question paper. However, internal choices are provided in two questions of one mark, one question of two marks, two questions of three marks and all three questions of five marks. An examinee is to attempt any one of the questions out of the two given in the question paper with the same question number.

Section A

1. Regression and disappearance of ovarian follicles of ovary during reproductive cycle of female is called as **[1]**

   a) Follicular atresia
   b) Cavernosa
   c) Mesovariun
   d) Follicular cessation

   OR

   A mother of one year old daughter wanted to space between her children. The best contraceptive method she should use is

   a) Oral contraceptives
   b) Copper-T
   c) Tubectomy
   d) Diaphragm

2. Electron beam therapy is a kind of radiation therapy to treat **[1]**

   a) Enlarged prostate gland
   b) Kidney stones
   c) Gall bladder stones by breaking them
   d) Certain types of cancer

   OR

   Which of the following is used in treatment of thyroid cancer?

   a) C-14
   b) I-131
   c) U-238
   d) rA-240

3. Gel electrophoresis is a technique to separate fragments of DNA from a mixture. Some of the events of electrophoresis are given below. Arrange the events in order. **[1]**

1. Cut out DNA bands
2. Expose to UV
3. Force DNA to move through gel
4. Stain DNA with ethidium bromide

a) 4 - 3- 1 - 2

b) 4 - 3 - 2 - 1

c) 1 - 2 - 3 - 4

d) 1 - 3 - 4 - 2

4. In Genetic Engineering, to cut DNA at a specific site, the enzyme used is **[1]**

a) DNA polymerase

b) ß- galactosidase

c) RNA polymerase

d) Restriction enzyme

5. Man and Biosphere programme (MAB) studied **[1]**

a) Impact of human interference on abiotic environments only.

b) Impact of human interference and pollution on biotic and abiotic environments

c) Impact of human interference on water bodies only.

d) Impact of human population on ecosystem

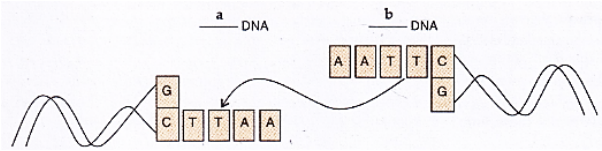
Section B

6. How is parthenocarpy different from parthenogenesis? Give an example of each. **[2]**

OR

Even though each pollen grain has two male gametes, why are at least 10 pollen grains and not 5 pollen grains required to fertilize 10 ovules present in a particular carpel?

7. List two artificial birth control measures. **[2]**
8. What is meant by chromosomal mutation? **[2]**
9. **[2]**



Study the linking of DNA fragments shown above.

i. Name 'a' DNA and 'b' DNA

ii. Name the enzyme that can link these two DNA fragments.

10. How are biofortified maize and wheat considered nutritionally improved? **[2]**
11. Why is the introduction of genetically engineered lymphocytes into a ADA deficiency patient not a permanent cure? Suggest a possible permanent cure. **[2]**
12. Write the name of four important functional aspects of ecosystem. **[2]**

Section C

13. Write the mode of pollination in Vallisneria and water lily. Explain the mechanism of pollination in Vallisneria. **[3]**

14. Draw a diagram of L.S. of an anatropous ovule of an angiosperm and label the following parts. **[3]**
    i. Nucellus
    ii. Integuments
    iii. Antipodal cells
    iv. Secondary nucleus.

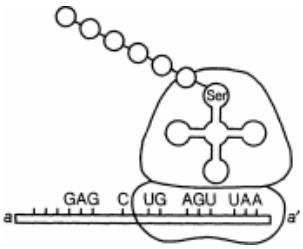
15. Differentiate between the following: **[3]**
    (a) Dominant and Recessive
    (b) Homozygous and Heterozygous
    (c) Monohybrid and Dihybrid

    OR

    A dihybrid heterozygous round, yellow-seeded garden pea was crossed with a double recessive plant.
    i. What type of cross is this?
    ii. Work out the genotype and phenotype of the progeny.
    iii. What principle of Mendel is illustrated through the result of this cross?

16. Explain the following two components of Darwin's theory of natural selection. **[3]**
    (i) Variations
    (ii) Formation of new species

17. Study the figure and answer the following questions: **[3]**



    i. Identify the polarity from a to a', in the diagram below and mention how many more amino acids are expected to be added to this polypeptide chain.
    ii. Mention the DNA sequence coding for serine and the anticodon of tRNA for the same amino acid.
    iii. Why are some untranslated sequence of bases seen in mRNA coding for a polypeptide? Where exactly are they present on mRNA?

18. i. Write the desirable characters a farmer looks for in his sugarcane crop. **[3]**
    ii. How did plant breeding techniques help North Indian farmers to develop cane with desired characters?

19. Highlight any four advantages of Genetically Modified Organisms (GMOs). **[3]**

20. Why are **[3]**
    (i) alien species invasion and
    (ii) loss of habitat and fragmentation considered to be the major cause of loss of biodiversity? Explain with the help of one example each.

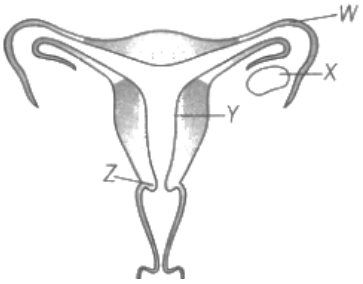
    OR

A team of research workers observed that the population of fish eating birds is declining every year after the establishment of a pesticide factory nearby five years ago. (a) What may be the possible reason in your opinion? Explain. (b) Can you suggest alternative to pesticide so that factory may be stopped.

21. i. A recombinant vector with a gene of interest inserted within the gene of α-galactosidase enzyme, is introduced into a bacterium. Explain the method that would help in selection of recombinant colonies from non-recombinant ones. **[3]**
    ii. Why is this method of selection referred to as insertional inactivation?

Section D

22. The diagram given below shows the female reproductive system. Answer the following questions: **[3]**



    i. Where do fertilisation and implantation occur in the above diagram?
    ii. How would a test confirm sexual intercourse by analysing vaginal swab?
    iii. Which layer of the uterus undergoes cyclic changes during the menstrual cycle?

23. How can sewage be used to generate biogas? Explain. **[3]**

24. Observe the diagram for the sewage discharge and answer the following questions: **[3]**

    i. What does A and B mentioned in the above graph indicate?
    ii. Explain giving the reason the causes of the appearance of peaks A and B in the graph shown above.
    iii. What causes low dissolved oxygen in wastewater?

Section E

25. List the differences between Turner's syndrome and Klenifelter's syndrome **[5]**

OR

Illustrate schematically the process of initiation, elongation and termination during transcription of a gene in a bacterium.

26. a. What is somatic hybridization? Explain the various steps involved in the process. **[5]**
    b. Mention any two uses of somatic hybridization.

OR

In your view what motivates youngsters to take to alcohol or drugs and how can this be avoided?

27. Why is the ozone layer required in the stratosphere? How does it get degraded? Explain. **[5]**

OR

a. What is hydrarch succession?
b. Compare the pioneer species and climax communities of hydrarch and xerarch succession respectively.
c. List the factors upon which the type of invading pioneer species depend in secondary succession. Why is the rate of this succession faster than that of primary succession?

Atomic Energy Central School No-4, Rawatbhata
Confidence Test – I (2019-20)
Class: XII , Computer Science

Time Limit: 3 Hours *Maximum Marks: 70*

Q.1

(a) What is a self referential structure? Explain with example. [2]

Or

Define enumerated list (enum), with example?

(b) Name the header files, to which following built-in functions belongs: [1]

(i) exit() (ii) ceil()

(c) Find out the errors in the following program. Underline each correction if any. [2]

```
#include<iostream.h>
void main()
{ float a, b;
  cout<< "\n Enter two real Numbers:";
  cin>>x>>y;
  swap (x);
  cout<<"A= "<<a<<"B= "<<b;
void Swap( float x, float y)
{ int T;
  T=a;
  a=b;
  b=pow(T,2);
}
}
```

(d) Find the output of the following program: [2]

```
#include<iostream.h>
struct Play
{ int Score, Bonus;
};
void Calculate(Play & P, int N = 10)
{ P.Score++;
  P.Bonus + = N;
}
void main()
{ Play PL = {10, 15};
  Calculate(PL, 5);
  cout<<PL.Score<<" ;" <<PL.Bonus<<endl;
  Calculate(PL);
  cout<<PL.Score<<" ;" <<PL.Bonus<<endl;
  Calculate(PL, 15);
  cout<<PL.Score<<" ;" <<PL.Bonus<<endl;
}
```

(e) Find the output for the following program: [2]

```
#include<iostream.h>
#include<ctype.h>
void Encrypt ( char T[])
{for( int i=0 ; T[i] != ' \0' ; I += 2)
    if( T[i] = = 'A' || T[i] = = 'E' )
     T[i] = '#' ;
    else if (islower(T[i]))
            T[i] = toupper(T[i]);
         else
                 T[i] = '@';
}
void main()
```

```
{ char text [] = "XiAomi REd Note-8";
  Encrypt(text);
  cout<<text<<endl;
}
```

(f) Observe the following program Score.cpp carefully. If the value of Num given by the user is 5, choose the incorrect possible output(s) from the option from (i) to (iv), and justify your option. [2]

```
//Program : Score.cpp
#include<stdlib.h>
#include<iostream.h>
void main()
{ randomize();
  int Num, Rndnum;
  cin>>Num;
  Rndnum = random(Num) + 5;
  for(int N = 1 ; N<= Rndnum ; N++)
    cout<<N <<" ";
}
```

Output Options:

(i) 1 2 3 4 5 (ii) 1 2 (iii) 3 4 5 6 7 8 9 (iv) 1 2 3 4 5 6 7

Q.2 (a) Define functions overloading with example? [2]

(b) Answer the following questions after going through the following class: [2]

```
class Interview
{ int month;
public:
Interview( int Y ) { month = y; }        // Constructor 1
Interview ( Interview & t );             // Constructor 2
};
```

(1) Create an object, such that it invoke constructor 1.

(2) Interview obj1; //*(for example)* Explain: Is this object is valid/invalid, justify the answer?

(c) Design a class ***Taxpayer*** in C++ to calculate the tax for the people living in Utopia. [4]

Private Data member:

Panno	integer
Name	string
Taxableincom	float
Tax	float

Public Member function:

Inputdata( ) to enter the data (Panno, Name, Taxableincom)

Displaydata( ) to display all data for tax payer

Computetax( ) to compute tax for a tax payer as per following:

Taxable Income	**Rate of Taxation**
Upto 60000	0%(of taxableincom)
Above 60000 but less than equal to150000	5%
Above 150000 but less than equal to500000	10%
Above 500000	15%

(d) Consider the following and answer the questions given below: [5]

```
class CEO
{ double Turnover;
  protected:
    int Noofcomp;
  public:
    CEO();
    void INPUT(int);
    void OUTPUT();
};
class Director : public CEO
```

	{ int Noofemp;
	public:
	Director ();
	void Indata();
	void Outdata();
	protected:
	float Funds;
	};
	class Manager : public Director
	{ float Expenses;
	public:
	void Display();
	Manager();
	}
	1) Which constructor will be called first at the time of declaration of an object of class Manager?
	2) How many bytes will an object belonging to class Manager require?
	3) Name the member function(s), which are directly accessible from the object of class Manager.
	4) Is the member function OUTPUT() accessible by the object of the class Director and why?
	5) If the class Manager is derived in protected mode in place of public then, give the names of inherited members in the protected section only?	

Q.3	a) An array A[1..10][-1..10] is stored in the memory with each element occupying 4 bytes of space. Assuming the address of A[5][9] is 1500 then compute the base address of A and also the address of A[7][2], when the array is stored as row wise.
	b) Write a function in C++ which accepts an array of following structure type and its size as arguments and sort the array in ascending order of price by using Bubble or Selection Sort Methods.
	struct ITEM
	{ int code;
	char Name[20];
	float Price;
	};
	OR
	Write a function in C++ which accepts an integer array and its size as arguments and replaces elements having values divisible by 5 with 5.
	Example : if an array of five elements initially contains the elements as
	3, 4, 5, 16, 20
	then the function should rearrange the content of the array as: 3, 4, 5, 16, 5
	c) Write a function in C++ which accepts a 2-D array of integers as argument and store all the odd elements in to a new 1-d array. Display the content of 1-d array.
	Example, if the array content is
	3 5 4 2
	7 6 9 1
	2 1 8 3
	Output through the function should be :
	Odd array is : 3 5 7 9 1 1 3
	d) Write a function DelPlayer () in C++ to delete the record of a player from a dynamically allocated Queue implemented with the help of following structure. (Assume the queue is already created with some elements of Game type.)
	struct Game
	{ int Pid; // Player ID
	char Pname[20]; // Player Name
	char Type[20]; // Batsman or Bowler or Keeper or Others
	Game *next;
	}*Front, *Rear;
		[3]
		[3]
		[3]
		[4]

	e) Convert the following infix expression into postfix expression. Show the stack status after execution of each operation. X – Y / (Z+U) * V- M	[2]

Q.4	a) Observe the program segment given below carefully and write C++ statements for the statement 1 and statement 2. Where statement 1 is required to position the file write pointer to an appropriate place in the file and statement 2 is to perform the write operation with the modified record.
	class PracFile
	{ intPracno;
	char PracName[20];
	int TimeTaken;
	int Marks;
	public:
	void EnterPrac( ); // function to enter PracFile details
	void ShowPrac( ): // function to display PracFile details
	int RTime() // function to return TimeTaken
	{ return TimeTaken; }
	void Assignmarks (int M) // function to assign Marks
	{ Marks = M; }
	};
	void AllocateMarks( )
	{ fstreamFile;
	File.open("MARKS.DAT",ios::binary|ios::in|ios::out);
	PracFile P;
	int Record = 0;
	while (File.read((char*) &P, sizeof(P)))
	{ if(P.RTime()>50)
	P.Assignmarks(0)
	else
	P.Assignmarks(10)
	_____ //statement 1
	_____ //statement 2
	Record + + ;
	}
	File.close();
	}
	If the function AllocateMarks () is supposed to Allocate Marks for the records in the file MARKS.DAT based on their value of the member TimeTaken.
		[1]
		
		[3]

	b) Given a binary file CAR.DAT, containing records of the following class Car type:
	class Car
	{
	char C_no[10];
	char C_Name[30];
	int Mileage;
	public:
	void Enter()
	{ gets(C_no); gets(C_Name); cin>>Mileage;
	}
	void Display()
	{ cout<<setw(12)<<C_no;
	cout<<setw(32)<<C_Name<<setw(3)<<Mileage<<endl;
	}
	int ReturnM() { return Mileage; }
	};
	Write a function in C++ that would read the content of file CAR.DAT and display the details of car with mileage between 16 and 20.
		[2]

c) Define the following functions with its syntax and usage.
(i) seekp() (ii) read()

Q.5 a) Consider the following relation and perform the relational algebra operation (for Q. 1 & 2): [2]

Customer:

id	Name	Banker name	Amount	Balance
C001	reva	reva	21000	22000
C002	ramesh	ajit	10000	25000
C003	kalpana	ajit	5000	35000
C004	sonali	reva	12000	22000
C005	ajay	kamal	5000	13000

1) Find the name of customer with their banker name from the relation customer.
2) Find out the name and balance of customer with the banker "ajit".

OR

Define the following :
(i) Primary Key (ii) Degree (iii) Cardinality (iv) Tuple

b) Consider the following WORKERS and DESIG. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (vi) [6]

WORKERS

W_ID	FIRSTNAME	LAST NAME	ADDRESS	CITY
102	Sam	Tones	33 Elm St.	Paris
105	Sarah	Ackerman	440 U.S. 110	New York
144	Manila	Sengupta	24 Friends Street	New Delhi
210	George	Smith	83 First Street	Howard
255	Mary	Jones	842 Vine Ave.	Losantiville
300	Robert	Samuel	9 Fifth Cross	Washington
335	Henry	Williams	12Moore Street	Boston
403	Ronny	Lee	121 Harrison St.	New York
451	Pat	Thompson	11 Red Road	Paris

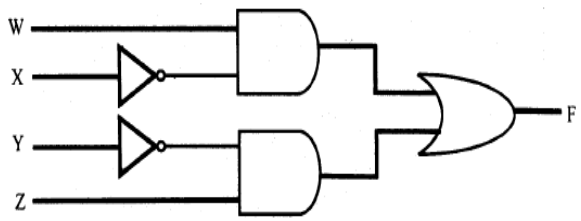
DESIG

W_ID	SALARY	BENEFITS	DESIGNATION
102	75000	15000	Manager
105	85000	25000	Director
144	70000	15000	Manager
210	75000	12500	Manager
255	50000	12000	Clerk
300	45000	10000	Clerk
335	40000	10000	Clerk
403	32000	7500	Salesman
451	28000	7500	Salesman

(i) To display the content of workers table in ascending order of first name.
(ii) To display the firstname, City and total salary of all Clerks from the tables workers and design, where total salary is calculated as salary + benefits.
(iii) To display the minimum salary among Managers and Clerks from the table DESIG.
(iv) Increase the Benefits of all Salesmen by 10% in table DESIG.
(v) SELECT FIRSTNAME, SALARY FROM WORKERS, DESIG WHERE DESIGNATION = 'Manager' AND WORKERS.W_ID = DESIG.W_ID;
(vi) SELECT DESIGNATION, SUM(SALARY) FROM DESIG GROUP BY DESIGNATION HAVING COUNT(*)>=2 ;

Q.6 a) State and verify Demorgan's Law in Boolean Algebra. [2]

b) Find out the output for the following logic circuit diagram [1]



c) Write the Product of Sum form of the function H (U, V, W). Truth table representation of H is as follows: [1]

U	V	W	H
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

d) Minimize the following function using K- map and find out the expression [3]
F(A, B, C, D) = ∑ (5,6,7,8,9,12,13,14,15)

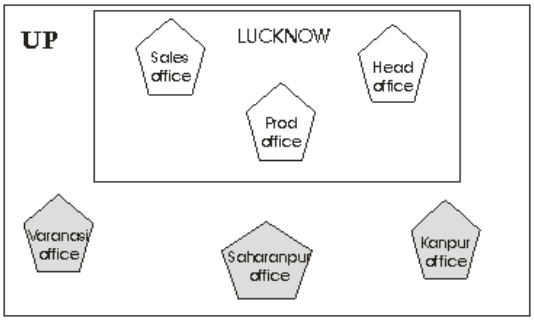
Q.7 a) Differentiate between LAN & WAN? [1]

b) Write a brief note on types of cables used in communication. [2]

c) Compare the HTTP and FTP? [1]

d) Define the terms : TDMA & CDMA. [1]

e) "Kanganalay Cosmetics" is planning to start their offices in four major cities in Uttar Pradesh to provide cosmetic product support in its retail fields. The company has planned to set up their offices in Lucknow at three different locations and have named them as "Head office", "Sales office", & "Prod office". The company's regional offices are located at Varanasi, Kanpur & Saharanpur. A rough layout of the same is as follows : [3]



Approximate distances between these offices as per network survey team is as follows :

Place from	Place to	Distance
Head office	Sales office	150M
Head office	Prod office	80M
Head office	Varanasi Office	295 KM
Head office	Kanpur Office	195 KM
Head office	Saharanpur office	408 KM

Number of computers :

Head office	156
Sales office	25
Prod office	56
Varanasi Office	85
Kanpur Office	107
Saharanpur office	105

(i) a)Suggest the placement of the Server and repeater with justification in Lucknow city network.
b) if we connect all offices in UP together then which type of this n/w is: LAN, WAN or MAN?

(ii) Suggest the device to be procured by the company for connecting all the computers within each of its offices in Lucknow out of the following devices :
Modem, Telephone, Switch/Hub

(iii) Suggest a suitable way to connect this n/w to the branch office in Kolkata with high accuracy.

f) What is web 2.0? [1]

g) What is hosting? Give name of any server side scripting language? [1]

परमाणु ऊर्जा केंद्रीय विद्यालय -4 रावतभाटा

प्रथम आत्मविश्वास परीक्षा –(2019-20)

समय- 3 घंटे कक्षा -12 , विषय – हिन्दी पूर्णांक -80

खण्ड –क

1 निम्नलिखित गदयांश को ध्यानपूर्वक पढ़कर पूछे गए प्रश्नों के उत्तर लिखिए -

सिनेमा जगत के अनेक नायक - नायिकाओं ,गीतकारों कहानीकारों और निर्देशकों को हिन्दी के माध्यम से पहचान मिली है । यही कारण है कि गैर हिन्दी भाषी कलाकार भी हिन्दी की ओर आए हैं । समय और समाज के उभरते सच को पर्दे पर पूरी अर्थवत्ता मे धारण करनेवाले ये लोग दिखावे के लिए भले ही अंग्रेजी के आग्रही हो , लेकिन बुनयादी और जमीनी हकीकत यही है कि इनकी पूंजी ,इनकी प्रतिष्ठा का एकमात्र निमित्त हिन्दी ही है । लाखों –करोड़ों दिलों की धड़कनो पर राज करने वाले ये सितारे फिल्म और भाषा के सबसे बड़े प्रतिनिधि हैं ।

'छोटा परदा' ने आम जनता के घरों मे अपना मुकाम बनाया , तो लगा हिन्दी आम भारतीयों की जिंदगी बन गयी है । हमारे आद्यग्रंथ , रामायण और महाभारत को जब हिन्दी मे प्रस्तुत किया गया ,तो सड़कों का कोलाहल सन्नाटे मे बदल गया । ' बुनियाद ' और ' हम लोग ' से शुरू हुआ सोप ऑपेरा का दौर हो या सास - बहू धारवाहिकों का ,ये सभी हिन्दी की रचनात्मकता और उर्वरता के प्रमाण हैं। ' कौन बनेगा करोड़पति' से करोड़पति चाहे जो बने हो , पर सदी के महानायक की हिन्दी हर दिल की धड़कन और हर धड़कन की भाषा बन गई । सुर और संगीत की प्रतियोगिताओं में कर्नाटक ,गुजरात ,महाराष्ट्र ,असम ,सिक्किम जैसे गैर हिन्दी क्षेत्रों के कलाकारों ने हिंदी गीतों के माध्यम से पहचान बनाई । ज्ञान गंभीर ' डिस्कवरी चैनल' हो या बच्चों को लुभाने - रिझाने वाला 'टाम ऐंड जेरी –इनकी हिन्दी उच्चारण की मिठास और गुणवत्ता अद्भुत प्रभावी और ग्राह्य है । धर्म –संस्कृति ,कला –कौशल , ज्ञान विज्ञान सभी कार्यक्रम हिन्दी की संप्रेषणीयता के प्रमाण हैं ।

(क) प्रस्तुत गदयांश के लिए एक उपयुक्त शीर्षक दीजिए । 1

(ख) गैर हिन्दी भाषी कलाकारों के हिन्दी सिनेमा में आने का कोई एक कारण लिखिए । 1

(ग) छोटा पर्दा से क्या तात्पर्य है ? इसका आम जन-जीवन की भाषा पर क्या प्रभाव पड़ा ? 2

(घ) कुछ बहु प्रचलित और लोकप्रिय धारावाहिकों के उल्लेख से लेखक क्या सिद्ध करना चाहता है ? 2

(ड़) सदी का महानायक से लेखक का संकेत किस फिल्मी सितारे की ओर है ? 2

(च) फिल्म और टीवी ने हिन्दी के प्रचार प्रसार में क्या भूमिका निभाई है ? 2

(छ) ' उच्चारण 'और 'भारतीय' शब्दों में निहित उपसर्ग और प्रत्यय छांट कर लिखिए । 2

2। निम्नलिखित काव्यांश को पढ़कर पूछे गए प्रश्नों के उत्तर लिखिए -

मेरे पांव बहुत छोटे हैं धरती बहुत बड़ी है मां !
मेरी अंगुली थामे मेरे बिलकुल पास खड़ी रह मां !
तेरा नेह कवच कुंडल है , तेरा परस ढाल मेरी ,
ऐसी थकन थका हूं अबकी थकने लगी चाल मेरी ,
अंध कूप मे उतर रहा हूं कैसी विकट घड़ी है माँ !
मेरी अंगुली थामें मेरे बिलकुल पास खड़ी रह मां !
जब भी चाहा सुख से जी लूं दुख ने आकार घेर लिया ,
जितना अधिक सहा उतना ही नाम तुम्हारा टेर लिया ,
मरुस्थलों के तपते पथ मे तू ही मेघ झड़ी है मां !
मेरी उंगली थामे मेरी बिलकुल पास खड़ी रह मां !
राहें जिसकी मंजिल होंगी उसको तो चलना ही होगा ,
जो वसंत का अधिकारी है उसको तो जलना ही होगा ।
ऋतु –चक्रों की हर वेला मे तू ही पुष्प लड़ी है माँ !
मेरी अंगुली थामे बिलकुल पास खड़ी रह मां !

(क) मां के स्नेह को कवच कुंडल क्यों कहा गया है ? 1

(ख) विषम परिस्थितियों में मां ही क्यों याद आती है ? 1

(ग)" मरुस्थलों के तपते पाठ में तू ही मेघ झड़ी है मां" –पंक्ति का भाव लिखिए। 1

(घ) उन पंक्तियों को उद्धृत कीजिए ,जिनका भाव है –जीवन में विविध अनुभवों के बीच मां का साथ फूलों जैसा सुहाना होता है। 1

अथवा

मिट्टी तन है ,मिट्टी मन है ,मिट्टी दाना पानी है।
मिट्टी ही तन - बदन हमारा ,सो सब ठीक कहानी है।
पर जो उलटा समझ इसे ही बने आप ही ज्ञानी है।
मिट्टी करता है जीवन को जो और बड़ा अज्ञानी है।
समझ सदा अपना तन मिट्टी ,मिट्टी जो कि रमाता है।

मिट्टी करके सरबस अपना मिट्टी में मिल जाता है ,
जगत है सच्चा तनिक न कच्चा समझो बच्चा इसका भेद ।
खाओ पीओ कर्म करो नित ,कभी न लाओ मन में खेद।
रचा उसी ने है यह जग तो निश्चय उसको प्यारा है।
इसमें दोष लगाना अपने लिए दोष का द्वारा है।

(क) कवि ने कैसे ज्ञानियों पर कटाक्ष किया है ?

(ख) जीवन को मिट्टी करने से कवि का क्या आशय है ?

(ग) कवि संसार को सच्चा मानकर क्या संदेश देना चाहता है ?

(घ) यह संसार भगवान को प्रिय क्यों है ?

खण्ड –ख

3 निम्नलिखित मे से किसी एक विषय पर रचनात्मक लेख लिखिए - 5

(क) काश ! मै उड़ पाता

(ख) जहां न पहुंचे रवि वहां पहुंचे कवि

(ग) चांदनी रात और मै

4 आपके क्षेत्र मे एक सड़क को चौडा करने के बहाने आवश्यकता से अधिक पेड़ काटे गए हैं। इसकी विस्तृत जानकारी देते हुए वन और पर्यावरण विभाग को पत्र लिखिए। 5

अथवा

किसी प्रमुख दैनिक समाचार -पत्र के संपादक को गांवों में चिकित्सा सुविधा के अभाव का उल्लेख करते हुए एक विशेष चिकित्सा सुविधाओं वाला अस्पताल खोलने का सुझाव प्रकाशित करने का अनुरोध करते हुए पत्र लिखिए।

5 निम्नलिखित मे से किन्हीं चार प्रश्नों के संक्षिप्त उत्तर लिखिए - 1 X4=4

(क) पेज थ्री पत्रकारिता का क्या तात्पर्य है ?

(ख)फ्लैश या ब्रेकिंग न्यूज किसे कहते है ?

(ग) संपादक के दो प्रमुख उत्तरदायित्वों का उल्लेख कीजिए हैं ?

(घ) अंशकालिक पत्रकार किसे कहते हैं ?

(ड) हिन्दी के किन्हीं दो समाचार –पत्रों का नाम लिखिए।

6 कहानी का नाट्य –रूपान्तरण करते समय किन महत्वपूर्ण बातों का ध्यान रखना चाहिए ? उत्तर लिखिए। 3

अथवा

छंद तथा बिम्ब का कविता लेखन मे महत्वपूर्ण स्थान है। स्पष्ट कीजिए।

7 ' फिल्मों में बढ़ती हिंसा' विषय पर आलेख लिखिए। 3

अथवा

'बाल श्रमिक' विषय पर एक फीचर लिखिए।

खण्ड –ग

8 निम्नलिखित काव्यांश को पढ़कर पूछे गए प्रश्नों के उत्तर लिखिए।

सोचिए बताइए ,
आपको अपाहिज होकर कैसा लगता है

कैसा ,यानी कैसा लगता है हम खुद इशारे से बताएंगे कि क्या ऐसा ?)

सोचिए बताइए ,

थोड़ी कोशिश करिए (यह अवसर खो देंगे ?)

आप जानते हैं कि कार्यक्रम रोचक बनाने वास्ते

हम पूछ -पूछ कर उसको रुला देंगे

इंतजार करते हैं आप भी उसके साथ रो पड़ने को करते हैं ?

(क) प्रस्तुत पंक्तियां किस कविता से ली गई है और इसके कवि कौन हैं ? 2

(ख) संवाददाता अपाहिज से कौन – कौन – सा प्रश्न पूछेगा ? 2

(ग) कार्यक्रम को रोचक बनाने के लिए संवाददाता क्या कार्य करता है ? 2

अथवा

तव प्रताप उर राखि प्रभु जैहऊं नाथ तुरंत ।

अस कहि आयसु पाइ पद बंदी चलउ हनुमंत ।।

भरत बाहु बल सील गुन प्रभु पद प्रीति अपार ।

मन महु जात सराहत पुनि - पुनि पवन कुमार । ।

(क) इस काव्यांश के कवि और कविता का नाम लिखिए ।

(ख) हनुमान ने संजीवनी बूटी लाने के विषय मे राम से क्या कहा ?

(ग) हनुमान भरत के किन गुणों से प्रभावित हुए ?

9 निम्नलिखित काव्यांश को पढ़कर पूछे गए प्रश्नों के उत्तर लिखिए : 2+2=4

नभ मे पांती बाधे बगुले के पंख ,

चुराए लिए जाती वे मेरी आंखे ।

कजरारे बादलों की छाई नभ छाया ,

तैरती सांझ की सतेज श्वेत काया ।

(क) काव्यांश के शिल्प सौन्दर्य पर प्रकाश डालिए । (ख) काव्यांश का भाव सौंदर्य लिखिए ।

अथवा

रक्षाबंधन की सुबह रस की पुतली

छायी है छटा गगन की हलकी- हलकी

बिजली की तरह चमक रहे हैं

लच्छे भाई के हैं बांधती चमकती राखी ।

(क) काव्यांश के भाव सौंदर्य को स्पष्ट कीजिए । (ख) काव्यांश के शिल्प सौंदर्य पर पकाश डालिए ।

10 निम्नलिखित में से किन्ही दो प्रश्नों के उत्तर लिखिए : 3+3=6

(क)दिन ढलने पर कवि के पद शिथिल होने और उर में विह्वलता का अनुभव होने के क्या कारण हैं ? 'एक गीत' के आधार पर लिखिए ।

(ख) 'सहर्ष स्वीकारा है' कविता में कवि संबोध्य (तुम) को भूल जाने का दंड क्यों मांग रहा है ?

(ग) 'उषा' कविता में भोर के नभ की तुलना किससे की गई है और क्यों ?

(घ) 'छोटा मेरा खेत' कविता में कवि ने रस के अक्षय पत्र से रचना कर्म की किन विशेषताओं का संकेत किया है ? स्पष्ट कीजिए ।

11 निम्नलिखित गदयांश को पढ़कर पूछे गए प्रश्नों के उत्तर लिखिए : 2+2=6

फिर जीजी बोली , "देख तू तो अभी से पढ़- लिख गया है । मैंने तो गांव के मदरसे का भी मुंह नहीं देखा । पर एक बात देखी है कि अगर तीस –चालीस मन गेहूं उगाना है तो किसान पांच –छह सेर अच्छा गेहूं अपने पास से

लेकर जमीन में क्यारियां बना कर फेंक देता है। उसे बुवाई कहते हैं। यह जो सूखे हम अपने घर का पानी इन पर फेंकते हैं वह भी बुवाई है। यह पानी गली मे बोएंगे तो सारे शहर ,कस्बा गांव पर पानीवाले फसल आ जाएगी। हम बीज बना कर पानी देते हैं ,फिर काले मेघा से पानी मांगते हैं। सब ऋषि- मुनि कह गए हैं कि पहले खुद दो तब देवता तुम्हें चौगुना - अठगुना करके लौटाएंगे। भईया ,यह तो हर आदमी का आचरण है , जिससे सबका आचरण बनता है। यथा राजा तथा प्रजा सिर्फ यही सच नहीं है। सच यह भी है कि यथा प्रजा तथा राजा। यही तो गांधी जी महाराज कहते हैं। "

(क) बुवाई के लिए किसान किस प्रकार से श्रम करते हैं ?

(ख) त्याग की महत्ता को किसने बताया था ? समाज के लिए यह क्यों जरूरी है ?

(ग) यथा राजा तथा प्रजा से जीजी क्या कहना चाहती थीं ?

अथवा

जेब भारी हो और मन खाली हो , ऐसी हालत मे जादू का असर खूब होता है। जेब खाली पर मन भरा न हो , तो भी जादू चल जाएगा। मन खाली है तो बाजार की अनेकानेक चीजों का निमंत्रण उस तक पहुंच जाएगा। कहीं हुई उस वक्त जेब भारी ,तब तो वह मन फिर किसकी मानने वाला है ! मालूम होता है कि यह भी लूं ,वह भी लूं। सभी सामान जरूरी और आराम को बढ़ाने वाला मालूम होता है। पर यह सब जादू का असर है। जादू की सवारी उतरी कि पता चलता है कि फैंसी चीजों की बहुतायत आराम मे मदद नहीं देती ,बल्कि खलल ही डालती है। थोड़ी देर को स्वाभिमान को जरूर सेंक मिल जाता है , पर इससे अभिमान की गिल्टी को और खुराक ही मिलती है।

(क) जादू किसे कहा गया है और क्यों ?

(ख) यह जादू कब और किन स्थितियों मे असर करता है ?

(ग) जादू का असर समाप्त होने पर ग्राहक की दशा कैसे हो जाती है ? उसे क्या बोध होता है ?

12 निम्नलिखित प्रश्नों के उत्तर लिखिए :

(क)'काले मेघा पानी दे' पाठ की इंदर सेना क्या युवाओं को रचनात्मक कार्य करने की प्रेरणा दे सकती है ? तर्क सहित उत्तर लिखिए। 3

(ख)पहलवान लुट्टन सिंह को राजा साहब की कृपा दृष्टि कब प्राप्त हुई ? वह उन सुविधाओं से वंचित कैसे हो गया ? 'पहलवान की ढोलक' पाठ के आधार पर स्पष्ट कीजिए। 3

(ग)"चार्ली की फिल्म ' भावनाओं पर टिकी हुई हैं ,बुद्धि पर नहीं " 'चार्ली चैप्लिन यानी हम सब' पाठ के आधार पर स्पष्ट कीजिए। 3

(घ) किस प्रकार का मनुष्य बाजार को सार्थकता देते हैं ? 1

13 जूझ के लेखक ने अपने मराठी शिक्षक सैंदलगेकर से किन गुणों और जीवन मूल्यों को ग्रहण किया ? क्या आज भी उसकी प्रासंगिकता है ? 4

अथवा

एन फ्रेंक की डायरी विश्व की सर्वाधिक पढ़ी गई पुस्तकों मे से एक है। इसके क्या कारण हैं?

14 निम्नलिखित में से किंही दो प्रश्नों के उत्तर लिखिए : 4+4=8

(क) हमारे पूर्वजों ने पांच हजार वर्ष पहले किस प्रकार विश्व को व्यवस्थित जीवन जीने का तरीका सिखाया था ? अतीत के खंडहर के आधार पर सोदाहरण उत्तर दीजिए।

(ख) यशोधर बाबू ने किशन दा से किन जीवन मूल्यों को पाया था ? क्या आप भी उन्हें अपनाना चाहेंगे ? क्यों ?

(ग) जूझ पाठ के लेखक के पिता अपने बेटे की पढ़ाई के विरूद्ध क्यों थे ? शिक्षा के प्रति अपनाया गया उनका यह रवैया वर्तमान संदर्भों में त्याज्य क्यों है ?

(घ) ऐन फ्रेंक ने अपनी डायरी एक निर्जीव गुड़िया 'किट्टी' के नाम संबोधित चिट्ठी के रूप में क्यों लिखी ? इस आलोक में तत्कालीन राजनीतिक स्थिति पर टिप्पणी कीजिए।

Atomic Energy Central School No. 4 Rawatbhata

Confidence Examination - I(2019-20)

CLASS XII, Physical Education (048)

Time Allowed: 3 Hrs Max. Marks: 70

GENERAL INSTRUCTIONS:

1) The question paper consists of 34 questions

2) All questions are compulsory.

3) Question 1-20 carry 1 mark and are multiple choice questions.

4) Question 21-30 carry 3 marks each and

should not exceed 80 -100 words each.

5) Question 31-34 carry 5 marks and should not exceed 150-200 words.

Q.1.What is the formula for calculating the number of matches in a Knockout tournament?

a) n+1 b) n-1 c) n-1 d) n+1 1

Q.2.How many rounds will take place, if 13 teams are participating in a Single league tournament?

a) 12 b) 13 c) 14 d) none of these 1

Q.3.Which of the following is a micro-nutrient?

a) Calcium b) Potassium c) Magnesium d) All of these 1

Q.4.Which is not a Fat soluble Vitamin?

a) Vit-A b) Vit-B c) Vit-D d) Vit-K 1

Q.5.How many elements are there in Yoga?

a) 7 b) 8 c) 6 d) 9 1

Q.6.Among these, which is not classified as Asana.

a) Pranayam b) Meditative c) Relaxative d) Corrective 1

Q.7.The correct full form of SPD.

a) Sensory Protecting Disorder b) Sensory Proceeding Disorder c) Sensory Processing Disorder d) None 1

Or

Which of the following is not a component of Physical Fitness?

a) Eating Disorder b) Muscle Strength c) Age & Gender d) Agility & Flexibility

Q.8.Doing or Checking things repeatedly is symptom of

a) ASD b) ADHD c) OCD d) ODD 1

Q.9.Which is not a Postural disease?

a) Kyphosis b) Bow Legs c) Lordosis d) Cognitive 1

Q.10.Female Athlete Triad is a Syndrome characterized by

a) Osteoporosis b) Amenorrhea c) Eating disorder d) All of these 1

Q.11.Who introduced the Barrow three item general motor ability test?

a) Franklin Barrow b) Kraus Weber Barrow c) Harold Marion Barrow d)None of these 1

Q.12.Which of the following test is conducted to measure Cardiovascular fitness?

a) Rockport test b) Chair Stand Test c) Back Stretch d) None of these 1

Or

Which of the following is not an example of Isometric exercise?

a) Running Fast b) Pushing the wall c) Lifting heavy weight d) None of these

Q.13.This is an over use injury.

a) Contusion b) Abrasion c) Tennis Elbow d) Incision 1

Q.14.This is the amount of blood pumped out by each ventricle per minute.

a) Stroke volume b) Cardiac output c) Tidal volume d)None of these 1

Q.15.Principles of Biomechanics are applied in:

a) Designing sports Equipments b) Designing training Prog. c) Improving technique d) All of these 1

Q.16.Movement of leg away from the imaginary central line is an example of:

a) Abduction b) Flexion c) Extension d) Adduction 1

Q.17.Which of the following personality traits are included in Big Five theory?

a) Openness & Extraversion b) agreeableness & Neuroticism c) Conscientiousness d) All of these 1

Q.18.The main Strategy for enhancing adherence to exercise is:

a) Set short term goal b) Set long term goal c) Set no goal d) workout alone 1

Q.19.Which of the following is not a type of Endurance?

a) Aerobic endurance b) Anaerobic endurance c) Running endurance d) Strength endurance 1

Q.20.Time taken by a athlete to start the race from the starting block is known as:

a) Starting time b) Reaction time c) Action time d) All of these

Q.21.What is Big Five theory? Explain in detail. 3

Or

Write in brief about important mineral requirement.

Q.22.What is Flexibility? Explain its training laws. 3

Q.23.Describe the types of Movements with example. 3

Q.24.What preventive measures can be taken to avoid sports injuries? 3

Q.25.Explain Rock Port one mile test. 3

Q.26.Explain in detail about Eating disorder. 3

Q.27.Physical activities are beneficial for children with special needs. Explain. 3

Or

Explain the advantages of correct posture.

Q.28.Suggest and explain any two asanas use for curing Back pain? 3

Q.29.Dieting can be harmful for our body. Justify. 3

Or

What do you mean by IsoKinetic Exercise?

Q.30.Differentiate between seeding and Byes. 3

Q.31.Define Endurance and describe the methods of developing it. 5

Q.32.What is Personality? Explain its dimension and role of sports in personality development. 5

Q.33.Explain the meaning and importance of Biomechanics in sports. 5

Q.34.What are the immediate and long term effects of regular exercise on respiratory system. 5

Or

What is Autism Spectrum Disorder/Discuss its causes in detail.

Solution

Class 12 - English Core

Confidence Examination-I (2019-20)

Section A

1. **1.1 Answer each of the questions given below by choosing the most appropriate option: (1×5=5)**
   i. (b) Meet her power shortage
   ii. (c) It lies very deep and the cost of extraction is very high
   iii. (a) 74 percent of her total consumption
   iv. (d) Peaceful purposes
   v. (a) Production will be higher and so per capita income will increase
   vi. (c) dams

   1.2 Answer the following questions briefly: (1×5=5)
   i. India needs nuclear energy to meet the power shortage throughout the country. It is a cheap and more dependable alternative to coal, water and oil which can be other alternatives to source of energy.
   ii. Radiation can be helpful in increasing the shelf life of vegetables and fruits without any change in texture and taste. Radiation can also check the sprouting of onions and potatoes which are much in demand in foreign countries. Radiation is also used for preparing the mutant seeds.
   iii. Nuclear technology can also be used for medical purposes. The radioactive iodine is used for detecting the disease of the thyroid glands. Radiated vaccine can immunize sheep from ringworm disease.
   iv. Properly processed nuclear fuel is used for artificial satellite in space. Communication satellites can help in conveying the messages to very long distances.
   v. With the help of radiations, fruits and vegetables which have much export potential can be preserved for a very long time.

   1.3 Pick out the words/phrases from the passage which are similar in meaning to the following: (1×2=2)
   i. Pull out
   ii. Propaganda

2. a. **Happiness**
   I. What's happiness?
      i. happiness—stronger, deeper & more abiding emotion
      ii. happiness—intangible something after act
      iii. fun—watching movie, going shopping, meeting friends
      iv. fun—exp. during act
      v. happiness—joy, contentment with meaning & purpose
   II. Happiness as goal
      i. perceive happiness as ultimate goal—devise a way to achieve it
      ii. great happiness—earned by diligent, constant & great efforts
      iii. pursuit of happiness—lifetime goal, striving all the time unrealistic
      iv. path to happiness—not smooth; rocky & rugged terrain
      v. requires constant & diligent effort
   III. Gen. misconceptions vs. reality
      i. happiness—fun, good living & plenty of money
         - reality—rich people freq. unhappy despite their riches
      ii. fun & pleasure—happiness; pain—unhappiness
         i. reality—diff. endeavours (raising children, estab. deeper relationships, trying something worthwhile)— the world of happiness
         ii. response to circumstances—influence our happiness
         iii. Trauma acts a catalyst for happiness
      iii. rich enough not to work—blissfully happy
         i. reality—job—feeling of contributing
         ii. happiness from challenges of job

iii. basic necessities necessary for happiness

IV. Ingr. of happiness

i. ingr. of happiness—contentment

ii. Contentment

- neither apathy or lack of ambition
- nor curtailment of freedom

iii. helps to cherish gifts we receive; worth trying

iv. accept humanity, enjoy positive emotions & harness pain

v. success—what one wants; happiness—what one gets

Abbreviations used:-

exp. - experience
& - and
gen. - general
vs. - versus
freq.: frequently
diff. - difficult
estab. - establishing
ingr. - ingredient

Titles: Pursuit of Happiness, Happiness: Life Long Goal

Summary:

While fun is pleasure during an act (e.g., shopping etc.), happiness is that intangible something we feel after an act. Happiness is a much stronger, deeper and more abiding emotion. It is not a stable unchangeable trait but flexible. It is unrealistic to strive to be happy at all times. The path to happiness is rocky and rugged. Great happiness is earned by diligent and constant efforts. There are some misconceptions about happiness. People associate happiness with plenty of money, fun and pleasure, and no work and pain. Experiencing pain is a part of gaining happiness. In reality, rich people are frequently unhappy. Difficult endeavours and pain promise happiness. Our response to circumstances has great influence on the state of being happy. Pain acts a catalyst for change, ultimately resulting in a better and richer life. Besides job is more than just a pay-cheque. The secret ingredient of happiness is contentment. Success is what one wants, whereas happiness is what one gets.

Section B

3.

SAY NO TO CRACKERS
Let's Celebrate a Pollution Free Diwali!

This Diwali Let's Fill Our Minds and/Homes with Love and Happiness; Not with Fumes and Noise
Celebrate with Lights, Sweets and Flowers
Crackers Cause: Air/Noise Pollution, Health Hazards, Fire Accidents
It's time we show concern for the environment and the elderly.
Let's spread the cheer of Diwali by lighting smiles in all hearts.

Issued in Public Interest by: A Concerned Environmentalist

OR

Guru Ram Ray Public School
Mumbai
17th November 20XX
Dear Mr. Gupta,
We request you to accept our invitation to be our guest of honour on 20th November 20XX and witness the rendition of the classic play Waiting for Godot, which is to be presented by our students in the school auditorium. The play presentation will begin at 5:00 pm, which will be followed by dinner at 8:00 pm. Kindly confirm your consent to be present on the occasion.

Yours sincerely,
Gauri
(Secretary, Literary Club)

4. MG road
Bengaluru
28th June, 20XX
The Editor
The Hindu
Bengaluru
Subject Bad state of city roads
Sir,
Through the medium of this letter, I wish to bring to the notice of the concerned authorities the bad state of roads in the city due to which the commuters are facing a lot of problems.
The roads of the city are in terrible condition now. Due to poor maintenance, the roads are full of potholes and cracks which lead to traffic jams and even damage the suspension of the commuters' vehicles. This problem of the bad condition of roads is quite predominant throughout the country and it turns worse in and after the monsoon season. Dirty water gets collected in the potholes and finishes the visibility of its depth. No matter how carefully the vehicles are driven, they sometimes prove to be the main cause of accidents.
Sources from Bengaluru Municipal Corporation say that the maintenance work of the city roads has been divided between agencies like Public Works Department and Bengaluru Development Authority which is the main problem as each agency gets a chance to pass on their responsibility.
It is now high time that a policy should be made whereby all the important roads are maintained and regularly checked for repairs. In this way, the authorities can help to lessen the commuters' problems. I hope you will publish my letter in your esteemed newspaper so that the concerned authorities can look into this matter urgently.
Yours sincerely
Karuna

OR

HP Engineering College
Tirupathi
11th February, 20XX
The Manager (Publications)
Little Flower Company
Hyderabad
Sir,
Subject Order for books

Through this letter, I would like to place an order for the four books on Management and Administration that have been recently published by your publishing house. I require twenty copies of each of the four books. I shall pay for these books through a cheque after receiving the books. You are requested to send the bill along with the books. Also, I would appreciate it if you would offer discount to our institute. The new academic session has already begun and students are keen and pressing for issuing of these books. I hereby request you to kindly deliver the books at the earliest.
Looking forward to a fast delivery form your end.
Yours sincerely,
Rohini
Librarian

5. **Cable TV - A Boon or A Bane**
by XYZ
It is due to cable television that programmes are brought to our homes day and night for all the seven days in a week. It has brought a lot of change in the lifestyle of the people. But is it a boon or a bane? Television has become the most powerful means of entertainment in the last two decades. Cable TV has only added to its value by bringing about a revolution in the lifestyle of people. The cable TV has invaded people's rooms and they have become addicted to it. People feel rather uneasy, and it seems as if something is missing from their

daily routine if there is a power failure or a fault in the cable.
Nobody, be it children or the aged, has remained unaffected by its influence. From movies to cartoons, news channels to sports channels, serials to music channels to the programmes on history, wildlife and discovery, every channel has its unlimited viewers. There are times when we shirk from our important work for the sake of watching a movie or a daily soap. There is also a repeat telecast of the programmes and that is not only once, but twice or thrice.
People's outdoor activities, reading habits, social life have also been greatly affected by watching TV. They prefer staying at home, confined to their rooms, watching television instead of going out. That is why it is called an 'idiot box'. Although there are a lot of things that can be learnt from the programmes on Cable TV, yet there are several drawbacks too. We should find better alternatives like going outdoors for a picnic, playing outdoor games, visiting relatives etc. instead of merely watching television.

OR

Fire in a Slum Area

by Lakshmi

Madurai, 16th June, 20XX: On the evening of 15 June, 20XX, at about 7 PM, a horrifying fire broke out in the slum area near Laxmi Vihar Extension.
The ghastly fire burnt down at least 30 shanties. Nearly 15 casualties were reported. The meagre belongings of daily wagers and labourers living in that slum area were turned to ashes within minutes. The pathetic sight of wailing children and women was heart-wrenching. Most of the women were cooking their evening meals when this incident happened. Since the fire brigades took almost four hours to wipe out the flames and control the fire, many slum dwellers had to go without any food that night.
People from nearby colony came forward to help the distressed people. They also offered packed food and water to some of them. The miserable plight of those people will continue to haunt the residents of the colony for a long time.

6. **Protecting Our Eyesight**

Good morning everyone! Honourable Principal Sir, respected teachers and all my dear friends! I, XYZ, have come before you all to remind you about the importance of protecting our eyesight.
Our eyes are two of the most sensitive parts of our body, and we should never take our eyes for granted. But unfortunately, most of us don't take care of our eyesight unless something drastic happens.
A recent health check-up in our school has revealed that many of our fellow students are suffering from weak eyesight. Reading in bad light, bad posture, wrong direction from which light is coming, excessive TV/computer viewing etc. are some of the factors that can be attributed to it. It is high time we understand the imperative need for protecting our eyes. It starts with the food on our plate. Eating a well-balanced diet and including more green vegetables in our diet is very essential.
To improve our vision is a matter of changing the way we see and use our eyes i.e. bringing a change in our habits. We must make sure never to read in bad light and also that we do not sit in the wrong direction from the source of light. One must avoid watching television excessively, and not spend a long time in front of the computer screen. Regular washing of eyes with filtered water keeps them fresh. Besides, enough sleep and some simple exercises of the eyes are also of much help. By following these simple but necessary steps, we can protect our eyesight and thus show some respect for the wonderful gift of sight which God has bestowed upon us.
Thank you!

OR

For the Motion

Honourable judges, my worthy opponents and dear students,
Today, I Meena of class XII, will speak in favour of the motion, 'Government's ban on dissection of animals in laboratories is justified.'
I am sure many of you have pets in your homes. The fact that animals too have feelings, just as human beings do, is not unknown to anyone.
Do they not respond to feelings of affection or even when they are reprimanded for some wrong action on their part? Why then would someone want to kill animals without any fault of theirs? My opponents will say that it is required for the purpose of research. Well, we are living in the most technologically-advanced century ever; thus, the research can be carried out by using modern technology and without dissecting animals.

My honourable opponents will surely point out that this is a part of education, especially for the science students to practically observe what they have been taught in theory. But in my opinion, this can be done by providing models of suitable cross-sections of the insides of the animals. Such models can be made by commercial organisations for sale to educational institutions. This will also prevent repetition of such killing and dissection in future. Hence, it is my earnest appeal to ban the use of animals in laboratories for the purpose of dissection. Thank you!

Against the Motion

Honourable judges, my worthy opponents and dear students,
Today, I Meena of class XII, will express my views against the motion, 'Government's ban on dissection of animals in laboratories is justified.'
Students need to be provided a practical experience for the theoretical knowledge gained by them through books. And the dissection of animals in the school laboratories is merely a part of the same. The students procure an opportunity to actually put their learning into practice. It should not be looked at as an unjust practice, because such an activity is meant to develop the student's knowledge of the elements and functions of the living beings. The students don't kill and sell the animals or do any other illegal thing. They are not taught anything immoral. They simply get a practical experience regarding what they learn in class.
The dissection of animals has a scientific purpose. It is a mode of hands-on education for students so that they can learn beyond the pages of the textbook and actually look at what they are taught. We should give more credit to the sensitivity and intelligence of our students and not believe that a dissection class will make them more prone to animal violence.
Students should be taught the value of animal life by making them understand how an animal has the same kind of organs as human beings do and perform similar functions. The governing philosophy behind teaching students to dissect animals should be that life, whether human or animal, is the same; each living being is tied to the other by its inner similarity.
Thus, a ban on dissection of animals in school laboratories would not be the best course of action in such a case. I hope my views on this topic were substantial enough to throw a light on this topic.
Thank you!

Section C

7. Read the extracts given below and briefly answer the questions that follow each:
    a) i. The traffic passed by the roadside stand without stopping there.
       ii. The sight of the clumsy paint with which the building was painted spoiled the landscape. It irritated a person who stopped there.
       iii. Wild berries and golden squash.
       iv. One should keep one's money and move ahead.
    b) a. The unpleasant memory of being swept over by the waves at a California beach was revived. He was buried in water, unable to breathe, instilling in him an aversion for water.
       b. He was trying to learn how to swim.
       c. He had put on water wings and was paddling. He also looked at the other boys and tried to copy them.
       d. The misadventure referred to is Douglas being tossed into the swimming pool by an eighteen-year-old boy. Douglas had drowned and passed out before he was rescued.
8. Answer any five of the following questions in 30 -40 words each:
    a) Before dismissing the last class, M Hamel turned to the blackboard and wrote the phrase 'Vive La France!' as he wanted to motivate his people. He wanted to spread not only patriotic feelings amongst people but he wanted them to be optimistic about their future. These words meant 'Long Live France', and spoke of M Hamel's great love for his country and his deep sense of patriotism.
    b) The two worlds that burden a young man of Firozabad include his family which is poverty struck in which he is born because bangle making is not a lucrative profession. The other world is the vicious circle of the politicians ,middlemen, the police. The bureaucrats make policies to exploit poor people. All of these people make their life miserable.
    c) The peddler left a package as a Christmas gift for Edla Willmansson. The package was badly wrapped. Inside it, there was a small rattrap and three wrinkled ten kronor notes. It also contained a brief letter written by the peddler to Edla explaining his misconduct.

d) The poet subtly brings out the contrast between the wonderful freedom of the work of art created by Aunt Jennifer and the constraints of married life. She finds an outlet of her feelings in her needlework.The aunt has been subjected to suppression at the hands of her dominating husband and it is only in the embroidery that she gives expression to her fear and creates fearless animal which portrays her desire to be like them.
e) The psychiatrist explained that Charley couldn't obviously have reached the third level as it didn't exist at all. He was of the view that fear, insecurity, war, worry and the like, made his tension-ridden mind work out an escape route for himself. The third level was a creation of his own imagination and waking-dream wish fulfillment i.e. Charley's experience of the third level was a rationalization of his dreams and unfulfilled wishes of the subconscious mind. The flight never took place as the whole episode was a figment of his imagination.
f) Jack enjoyed the part of the story most when he had to speak in the wizard's voice, as it was one of Jack's own favourite part. He did it by scrunching up his face and somehow whining through his eyes. His felt being an old man suited him. He also loved to spend time with Jo as she loved to listen to the stories.
g) They were not in favour of keeping the American prisoner hidden in the house as by doing so they would be seen as traitors to the nation. They also did not want Dr Sadao to save his life as he was from an enemy nation. Also, if the police came to know about it, all their lives would be in danger, and they might get arrested for this. So they left the house.

9. Rajkumar Shukla, who was an illiterate and oppressed indigo farmer, invited Gandhiji to Champaran so that he could solve the problems faced by the miserable peasants.
Gandhiji's truthfulness, the sincerity of purpose and fearless efforts enabled him to solve the problem of the indigo farmers. He began by accumulating all the facts. The British landlords as well as Commissioner of Tirhut were non-cooperative and did not help him at all. This led to the rise of civil disobedience for the first time. A huge number of peasants and other common people stood in Gandhiji's support and the civil disobedience triumphed.
After four long interviews between Gandhiji and the Lieutenant Governor, an official commission of inquiry was appointed to look into the indigo sharecroppers' situation. Gandhiji was the sole representative of the peasants. The official inquiry assembled a huge quantity of evidence against the big planters. After negotiation, a settlement of 25% refund to the farmers was agreed on. This was a moral victory for the peasants. They recognised their rights and learned courage. Gandhiji, thus, helped the sharecroppers by his method of non-violence and non-cooperation.

OR

Gemini Studios was a studio where the movies were made. The studio was established in Madras in 1940 by S.S. Vasan the editor of Tamil Weekly ‘Ananda Vikatan’. The studio produced excellent films and attained worldwide recognition. The studio since its inception seemed to be a place where prominent figures wished to be seen.
In 1952, Frank Buchman’s Moral Re-armament Army came to the studio where it was given a very warm welcome. The two hundred strong people of the M.R.A. from more than twenty nations presented two plays. ‘Jotham Valley’ and ‘The Forgotten Factor' which were appreciated by all. Their real aim was to counter internal communism by simple and plain sermons and it made an impact on the audience. Another visitor, who visited months after, was a poet-editor Stephan Spender from England whose aim was to introduce his British weekly ‘The Encounter’. Such visits show how important Gemini Studios was.

10. A physical disability brings about a sense of alienation in the mind of a person more than it causes pain or inconvenience. The play ‘On The Face Of It’ focuses our attention on the physical pain and mental anguish of the persons suffering from some physical impairment. The playwright, Susan Hill, presents the two leading‘characters—an old man and a small boy—having different sorts of physical disabilities.
The old man, Mr. Lamb, has a tin leg. It does hurt him when it comes off. Then he gets used to it. He feels pain now and then, in wet weather. He finds it inconvenient to run, to climb a tree or a ladder. He lives all alone in a big house with a garden.
The boy, Derry, has one side of his face badly burnt by acid. He feels physical pain. After discharge from the hospital, he feels hurt at the attitude of the people. They regard his face as horrible and ugly, show signs of being scared and avoid his presence. In short, he is disliked, if not hated. He is not accepted as an ordinary member of society. So, he does not like people to look at him.

It is clear that the sense of alienation that these disabled persons feel causes them constant pain. Such persons expect kind and considerate behaviour from others. They do not want tears, sympathy or pity. They dislike being pointed at, nicknamed, mocked at or made fun of. They only demand reasonable behaviour from others, full of appreciation of their difficulties.

OR

In the story "Evans tries an O-level", the prisoner Evans managed to escape from the Oxford Prison once again in spite of the best precautionary measures taken by the governor. In this story, there is a battle of wits between the governor and two officers on one hand and Evans on the other. It was fully ensured by the prison authorities that Evans should not get any chance to escape again but he impersonated himself as Mc Lerry, the invigilator, and stayed inside the cell. He pretended to guide the prison officials about Evans whereabouts and escaped from the Radcliff hospital. Evans had the last laugh, as he escaped once again from the Golden Lion hotel, right in front of the governor and proved him to be just another a good for giggle, gullible governor.

The police arrest the criminals and the law enforcing agencies fight cases and punish them. But many a times, the criminals get themselves scot-free by playing numerous uncanny tricks. The punishment often does not match with the gravity and intensity of the crime. It varies according to the resourcefulness of criminal, his ability to defend himself and how cunningly he is able to manipulate the facts and figures to his advantage. thus, between crime and punishment, it is indeed a battle of wits.

Solution

Class 12 - Physics

Confidence Examination-I (2019-20)

Section A

1. **(d)** 9.81×10^{-4} mm

   Explanation: Density of oil, ρ = 1.26 gm/cm^3= 1.26×10^3 kg/m^3

   Acceleration due to gravity, g = 9.81 m s^{-2}

   Charge on an electron, e = 1.6 × 10^{-19} C

   Radius of the oil drop = r Force (F) due to electric field E is equal to the weight of the oil drop (W) F = W Eq = mg Ene=mg

   Where,q = Net charge on the oil drop = ne m = Mass of the oil drop = Volume of the oil drop × Density of oil

   So $Ene = \rho\frac{4}{3}\pi r^3$ =2.55 × 10^4 (12 × 1.6 × 10^{-19})

   = 1.26 × 10^3 × $\frac{4}{3}\pi r^3$

   So r = 9.82 × 10^{-4} mm

   Therefore, the radius of the oil drop is 9.82 × 10^{-4} mm.

2. **(b)** capacitance

   Explanation: Q = CV

   When V = 1

   Thus, Q = C

3. **(c)** the net current flowing through the area normally per unit time

   Explanation: Current density J = $\frac{I}{A}$

   In electromagnetism, current density is the electric current per unit area of cross section. It is a vector and has a direction along the area vector.

4. **(d)** 5 mV/m

   Explanation: The total resistance is the sum of the resistance of the potentiometer and the external resistance.

   R = R_{pot} + R_{ext} = 5 + 995 = 1000 ohms .

   The current through the potentiometer wire $I = \frac{E}{R} = \frac{10}{1000} = 0.01A$ I = E/R = 10/1000 = 0.01A.

   The potential drop across the potentiometer wire is

   $V = I \times R_{pot}$

   $\Rightarrow V = 0.01 \times 5$

   V = 0.05V

   The potential gradient = (potential drop across the potentiometer wire)/ length of the potentiometer wire)

   $= \frac{0.05}{10}$

   $= 5 \times 10^{-3} V/m$

   = 5 mV/m

5. **(d)** $\frac{1}{r^3}$

   Explanation: At a point distance r from the coil, the magnetic field is $B_r = \frac{\mu_0 NIR^2}{2\left(R^2+r^2\right)^{\frac{3}{2}}}$

   If r >> R, R is neglected in the denominator and $B_r = \frac{\mu_0 NIR^2}{2r^3}$

   So, $B \propto \frac{1}{r^3}$

6. **(c)** 2×10^6

   Explanation: The resolving power of telescope is given by $\frac{D}{1.22\lambda}$

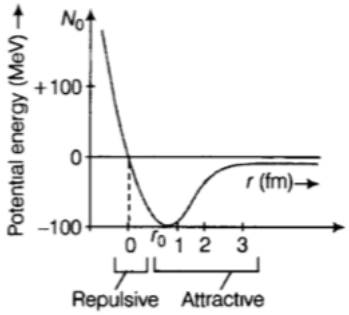
   $\frac{1.22}{1.22\times5000\times10^{-10}}$

   2×10^6

7. **(c)** $\frac{\lambda}{2\pi}\phi$
   Explanation: For any two waves with the same frequency, path difference and phase difference are related as:
   $\Delta x = \frac{\lambda}{2\pi}\Delta\phi$
8. **(d)** $\frac{R}{2}$
   Explanation: Since for spherical mirror R = 2f. Therefore $f = \frac{R}{2}$
9. **(b)** Lower because the Greenhouse effect of the atmosphere would be absent
   Explanation: Gases like, carbon dioxide, methane etc. present in atmosphere traps the heat because of green house effect and keeps the surface of earth warm.
10. **(a)** 3.6 $\times 10^{-7}$ m
    Explanation: Work function $= h\nu_o = \frac{hc}{\lambda_o} = 3.45eV$
    $\lambda_o = \frac{hc}{3.45\times1.6\times10^{-19}} = \frac{1240}{345} \times 10^{-7} = 3.6 \times 10^{-7}m$
11. $\overrightarrow{M} \times \overrightarrow{B}$
12. Ferromagnetism
13. $\frac{L}{2}$

    OR

    Motional emf
14. Isotopes
15. $\sqrt{2}$
16. Radius of any nucleus is proportional to its Mass number and can be related as-
    Radius of nucleus, $R = R_0 A^{1/3}$
    where, R = radius of nucleus, A = mass number
    and R_0 = 1.2 $\times$ 10^{-15} m is the radius of hydrogen nuclide or base radius.
17. Plot of potential energy of a pair of nucleons as a function of their separation is given in the figure:



    From the above graph it can be easily concluded that if distance between nucleons is greater than r_0, forces are attractive in nature while for separation less than r_0 , forces are attractive in nature.
18. Because of difference in free electron density and mobility between n-type and p-type region.
19. de-Broglie wavelength,
    $\lambda = \frac{h}{p} = \frac{h}{\sqrt{2mK}}$
    where, K is Kinetic Energy
    For given K, $\lambda \propto \frac{1}{\sqrt{m}}$
    Electron have smaller mass,
    $\therefore \quad \lambda_e > \lambda_p \quad [\because m_e < m_p]$
    For given kinetic energy, electrons have greater wavelength as it has smaller mass.
20. In an n-type extrinsic semiconductor, the ratio of a number of holes to the number of electrons is less than one.

    OR

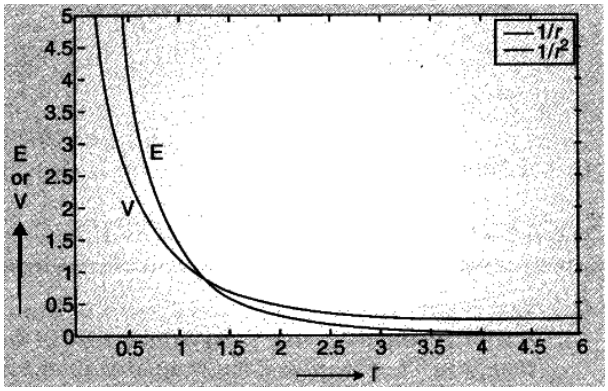
    In LED, energy of the photon should be equal to or less than the band gap energy i.e.
    $h\nu \leqslant E_g$

where, E_g = band gap energy,

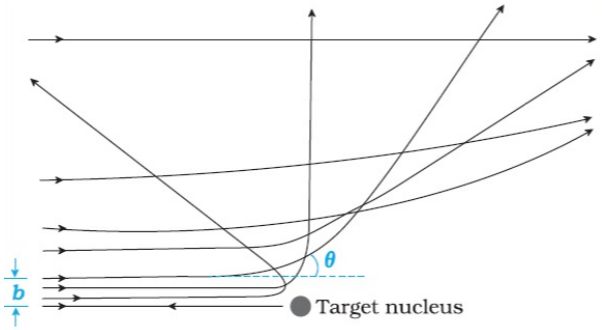
ν = frequency of emitted photon.

Section B

21. Given that,
    Power (P) = 630 W and
    Voltage(V) = 210 V,
    Current Drawn (I) = ?
    In DC source,
    we know that
    power = voltage x current drawn
    P = VI
    Therefore, $I = \frac{P}{V} = \frac{630}{210} = 3\text{A}$
22. i. Electric field E due to a point charge Q,
    $E = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}, E \propto \frac{1}{r^2}$
    ii. Electrostatic potential V due to a point charge Q,
    $V = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r} \Rightarrow V \propto \frac{1}{r}$
    The variation of electrostatic potential with distance, i.e. $V \propto \frac{1}{r}$ and also the variation of electrostatic field with distance, i.e. $E \propto \frac{1}{r^2}$.
    A graph showing variation of electric field (E) and electric potential (V) with distance (r) are shown below. The two expressions clearly show that both electrostatic field and potential decreases with distance. But electric field decreases more than potential for same distance.



23. Davisson and Germer's experiment.
24. Here it is given that, ν = 5×10^{19} Hz
    Now, we know that the wavelength is given by:
    $\lambda = \frac{c}{v} = \frac{3\times10^8}{5\times10^{19}} = 6 \times 10^{-12}$ m
    This wavelength corresponds to either gamma rays or X-rays. These are used:
    i. For causing certain nuclear reactions, and
    ii. For treatment of cancer
25. T_1 = 3s, T_2 = 4s
    $\frac{M_1}{M_2} = \frac{T_2^2+T_1^2}{T_2^2-T_1^2} = \frac{4^2+3^2}{4^2-3^2}$
    $= \frac{16+9}{16-9} = \frac{25}{7}$ or $\frac{M_1}{M_2} = 3.57$

26. 

The fact that only a small fraction of the number of incident particles rebound back indicates that the number of α-particles undergoing head on collision is small. This, in turn, implies that the mass of the atom is concentrated on a small volume. Rutherford scattering, therefore, is a powerful way to determine an upper limit to the size of the nucleus by estimating the distance of the closest approach from the experiment.

OR

$\frac{1}{\lambda} = R\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

For first member of Lyman series, n_1 = 1 and n_2 = 2.

$\therefore \frac{1}{\lambda_1} = R\left(\frac{1}{1^2} - \frac{1}{4}\right)$

or $\frac{1}{\lambda_1} = \frac{3R}{4}$

or $\lambda_1 = \frac{4}{3R}$ ...(i)

For second member of Balmer series, n_1 = 2, n_2 = 4

$\frac{1}{\lambda_2} = R\left(\frac{1}{2^2} - \frac{1}{4^2}\right) = \frac{3R}{16}$

or $\lambda_2 = \frac{16}{3R}$.... (ii)

Dividing equation (ii) by (i), we get

$\frac{\lambda_2}{\lambda_1} = \frac{16}{3R} \times \frac{3R}{4}$ = 4

or $\lambda_2 = 4\lambda_1 = 4 \times 1216\text{Å} = 4864\text{Å}$

27. When photodiode is illuminated with light then bonds get broken and additional electron hole pairs are created, it makes a significant change in minority carriers than in majority carriers . As the fractional change of minority carrier current is measurable significantly in reverse bias than that of forward bias. Therefore, photo diodes are always connected in reverse bias.

OR

Internal field emission is the prime cause of Zener breakdown. When we increase the reverse voltage across the pn junction diode, what really happens is that the electric field across the diode junction increases (both internal & external). This results in a force of attraction on the negatively charged electrons at junction. This force frees electrons from its covalent bond and moves those free electrons to conduction band. When the electric field increases (with applied voltage), more and more electrons are freed from its covalent bonds. This results in drifting of electrons across the junction and electron hole recombination occurs. So a net current is developed and it increases rapidly with increase in electric field.

Section C

28. In other words the algebraic sum of ALL the currents entering and leaving a junction must be equal to zero as: $\Sigma I_{IN} = \Sigma I_{OUT}$.

No current flows through 4Ω resistor as capacitor offers infinite resistance in DC circuits.

Also, 2Ω and 3Ω are in parallel combination

$\therefore \quad R_{AB} = \frac{2\times3}{2+3} = \frac{6}{5} = 1.2\text{A}$

Applying Kirchhoff's second rule in outer loop AB and cell.

Let I current flow through outer loop in clockwise direction.

-1.2I - 2.8I + 6 = 0 $\Rightarrow$ 4I = 6 $I = \frac{3}{2}A$

$\therefore$ Potential difference across AB,

$V_{AB} = IR_{AB} = \frac{3}{2} \times 1.2 = 1.8\text{V}$

$\therefore 3\Omega \text{ and } 2\Omega$ are in parallel combination.

Potential difference across 2Ω resistor is 1.8V.

$\therefore$ Current I through 2Ω resistor is given by

$I' = \frac{V}{R} = \frac{1.8}{2} = 0.9\text{A} \Rightarrow I' = 0.9\text{A}$

29. Current sensitivity $= \frac{\theta}{I}$

Voltage sensitivity $= \frac{\theta}{V}$

$= \frac{\theta}{IR}$

$= \frac{\text{current sensitivit y}}{\text{Resistance}}$

If current sensitivity increases and the resistance also increases in same order, the voltage sensitivity will remain unchanged.

30. i. Y is a capacitor.

ii. Phase angle, φ = $\frac{\pi}{2}$

Also, cos φ = $\frac{R}{Z}$

$\Rightarrow$ Z = $\frac{R}{cos\phi}$ = $\frac{R}{\cos(\pi/4)}$ = $\frac{100}{1/\sqrt{2}}$ = $100\sqrt{2}$ = 141.4 Ω

I_{rms} = $\frac{V_{rms}}{Z}$ = $\frac{141\text{V}}{141.4\Omega} \cong 1$ A

iii. The current will become zero.

31. i. Consider a plane perpendicular to the direction of propagation of the electromagnetic wave. If there are, on this plane, electric charges, they will be set and sustained in motion by the electric and magnetic fields of the electromagnetic wave. The charges thus acquire energy and momentum from the wave(like other waves) carries energy and momentum.

ii. Microwaves, with frequencies in the gigahertz (GHz) range, are produced by special vacuum tubes (called klystrons, magnetrons and Gunn diodes). In such oven, the frequency of the microwaves is selected to match the resonant frequency only so as to make the water molecules vibrate at maximum of their energy for proper cooking of food.

iii. The common use of infrared rays is in heat sensitive thermal imaging cameras and also this can be used in Remote control of electronic devices.

32. Given,

D = distance of screen from the slits = 1 m ,

d = distance between two slits $= 4 \times 10^{-3}\text{m}$

$\lambda_1 = 560\text{nm}$ and

$\lambda_2 = 420\text{nm}$.

Let n$^{\text{th}}$ order bright fringe of λ_1 coincides with $(n+1)^{th}$ order bright fringe of λ_2

$\Rightarrow \quad \frac{Dn\lambda_1}{d} = \frac{D(n+1)\lambda_2}{d}$

$\Rightarrow \quad n\lambda_1 = (n+1)\lambda_2$

$\Rightarrow \quad \frac{n+1}{n} = \frac{\lambda_1}{\lambda_2}$

$1 + \frac{1}{n} = \frac{560\times10^{-9}}{420\times10^{-9}} \Rightarrow 1 + \frac{1}{n} = \frac{4}{3}$

$\Rightarrow \quad \frac{1}{n} = \frac{1}{3}$

$\Rightarrow n = 3$

$\therefore$The Least distance from the central fringe where bright fringe of two wavelengths coincides

= Distance of 3rd order bright fringe of λ_1

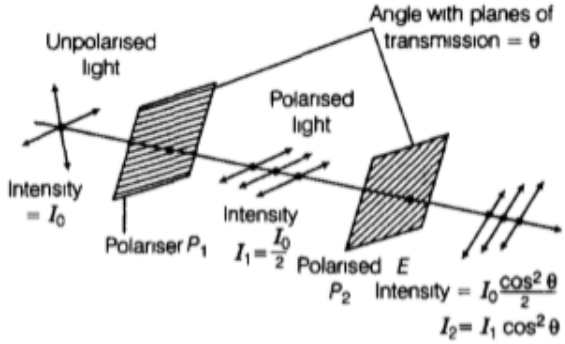
$\Rightarrow \quad y_n = \frac{3D\lambda_1}{d} = \frac{3\times1\times560\times10^{-9}}{4\times10^{-3}}$

$y_n = 420 \times 10^{-6}\text{m} = 0.42 \times 10^{-3}\text{m}$

$\therefore \quad y_n = 0.42\text{mm}$

Thus, 3$^{\text{rd}}$ bright fringe of λ_1 and 4$^{\text{th}}$ bright fringe of λ_2 coincide at 0.42 mm from central fringe.

OR

i. 

Polarisation of light is the phenomenon by which only the electric field vector of an ordinary unpolarized light is restricted or confined with the help of a special crystal called polariser to a given plane along the direction of propagation. It is also called linear polarisation. Now, according to law of Malus, when a beam of completely plane polarised light is incident on an analyser, the resultant intensity of light (I) transmitted from the analyser varies directly as the square of the cosine of angle θ between the plane of transmission of analyser and that of polariser.

i.e. $I \propto \cos^2\theta \Rightarrow I = I_0\cos^2\theta$, I_0 being the intensity of the incident unpolarised light

When polariser and analyser are parallel, $\theta = 0^\circ$ or 180°.

So that, $\cos\theta = \pm 1 \Rightarrow I = I_0$

When polariser and analyser are perpendicular to each other, then

$\Rightarrow \quad \cos\theta = \cos 90^\circ = 0 \Rightarrow I = 0$

In unpolarised light, vibrations are in all the probable directions in a plane perpendicular to the direction of propagation.

Therefore, θ can have any value from 0 and 2π.

$\therefore \quad \left[\cos^2\theta\right]_{av} = \frac{1}{2\pi}\int_0^{2\pi}\cos^2\theta d\theta$

$= \frac{1}{2\pi}\int_0^{2\pi}\frac{(1+\cos 2\theta)d\theta}{2}$

$= \frac{1}{2\pi\times 2}\left[0 + \frac{\sin 2\theta}{2}\right]_0^{2\pi} = \frac{1}{2}$

Using law of Malus, $I = I_0\cos^2\theta$

$\Rightarrow \quad I = I_0 \times \frac{1}{2} = \frac{1}{2}I_0$

As, per the question, I_0 is the intensity of incident unpolarised light and I_1 and I_2 are the intensities of the lights coming out from the polaroids P_1 and P_2 respectively, then we can say that when unpolarised light of intensity I_0 get polarised on passing through a polaroid P_1 its intensity become half, i.e. $I_1 = \frac{I_0}{2}$

ii. When this polarised light coming out from the first polaroid P_1 of intensity I_1 passes through the second polaroid P_2, then its final intensity will be given by $I_2 = I_1\cos^2\theta$

This is a required relation between intensities I_1 and I_2.

33. Given, wavelength of the photon, λ = 275nm

Energy of the photon is given by,

E = hv $= h\frac{c}{\lambda} = \frac{6.63\times10^{-34}\times3\times10^8}{275\times10^{-9}\times1.6\times10^{-19}}\text{eV} = 4.5\text{eV}$

This corresponds to transition B as from the figure.

i. $\Delta E = \frac{hc}{\lambda} \Rightarrow \lambda = \frac{hc}{\Delta E}$

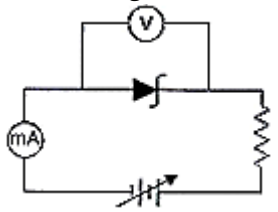
For maximum wavelength should be minimum.

Minimum energy corresponds to transition A.

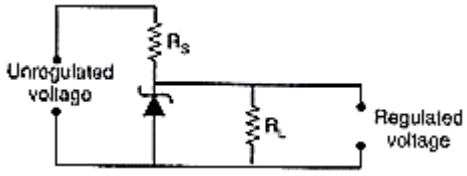
ii. For minimum wavelength, should be maximum. maximum energy corresponds to transition D.

34. i. The semiconductor diode whose V-I characteristic is shown in figure is Zener diode.

ii. Circuit diagram to obtain the given characteristic is shown in figure.



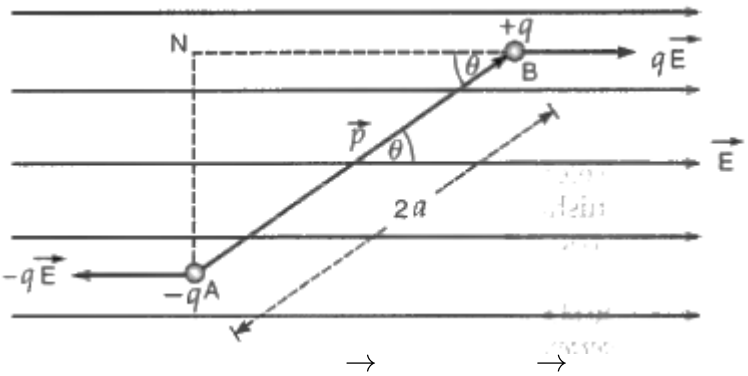
iii. The circuit of Zener diode used as voltage regulator is shown in figure.



The voltage to be regulated is applied across Zener diode as shown in circuit. When input voltage increases the current in Zener diode circuit increases and voltage drop across series resistance R_S increases and across R_L remain same i.e. the voltage drop across Zener diode. Similarly when voltage decreases, the current in the Zener diode circuit decreases and voltage drop across series R_S resistance decreases but across the load resistance remains same, hence the voltage is regulated.

Section D

35. a. Consider an electric dipole consisting of charges -q and +q and of length 2a placed in a uniform electric field $\vec{E}$ making an angle θ with the direction of the field as shown in Fig.



Force on charge -q at A = - q $\vec{E}$ (opposite to $\vec{E}$)

and force on charge +q at B = q $\vec{E}$ (along $\vec{E}$)

Thus, electric dipole is under the action of two equal and unlike parallel forces, which give rise to a torque on the dipole. The magnitude of the torque is given by

τ = either force $\times$ perpendicular distance between the two forces

= q E (AN) = q E (2a sin θ) = q (2a) E sin θ

or τ = p E sin θ

Here, p = q (2a) is electric dipole moment of the electric dipole.

The torque on the dipole tends to align it along the direction of the electric field.

Since electric dipole moment vector $\vec{p}$ is a vector from the charge -q to +q, the above equation may be expressed as

$\vec{\tau} = \vec{p} \times \vec{E}$

b. i. Charge enclosed by sphere S_1 = 2Q

Charge enclosed by sphere S_2 = 2Q + 4Q = 6Q

Now, using gauss law, electric flux enclosed by sphere S_1 and S_2 is given by

$\phi_1 = \frac{2Q}{\epsilon_0}$ and $\phi_2 = \frac{6Q}{\epsilon_0}$

Ratio of electric flux is,

$\frac{\phi_1}{\phi_2} = \frac{\frac{2Q}{\epsilon_0}}{\frac{6Q}{\epsilon_0}} = \frac{1}{3}$

ii. If a medium of dielectric constant '$\in_r$' is introduced in the space inside S_1 in place of air, electric flux becomes

$\phi_1' = \frac{\phi_1}{\epsilon_r}$

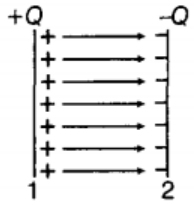
Therefore,

$\phi_1' < \phi_1$

That is, electric flux decreases.

OR

i. Let the total charge on the plates of the below capacitor is +Q and -Q respectively.



∴The potential difference between the plates of the above capacitor of capacitance C for an infinitesimal charge q is q/C.

∴ Potential of condenser = q/C

Small amount of work done in giving an additional charge dq to the condenser,

$dW = \frac{q}{C} \times dq$

∴Total work done in giving a charge Q to the condenser,

$W = \int_{q=0}^{q=Q} \frac{q}{C} dq = \frac{1}{C}\left[\frac{q^2}{2}\right]_{q=0}^{q=Q} \Rightarrow W = \frac{1}{C}\frac{Q^2}{2}$

As, an electrostatic force is conservative, this work is stored in the form of potential energy (U) of the condenser.

$U = W = \frac{1}{2}\frac{Q^2}{C}$

$\because \quad Q = CV \Rightarrow U = \frac{1}{2}\frac{(CV)^2}{C} = \frac{1}{2}CV^2$

$\because \quad CV = Q \Rightarrow U = \frac{1}{2}QV$

Hence, $U = \frac{1}{2}\frac{Q^2}{C} = \frac{1}{2}CV^2 = \frac{1}{2}QV$

Energy density (u) is defined as the total energy per unit volume of the condenser.

i.e., $u = \frac{\text{Total energy } (U)}{\text{Volume } (V)} = \frac{\frac{1}{2}CV^2}{Ad}$

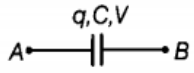
Using, $C = \frac{\varepsilon_0 A}{d}$ and V = Ed (Where V is the potential difference and E is the Electric field existing between the plates)

We get, $u = \frac{1}{2}\left(\frac{\varepsilon_0 A}{d}\right)\left(\frac{E^2 d^2}{Ad}\right) = \frac{1}{2}\varepsilon_0 E^2$

Here, Energy density between plates of capacitors is directly proportional to electric field that exists between the plates of capacitor.

ii. Initial condition :

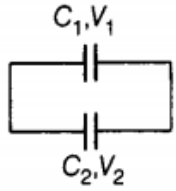
If we consider a charged capacitor of capacitance C with potential difference V, then its charge would be given, q = CV



and energy stored in it is given by

$U_1 = \frac{1}{2}CV^2$.....(i)

When this charged capacitor is connected to uncharged capacitor,



Let the common potential be V_1, the charge flow from first capacitor to the other capacitor unless both the

capacitor attains the common potential.

$\Rightarrow Q_1 = CV_1$ and $Q_2 = CV_2$

Applying conservation of charge,

$Q = Q_1 + Q_2 \Rightarrow CV = CV_1 + CV_2$

$\Rightarrow V = V_1 + V_2 \Rightarrow V_1 = \frac{V}{2}$ [hence voltage will be equally divided between the capacitors]

Total energy stored in both the capacitor is

$$U_2 = \frac{1}{2}CV_1^2 + \frac{1}{2}CV_1^2 \Rightarrow U_2 = \frac{1}{2}C\left(\frac{V}{2}\right)^2 + \frac{1}{2}C\left(\frac{V}{2}\right)^2$$

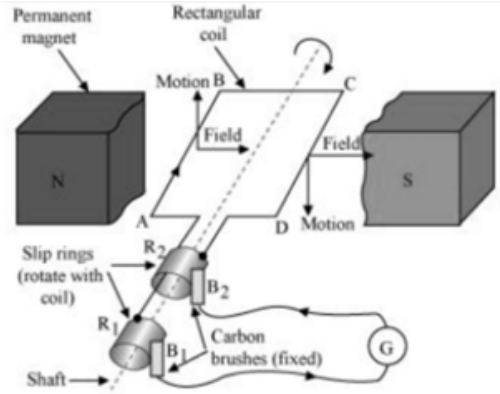
$$U_2 = \frac{2CV^2}{8} = \frac{1}{4}CV^2$$

From Eqs. (i) and (ii), we get, $U_2 < U_1$

It means that energy stored in the combination is less than that stored initially in the single capacitor. It is due to the fact that when the charge is transferred from one capacitor to another capacitor energy is wasted in transferring the charge.

36. i. A.C. generator principle:

Whenever a closed coil is rotated in a uniform magnetic field about an axis perpendicular to the field, the magnetic flux linked with coil changes and an induced emf is set up across its ends.



The construction of an ac generator is shown in the figure. Initially, the coil ABCD is horizontal. The coil starts rotating clockwise and the arm AB moves up while CD moves down. By Fleming's right-hand rule, the induced current flows along ABCD.

In second-half rotation, the arm CD moves up and AB moves down. The induced current flows in the opposite direction that is along DCBA. Thus, an alternating current flows in the circuit.

ii. Emf is induced due to the change of magnetic flux across the rod due to the presence of Earth's magnetic field.

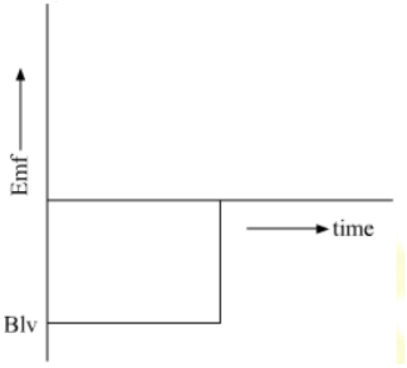
We know,

$E = \frac{d\varnothing_B}{dt}$

As the Earth's magnetic field is uniform,

$E = -Blv = -Bl\frac{dx}{dt}$

Hence,



OR

a. As per Biot-Savart law, the magnetic field due to a current element $\vec{dl}$ at the observation point whose position vector $\vec{r}$ is given by

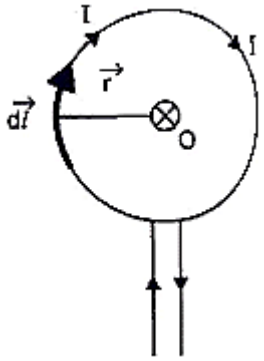
$\overrightarrow{dB} = \frac{\mu_0 I}{4\pi} \cdot \frac{\vec{dl} \times \vec{r}}{r^3}$

Where μ_0 is the permeability of free space.

Consider a circular loop of wire of radius r carrying a current I and also a current element dl of the loop. The direction of dl is along the tangent, so $dl \perp r$. From Biot-Savart law, magnetic field at the centre O due to the current element is

$dB = \frac{\mu_0 I}{4\pi} \frac{dl \sin 90^\circ}{r^3} = \frac{\mu_0 I}{4\pi} \frac{dl}{r^2}$

The magnetic field due to all such current elements will point into the plane of paper at the centre O. Hence the total magnetic field at the centre O is given by



$B = \int dB = \int \frac{\mu_0 I dl}{4\pi r^2}$

or $B = \frac{\mu_0 I}{4\pi r^2} \int dl = \frac{\mu_0 I}{4\pi r^2} \cdot l$

$= \frac{\mu_0 I}{4\pi r^2} \cdot 2\pi r$ or $B = \frac{\mu_0 I}{2r}$

For a coil of N turns, $B = \frac{\mu_0 NI}{2r}$

b. Magnetic field at 0 due to loop 1.

$B_1 = \frac{\mu_0 i R^2}{2(x^2+R^2)^{3/2}}$ acting towards left

Magnetic field at O due to loop 2.

$B_2 = \frac{\mu_0 i R^2}{2(x^2+R^2)^{3/2}}$ acting vertically upwards

Here R is the radius of each loop.

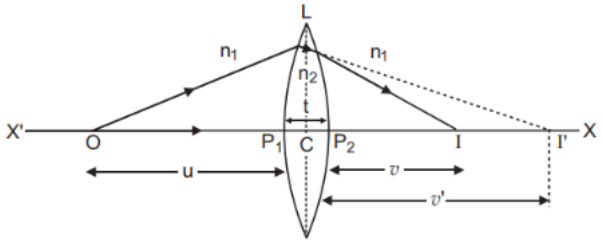
Resultant field at O will be

$B = \sqrt{B_1^2 + B_2^2} = \sqrt{2B_1} \, (\because B_1 = B_2)$

$= \frac{\mu_0}{\sqrt{2}} = \frac{iR^2}{(x^2+R^2)^{3/2}}$

This field acts at an angle of 45° with the axis of loop 1.

37. i. Consider the figure. Suppose L is a thin lens. The thickness of lens is t, which is very small. O is a point object on the principal axis of the lens. The distance of O from pole P_1 is u. The first refracting surface forms the image of O at I' at a distance v' from P_1. From the refraction formula at spherical surface:



$\frac{n_2}{v'} - \frac{n_1}{u} = \frac{n_2 - n_1}{R_1}$ ....(i)

The image I' acts as a virtual object for second surface and after refraction at second surface, the final image is formed at I. The distance of I from pole P_2 of second surface is v. The distance of virtual object (I') from pole P_2 is (v' - t).

For refraction at second surface, the ray is going from second medium (refractive index n_2) to first medium (refractive index n_1), therefore from refraction formula at spherical surface

$\frac{n_1}{v}$ - $\frac{n_2}{(v'-t)}$ = $\frac{n_1-n_2}{R_2}$ .....(ii)

For a thin lens, t is negligible as compared to v', therefore from (ii),

$\frac{n_1}{v} - \frac{n_2}{(v')} = -\frac{n_2-n_1}{R_2}$ .....(iii)

Adding equations (i) and (iii), we get

$\frac{n_1}{v} - \frac{n_1}{u} = (n_2 - n_1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

or $\frac{1}{v} - \frac{1}{u} = \left(\frac{n_2}{n_1} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ .....(iv)

If the object O is at infinity, the image will be formed at second focus i.e. if u = ∞, v = f_2 = f

Therefore from equation (iv)

$\frac{1}{f} - \frac{1}{\infty} = (\mu - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

i.e. $\frac{1}{f} = (\mu - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ ....(v)

This is the formula of refraction for a thin lens. This formula is called Lens-Maker's Formula.

ii. **Power of a Lens:** The power of a lens is its ability to deviate the rays towards its principal axis. It is defined as the reciprocal of focal length in metres.

Power of a lens, P = $\frac{1}{f(\text{ in metres})}$ diopters $= \frac{100}{f(\text{ in cm})}$ diopters

The SI unit for power of a lens is dioptre (D).

Power of convex lens, $P_1 = \frac{1}{F_1}D = \frac{1}{0{\cdot}50} = 2$ D

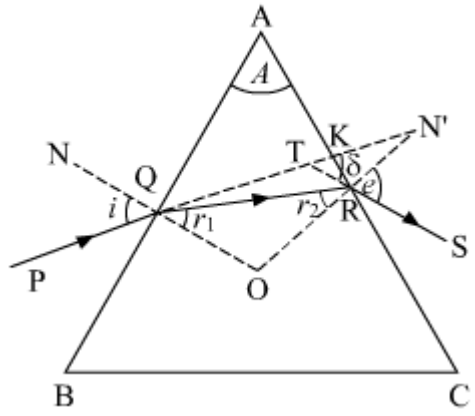
Power of concave lens, $P_2 = \frac{1}{F_2}D = \frac{1}{-0{\cdot}20} = -5$ D

∴ Power of combination of lenses in contact

$P = P_1 + P_2 = 2 - 5 = -3$ D

OR

a. The figure below shows the passage of light through a triangular prism ABC.



The angles of incidence and refraction at first face AB are $\angle i$ and $\angle r_1$

The angles of incidence at the second face AC is $\angle r_2$ and the angle of emergence $\angle e$

δ is the angle between the emergent ray RS and incident ray PQ and is called the angle of deviation.

Here, ∠PQN = i, ∠SRN' = e, ∠RQO = r_1, ∠QRO = r_2, ∠KTS = δ

∵ ∠TQO = i and ∠RQO = r_1, we have

∠TQR = i - r_1

∠TRO = e and ∠QRO = r_2

∠TRQ = e - r_2

In triangle TQR, the side QT has been produced outwards. Therefore, the exterior angle δ should be equal to the sum of the interior opposite angles.

i.e., δ = ∠TQR + ∠TRQ = (i - r_1) + (e - r_2)

δ = (i + e) - (r_1 + r_2) ...(i)

In triangle QRO,

$r_1 + r_2 + \angle ROQ = 180^o$ ...(ii)

From quadrilateral AROQ, we have the sum of angles ($\angle AQO + \angle ARO = 180^o$) This means that the sum of the remaining two angles should be 180^o.

i.e., $\angle A + \angle QOR = 180^o$ [$\angle A$ is called the angle of prism]

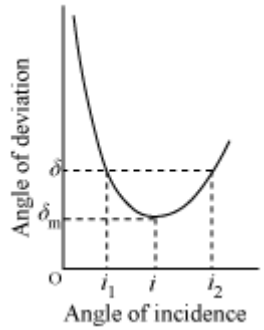
From equations (i) and (ii),

$r_1 + r_2 = A$ ...(iii)

Substituting (iii) in (i), we obtain,

$\delta = (i + e) - A$

$A + \delta = i + e$



If the angle of incidence is increased gradually, then the angle of deviation first decreases, attains a minimum value (δ_m), and then again starts increasing.

When angle of deviation is minimum, the prism is said to be placed in the minimum deviation position. There is only one angle of incidence for which the angle of deviation is minimum.

When

$\delta = \delta_m$ [prism in minimum deviation position],

$e = i$ and $r_2 = r_1 = r$ ...(iv)

$\because r_1 + r_2 = A$

From equation (iv), $r + r = A$

$r = \frac{A}{2}$

Also, we have

$A + \delta = i + e$

Setting,

$\delta = \delta_m$ and $e = i$

$A + \delta_m = i + i$

$i = \frac{(A+\delta_m)}{2}$

$\because \mu = \frac{\sin i}{\sin r}$

$\therefore \mu = \frac{\sin\left(\frac{A+\delta_m}{2}\right)}{\sin\left(\frac{A}{2}\right)}$

b. The incident ray travelling from denser medium to rarer medium grazes along the surface of the separation of the medium only when the light ray incident at the surface at an angle called critical angle (C) such that the angle of reflection is 90^o. Therefore, following Snell's law, we can write

$\frac{\mu_1}{\mu_2} = \frac{\sin 90}{\sin C}$

$\frac{\mu_1}{\mu_2} = \frac{1}{\sin C}$

$\frac{\sqrt{2}}{1} = \frac{1}{\sin C}$

$\text{Sin C} = \frac{1}{\sqrt{2}}$

$C = \sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$

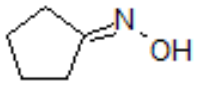
$\therefore$ Critical angle = Angle of incidence = 45^o

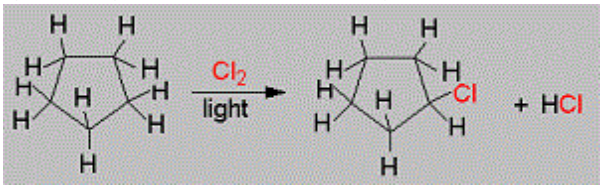
Solution

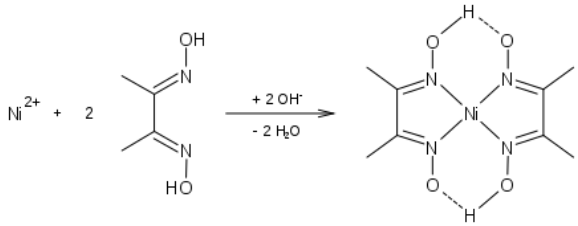
Class 12 - Chemistry

Confidence Examination-I (2019-20)

Section A

1. Unity
2. Number of particles
3. Composition
4. Pyrometallurgy is the process of extracting the metal by heating the metal oxide with a suitable reducing agent.
5. A starch has two components: amylose and amylopectin. Amylose is water soluble.
6. Polysaccharides are not sweet in taste & hence are called non-sugars.
7. Biodegradable polymer: Poly - beta- hydroxybutyrate-co-beta-hydroxy valerate (PHVB)
8. 

Cyclopentanone oxime
9. **(d)** Cyclopentane
Explanation: Cyclopentane is nearly inert chemically, they react with halogens in the presence of light through the substitution of one hydrogen atoms. Since the cyclic structure confers a high degree of symmetry on the molecule, only one monochloro cyclopentane is possible.


10. **(c)** NaCN
Explanation: NaCN combines with Zn to form water soluble complex which prevents it from coming to froth and it makes sure that PbS comes to the froth.
11. **(d)** Ni
Explanation: Ni^{2+} reacts with DMG to form a red color complex. The reaction can be shown as below:


12. **(a)** Ammonia is stronger ligand than water
Explanation: Ammonia forms stable complex with Cu^{2+} which is dark blue in colour. So the blue colour of $CuSO_4$ solution becomes darker when ammonia is added to it.
$Cu^{+2} + 4NH_3 \rightarrow [Cu(NH_3)_4]^{+2}$
13. **(c)** $[Ni(NH_3)_4]^{2+}$
Explanation: Ni has atomic number 28, so Ni^{2+} has electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8$. NH_3 is a weak field ligand and hence two electrons are unpaired and hence this complex is paramagnetic.
14. **(a)** Orlon (acrilan)
Explanation: Polyacrylonitrile is used as a substitute for wool in making commercial fibres as orlon or acrilan.
15. **(a)** Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
Explanation: Both assertion and reason are CORRECT and reason is the CORRECT explanation of the

assertion.

16. **(a)** Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
Explanation: Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

17. **(a)** Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
Explanation: Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

OR

(b) degreasing agent
Explanation: CCl_4 was widely used as a cleaning fluid in industry as a degreasing agent.

18. **(d)** Assertion is INCORRECT but, reason is CORRECT.
Explanation: Assertion is INCORRECT but, reason is CORRECT.

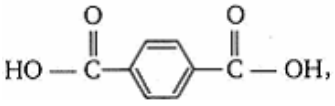
19. **(c)** Assertion is CORRECT but, reason is INCORRECT.
Explanation: Assertion is CORRECT but, reason is INCORRECT.

20. **(b)** Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.
Explanation: Both assertion and reason are CORRECT but, reason is NOT THE CORRECT explanation of the assertion.

OR

(b) Mutual coagulation
Explanation: By the mutual coagulation of animal skin (consist of positively charged particles) and tanning(consists of negatively charged particles), leather gets hard.

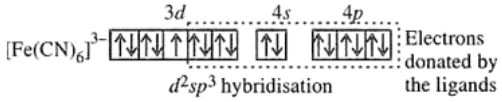
Section B

21. i. Butadiene $CH_2 = CH - CH = CH_2$, Styrene $C_6H_5 - CH = CH_2$
ii. Butadiene $CH_2 = CH - CH = CH_2$, Propenenitrile $\overset{}{CH_2} = \underset{|}{\overset{}{CH}}_{CN}$
iii. Terephthalic acid  and Ethylene glycol (Ethane-1, 2-diol) $\underset{|}{\overset{}{CH_2OH}}_{CH_2OH}$.

22. The factors that effect the rate of chemical reactions are:
i. Nature of reactants
ii. Physical state of reactants
iii. Concentration
iv. Temperature
v. Catalyst
vi. Surface area

23. Applying Nernst equation to the given cell reaction:
$E^0_{cell} = E^0_{cell} - \frac{0.0591}{x}\log\frac{Ni^{2+}}{[Ag^+]^2}$
$= 1.05V - \frac{0.0591}{2}\log\frac{0.160}{(0.002)^2}$
$= 1.05 - \frac{0.0591}{2}\log\left(4 \times 10^4\right)$
$= 1.05 - \frac{0.0591}{2} \times 4.6021$
= 1.05 - 0.14V = 0.91V

24. Fe(26): [Ar]4^3d6, Fe^{3+} : [Ar]$4s^0 3d^5$



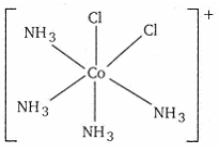
It has octahedral shape and is paramagnetic in nature due to presence of one unpaired electron.

25. In a free transition metal ion the five d-orbital are degenerate, when it forms a complex, the degeneracy is split. In an octahedral field three d-orbitals having lower energy are called t_{2g} orbitals and the remaining two

d-orbitals of higher energy are called e_g orbitals.

OR

i. Structure of cis $[Co(NH_3)_4Cl_2]^+$



ii. cis - tetrammine dichloro cobalt (III) ion.

26. Copper is less reactive than hydrogen, therefore, it can be extracted by hydrometallurgy, whereas Zn cannot be extracted by hydrometallurgy because zinc is more reactive than hydrogen.

OR

Since in the given redox reaction, all the reactants and the products at room temperature are solids. Therefore it does not take place at room temperature.

27. Primary tertiary and secondary alcohols can be distinguished by oxidation reaction. Primary alcohols give aldehyde with CrO_3

$RCH_2OH \xrightarrow{CrO_3} \text{RCHO}$

Secondary alcohols give ketone with CrO_3

$R_2CHOH \xrightarrow{CrO_3} \text{R}_2\text{CO}$

Tertiary alcohol do not get oxidized with CrO_3

$R_3COH \xrightarrow{CrO_3} \text{No reaction}$

Section C

28. **Kohlrausch law of independent migration of ions:** It states that limiting molar conductivity of an electrolyte can be represented as the sum of the individual contributions of the anion and cation of the electrolyte. If $\lambda^o Na^+$ and $\lambda^o Cl^-$ are limiting molar conductivity for sodium chloride is given by

$\lambda_m^0\,(NaCl) = \lambda^o Na + \lambda^0 Cl^-$

Calculation of degree of dissociation of weak electrolyte like acetic acid. The degree of dissociation α is given by:

$\alpha = \frac{\lambda_m}{\lambda_m^0}$

where λ_m be molar conductivity and λ_m^0 be the limiting molar conductivity.

29. T_1= 273 + 50 = 323 K

T_2= 273 + 100 = 373 K

K_1= K

K_2 = 3K

Using the formula,

$log\frac{K_2}{K_1} = \frac{E_a}{2.303R}\left[\frac{T_2-T_1}{T_1T_2}\right]$

$\log\frac{3K}{K} = \frac{E_a}{2.303\times8.314}\left[\frac{373-323}{373\times323}\right]$

$\log 3 = \frac{E_a\times50}{2.303\times8.314\times373\times323}$

$E_a = 22011.76\,J\,mol^{-1}$

OR

Here $T_1 = 300K$

$T_2 = 310K$

$k_1 = 6.0\times10^{-4}s^{-1}$

$E_a = 3.05\times10^5 J\,mol^{-1}$

and $k_2 = ?$

We know that

$\log k_2 - \log k_1 = \frac{E_a}{2.303R}\left[\frac{T_2-T_1}{T_1T_2}\right]$

$\log k_2 - \log 6.0\times10^{-4} = \frac{3.05\times10^5}{2.303\times8.314}\left(\frac{310-300}{310\times300}\right)$

$\log k_2 - (-4 + 0.7782) = \frac{3.05 \times 10^5}{19.147} \times \frac{10}{93000}$

$\log k_2 - (-3.2218) = \frac{3.05 \times 1000}{19.147 \times 93}$

$\log k_2 + 3.2218 = 1.7128$

$\log k_2$ = 1.7128 - 3.2218

$\log k_2 = -1.5090$

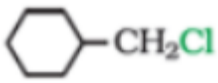
k_2 = antilog (-1.5090)

$k_2 = 3.097 \times 10^{-2} s^{-1}$

30. Adding the two half reactions, e.m.f. comes out to positive.
emf = $E_{cathode} - E_{anode}$
emf = 1.82 - 1.23 = +0.59
This means that Co (III) in aqueous solution has the tendency to change to Co (II). Hence, Co (III) is not stable in aqueous solution.

31. They have same general electronic configuration ns^2np^4. Minimum oxidation state of these elements should be -2, other elements except sulphur and oxygen shows positive oxidation states of +4 and +6.
All of them form hydrides having general formula EH_2 i.e. H_2O, H_2S H_2Te, H_2Po. Thus on the basis of formation of hydrides of the general formula EH_2. These elements are justified to be placed in the same group Group 16 of the periodic table.

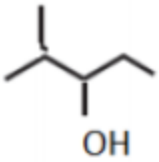
32. a.



is more reactive towards S_N2 because it is a primary halide.

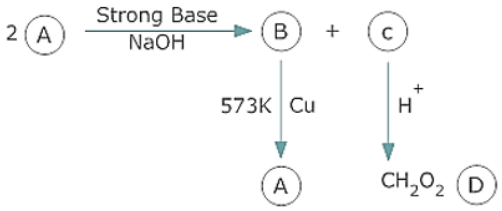
b.

is more reactive towards nucleophilic substitution reaction because it is more reactive due to the presence of electron with drawing - NO_2 group.

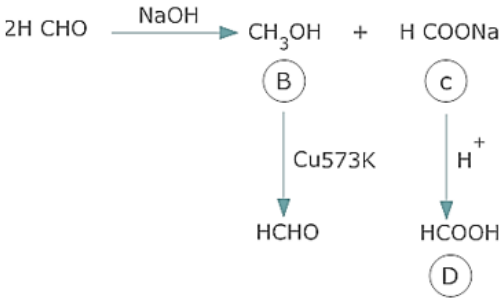
c. 

It is optically active due to chiral carbon.

33.



Since (D) is a carboxylic acid with one carbon only, it is HCOOH. As it is obtained from (C) acidification, (C) COONa and (A) is HCHO which on treatment with strong base (NaOH) gives CH_3OH & HCOONa. This is Cannizzaro reaction in which formaldehyde undergoes self oxidation and reduction(disproportion) on treatment with concentrated alkali. The reactions are as follows:-



OR

The relevant equations for all the reactions involved may be explained as follows:

$$\underset{Buytl\ butonate(A)(M.F=C_8H_{16}O_2)}{CH_3CH_2CH_2-\overset{O}{\overset{||}{C}}-OCH_2CH_2CH_3} \xrightarrow[Hydrolysis]{Dil.H_2SO_4} \underset{But\tan oic\ acid(II)}{CH_3CH_2CH_2-\overset{O}{\overset{||}{C}}-OH} + \underset{But\tan -1-ol(B)}{CH_3CH_2CH_2CH_2OH}$$

$$\underset{But\tan oic\ acid(B)}{CH_3CH_2CH_2-\overset{O}{\overset{||}{C}}-OH} \xleftarrow[Oxidation]{CrO_3/CH_3COOH} \underset{But\tan -1-ol(C)}{CH_3CH_2CH_2CH_2OH} \xrightarrow[(-H_2O)]{Dehydration} \underset{But-1-ene}{CH_3CH_2CH=CH_2}$$

34. i. **Bithional** added to soap so as to impart antiseptic properties to the soap.
    ii. **Chloramphenicol** is broad spectrum antibiotic used in curing typhoid, meningitises.
    iii. **Streptomycin** is used for the treatment of T.B
    iv. **Paracetamol** is antipyretic used in bringing down temperature in high fever.

Section D

35. i. In multi-molecular colloids, the colloidal particles are an aggregate of atoms or small molecules with a diameter of less than 1 nm. The molecules in the aggregate are held together by Van der Waal's forces of attraction. Examples of such colloids include gold sol and sulphur sol.
    ii. In macro-molecular colloids, the colloidal particles are large molecules having colloidal dimensions. These particles have a high molecular mass. When these particles are dissolved in a liquid, sol is obtained. For example: starch, nylon, cellulose, etc.
    iii. Certain substances tend to behave like normal electrolytes at lower concentrations. However, at higher concentrations, these substances behave as colloidal solutions due to the formation of aggregated particles. Such colloids are called aggregated colloids or associated colloids.

OR

We have,

C = 0.025 mol L^{-1}

$\Lambda_m = 46.1\, S\, cm^2\, mol^{-1}$

$\lambda^\circ (H^+) = 349.6\, S\, cm^2\, mol^{-1}$

$\lambda^\circ (HCOO^-) = 54.6\, S\, cm^2\, mol^{-1}$

From Kohlraush law of independent migration of ions,

$\Lambda_m^o (HCOOH) = \lambda^\circ (H^+) + \lambda^\circ (HCOO^-)$

= 349.6 + 54.6 = 404.2 S cm^2 mol^{-1}

Now;

$$\underset{c}{HCOOH} + \underset{0}{H_2O} \rightleftharpoons \underset{0}{HCOO^-} + \underset{0}{H_3O^+} \quad at\ t=0s$$
$$\underset{c-a_\alpha}{} \quad \underset{0}{} \quad \underset{+c_a}{} \quad \underset{+c_\alpha}{} \quad at\ t=1s$$

$K_a = \frac{(c\alpha)\ (c\alpha)}{(c-c\alpha)} = \frac{c\alpha^2}{1-\alpha}$

Now, degree of dissociation:

$\alpha = \frac{A_m(HCOOH)}{A_m^0(HCOOH)} = \frac{46.1}{404.2}$

= 0.114 (approximately)

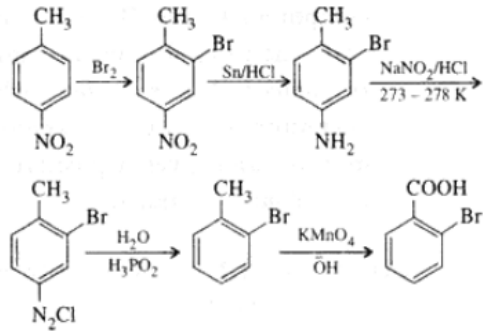
Thus, dissociation constant:

$K_a = \frac{c\propto^2}{(1-\propto)}$

$= \frac{(0.025\ mol\ L^{-1})(0.114)^2}{(1-0.114)} = 3.67 \times 10^{-4}\ mol\ L^{-1}$

36. A. i. Aniline is weaker base than methylamine because C_6H_5 - group is electron withdrawing in aniline whereas CH_3 - group is electron releasing in methylamine. Moreover, a lone pair of electrons on N in aniline is delocalised due to resonance with a benzene ring. This reduces electron density on amino group in aniline.
    ii. In aryl halides C - CI bond acquires a partial double bond character due to resonance which cannot be broken easily. Therefore, they are less reactive towards nucleophilic substitution reaction and -CI cannot be easily replaced by - CN to get aryl cyanide.

B.



OR

i. Tert.-Butyl bromide being a 3° alkyl halide on treatment with a base (i.e., NH_3) prefers to undergo elimination rather than substitution. Therefore, the product is isobutylene rather than tert-butylamine.

$$\underset{tert-Butyl\ bromide}{CH_3-\overset{CH_3}{\overset{|}{\underset{CH_3}{\underset{|}{C}}}}-Br} \xrightarrow[(Substitution)]{\overset{NH_3}{\longrightarrow}\ -HBr} \underset{tert-Butyla\min e}{CH_3-\overset{CH_3}{\overset{|}{\underset{CH_3}{\underset{|}{C}}}}-NH_2};$$

$$\underset{tert-Butyla\min e}{CH_3-\overset{CH_2-H}{\overset{|}{\underset{CH_3}{\underset{|}{C}}}}-Br} \xrightarrow[(E\lim ination)]{\overset{NH_3}{\longrightarrow}\ -NH_4Br} \underset{Isobutylene}{CH_3-\overset{CH_3}{\overset{|}{C}}=CH_2};$$

ii. 1° amines containing tert-alkyl groups can be prepared by action of suitable Grignard reagents and o-methylhydroxylamine. For example,

$$\underset{tert-Butylmagnesium\ bromide}{CH_3-\overset{CH_3}{\overset{|}{\underset{CH_3}{\underset{|}{C}}}}-MgBr} + \underset{o-Methyl\ hydroxyla\min e}{NH_2-OCH_3} \xrightarrow{Dry\ Ether} \underset{Tert-butyla\min e}{CH_3-\overset{CH_3}{\overset{|}{\underset{CH_3}{\underset{|}{C}}}}-NH_2} + Mg(OCH_3)Br$$

37. a. i. Steps involved in the preparation of $K_2Cr_2O_7$ from Na_2CrO_4 are explained with the help of following equations: The yellow solution of sodium chromate is filtered and acidified with sulphuric acid to give a solution from which orange sodium dichromate, $Na_2Cr_2O_7.\ 2H_2O$ can be crystallised.

$2Na_2CrO_4 + H_2SO_4 \rightarrow Na_2Cr_2O_7 + Na_2SO_4 + H_2O$

Sodium dichromate is more soluble than potassium dichromate. The latter is therefore, prepared by treating the solution of sodium dichromate with potassium chloride.

$Na_2Cr_2O_7 + 2KCl \rightarrow K_2Cr_2O_7 + 2NaCl$

ii. Step involved in the preparation of $KMnO_4$ from K_2MnO_4 is explained with the help of following equation:

$$MnO_4^{2-} \xrightarrow{electrolysis} MnO_4^- + e^-$$

b. The decrease in atomic and ionic size with the increase in atomic number in lanthanoids is called lanthanoid contraction. It causes the radii of the members of the third transition series to be very similar to those of the corresponding members of the second series. The almost identical radii of Zr(160 pm) and Hf (159 pm), a consequence of the lanthanoid contraction, account for their occurrence together in nature and for the difficulty faced in their separation.

OR

i. It is due to the presence of unpaired electrons due to which they are attracted by magnetic field and show paramagnetism.

ii. It is because of presence of unpaired electrons in them due to which they form strong metallic bonding and hence they have high lattice energy and consequently high melting point.

iii. It is due to the presence of unpaired electrons, they undergo d-d transitions by absorbing light from visible region and radiate complementary colour.
iv. It is due to variable oxidation states. They have large surface area and can form intermediate with reactants which readily changed into products.

Solution

Class 12 - Mathematics

Confidence Examination-I (2019-20)

Section A

1. **(d)** AB = BA = I
   Explanation: If AB = BA = I, then A and B are inverse of each other. i.e. A is inverse of B and B is inverse of A.

2. **(b)** B = –4A
   Explanation: $\begin{vmatrix} -2 & 4 & 2 \\ 6 & 2 & 0 \\ -2 & 4 & 8 \end{vmatrix}$ = -2(16) - 4(48) + 2(56) = -168
   $\begin{vmatrix} -1 & 2 & 4 \\ 3 & 1 & 0 \\ -2 & 4 & 2 \end{vmatrix}$ = -1(2) - 2(6) + 4(14) = 42
   $\Rightarrow$ |B| = -168 = -4(42) = -4|A|

3. **(b)** an even function
   Explanation: The derivate of an odd function is an even function

4. **(a)** $P(E_i|A) = \frac{P(E_i)P(A|E_i)}{\sum_{i=1}^{n} P(E_i)P(A|E_i)}$
   Explanation: If E_1, E_2,.....,E_n are mutually exclusive and exhaustive events associated with a samplespace, and A is any event of non zero probability, then According to Bay's theorem :
   $P(E_i|A) = \frac{P(E_i)P(A|E_i)}{\sum_{i=1}^{n} P(E_i)P(A|E_i)}$

5. **(b)** $\frac{45}{512}$
   Explanation: Here , probability of getting a spade from a deck of 52 cards = 13/52 = $\frac{1}{4}$. p = $\frac{1}{4}$, q = $\frac{3}{4}$. let , x is the number of spades , then x has the binomial distribution with n = 5 , p = $\frac{1}{4}$, q = $\frac{3}{4}$.
   P(only 3 cards are spades) =P (x = 3) =$^5C_3\left(\frac{3}{4}\right)^{5-3}\left(\frac{1}{4}\right)^3 = \frac{45}{512}$

6. **(d)** 43
   Explanation:

Corner points	Z = 5x + 7y
O(0,0)	0
B (3,4)	43
A(7,0)	35
C(0,2)	14

   Hence the maximum value is 43

7. **(d)** $\frac{\pi}{3}$
   Explanation: $\cos^{-1}\left(\cos\left(-\frac{\pi}{3}\right)\right)$=$\cos^{-1}\left(\cos\frac{\pi}{3}\right) = \frac{\pi}{3}$, because, $\cos\theta$ is positive in fourth quadrant.

8. **(a)** $\frac{\pi}{4}$
   Explanation: =$I = \int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}dx$...(1)
   =$I = \int_0^{\frac{\pi}{2}} \frac{\sqrt{\cos x}}{\sqrt{\sin x}+\sqrt{\cos x}}dx$....(2)
   Adding (1) and (2), we get;

$= 2I = \int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}+\sqrt{\cos x}}{\sqrt{\sin x}+\sqrt{\cos x}} dx = \int_0^{\frac{\pi}{2}} 1.dx = [x]_0^{\frac{\pi}{2}}$

$\implies I = \frac{\pi}{4}$

9. **(a)** $d = \left| \frac{Ax_1+By_1+Cz_1+D}{\sqrt{A^2+B^2+C^2}} \right|$

   Explanation: The distance d from a point P(x1, y1, z1) to the plane Ax + By + Cz + D = 0 is given by :

   $d = \left| \frac{Ax_1+By_1+Cz_1+D}{\sqrt{A^2+B^2+C^2}} \right|$.

10. **(b)** $\pm\frac{1}{\sqrt{3}}$

    Explanation: As x$\left(\hat{i}+\hat{j}+\hat{k}\right)$ is a unit vector, therefore,

    $\left|x\left(\hat{i}+\hat{j}+\hat{k}\right)\right| = 1 \Rightarrow x\sqrt{1+1+1} = 1 \Rightarrow x = \frac{1}{\sqrt{3}}$

11. 2^{pq}
12. 0
13. skew symmetric
14. $\frac{\pi}{2}$

    OR

    $\sqrt{b^2+c^2}$

15. $\left|\overrightarrow{a}\right|^2\left|\overrightarrow{b}\right|^2$

    OR

    $\hat{k}$

16. $(3-x)^2 = 3-8$

    $3-x^2 = 3-8$

    $-x^2 = -8$

    $x = \pm\sqrt{8}$

    $x = \pm 2\sqrt{2}$

17. We have to evaluate $\int \sqrt{\frac{1-\cos 2x}{1+\cos 2x}} dx$.

    Let I = $\int \sqrt{\frac{1-\cos 2x}{1+\cos 2x}} dx \left[\begin{array}{c} \because \cos 2\theta = 1-2\sin^2\theta \\ = 2\cos^2\theta - 1 \end{array}\right]$

    $= \int \sqrt{\frac{2\sin^2 x}{2\cos^2 x}} dx$

    $= \int \tan x dx = \log|\sec x| + C$

    OR

    Let $I = \int \frac{x^3-x^2+x-1}{x-1} dx$

    $= \int \frac{x^2(x-1)+1(x-1)}{x-1} dx$

    $= \int \frac{\left(x^2+1\right)(x-1)}{x-1} dx = \int \left(x^2+1\right) dx$

    $= \frac{x^3}{3} + x + C$

18. Let $I = \int \frac{x^3-1}{x^2} dx = \int \left(\frac{x^3}{x^2} - \frac{1}{x^2}\right) dx$

    $= \int x dx - \int \frac{1}{x^2} dx = \frac{x^2}{2} - \frac{x^{-1}}{-1} + C$

    $= \frac{x^2}{2} + \frac{1}{x} + C$

19. We have to find the slope of tangent to the curve y = $3x^2$ - 6 at the point on it whose x-coordinate is 2.

    Given, y = $3x^2$ - 6

    On differentiating both sides w.r.t. x, we get

$\frac{dy}{dx} = 6x$

Now, slope of tangent= $\left(\frac{dy}{dx}\right)_{x=2}$ = 6(2) = 12

Hence, required slope is 12.

20. $y = x^2 + 2x + c$

$y^1 = 2x + 2$

$y^1 - 2x - 2 = 0$

Proved

Section B

21. Let $\sin^{-1}\frac{3}{5} = \theta$ so that $\sin\theta = \frac{3}{5}$

$\therefore \cos\theta = \sqrt{1-\sin^2\theta} = \sqrt{1-\frac{9}{25}} = \sqrt{\frac{16}{25}} = \frac{4}{5}$

$\therefore \tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{3}{4}$

Since $\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$

$= \frac{2\times\frac{3}{4}}{1-\frac{9}{16}} = \frac{\frac{3}{2}}{\frac{7}{16}} = \frac{24}{7}$

$\Rightarrow 2\theta = \tan^{-1}\frac{24}{7}$

$\Rightarrow 2\sin^{-1}\frac{3}{5} = \tan^{-1}\frac{24}{7}$

OR

Given: $f(x) = x^2 - x + 1$f(x) = x^2 - x + 1

$\Rightarrow$ f'\(x) = 2x - 1

f(x) is strictly increasing if f'(x) < 0

$\Rightarrow$2x - 1 > 0

$\Rightarrow x > \frac{1}{2}$

i.e., increasing on the interval $\left(\frac{1}{2}, 1\right)$

f(x) is strictly decreasing if f'(x) < 0

$\Rightarrow$ 2x - 1 < 0

$\Rightarrow x < \frac{1}{2}$

i.e., decreasing on the interval $\left(-1, \frac{1}{2}\right)$

hence, f(x) is neither strictly increasing nor decreasing on the interval (-1, 1).

22. Given: $x + y = 60, x > 0, y > 0$...(i)

Let $P = xy^3$ [To be maximized] ...(ii)

Putting from eq. (i), $x = 60 - y$ in eq. (ii),

$P = (60 - y)\, y^3 = 60y^3 - y^4$

$\Rightarrow \frac{dP}{dy} = 180y^2 - 4y^3 = 4y^2\,(45 - y)$ ...(iii)

Now $\frac{dP}{dy} = 0$

$\Rightarrow 4y^2\,(45 - y) = 0$

$\Rightarrow y = 0, 45$

It is clear that $\frac{dP}{dy}$ changes sign from positive to negative as y increases through 45.

Therefore, P is maximum when $y = 45$.

Hence, xy^3 is maximum when $x = 60 - 45 = 15$ and y = 45.

23. Let $y = \cos x^3 . \sin^2\left(x^5\right)$

$\therefore \frac{dy}{dx} = \cos x^3 \frac{d}{dx}\sin^2\left(x^5\right) + \sin^2\left(x^5\right)\frac{d}{dx}\cos x^3$

$= \cos x^3 .2\sin\left(x^5\right)\frac{d}{dx}\sin\left(x^5\right) + \sin^2\left(x^5\right)\left(-\sin x^3\right)\frac{d}{dx}x^3$

$= \cos x^3 .2\sin\left(x^5\right)\frac{d}{dx}\sin\left(x^5\right) + \sin^2\left(x^5\right)\left(-\sin x^3\right)3x^2$

$= \cos x^3 .2\sin\left(x^5\right)\cos\left(x^5\right)\left(5x^4\right) - \sin^2\left(x^5\right)\sin x^3 .3x^2$

$= 10x^4\cos x^3\sin\left(x^5\right)\cos\left(x^5\right) - 3x^2\sin^2\left(x^5\right)\sin x^3$

24. $\vec{a} + \lambda\vec{b} = \left(2\hat{i} + 2\hat{j} + 3\hat{k}\right) + \lambda\left(-\hat{i} + 2\hat{j} + \hat{k}\right)$

$= (2-\lambda)\,\hat{i} + (2+2\lambda)\,\hat{j} + (3+\lambda)\,\hat{k}$

$\left(\vec{a}+\lambda\vec{b}\right).\vec{c} = 0 \ \left[\because \vec{a}+\lambda\vec{b} \perp \vec{c}\right]$

$\left[(2-\lambda)\,\hat{i} + (2+2\lambda)\,\hat{j} + (3+\lambda)\,\hat{k}\right].\left(3\hat{i}+\hat{j}\right) = 0$

$3(2-\lambda) + (2+2\lambda) = 0$

$-\lambda = -8$

$\lambda = 8$

OR

$\vec{a}+\vec{b}+\vec{c} = 0$

$\vec{a}.\left(\vec{a}+\vec{b}+\vec{c}\right) = 0$

$\vec{a}.a + \vec{a}.\vec{b} + \vec{a}.\vec{c} = 0$

$\vec{a}.\vec{b} + \vec{a}.\vec{c} = -|\vec{a}|^2$

$\vec{a}.\vec{b} + \vec{a}.\vec{c} = -1$...(i)

Similarly $\vec{b}.\vec{a} + \vec{b}.\vec{c} = -16$ ...(ii)

and $\vec{a}.\vec{c} + \vec{b}.\vec{c} = -4$ ...(iii)

Adding (i) (ii) and (iii)

$2\left(\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{a}.\vec{c}\right) = -21$

$\mu = \frac{-21}{2}$

25. Direction ratios of one line are a, b, c

$\Rightarrow$ A vector along this line is $\vec{b}_1 = a\hat{i} + b\hat{j} + c\hat{k}$

Direction ratios of second line are $b-c, c-a, a-b$

$\Rightarrow$ A vector along second line is $\vec{b}_2 = (b-c)\,\hat{i} + (c-a)\,\hat{j} + (a-b)\,\hat{k}$

Let θ be the angle between the two lines, then

$\cos\theta = \frac{\left|\vec{b}_1.\vec{b}_2\right|}{\left|\vec{b}_1\right|.\left|\vec{b}_2\right|} = \frac{a(b-c)+b(c-a)+c(a-b)}{\sqrt{a^2+b^2+c^2}\sqrt{(b-c)^2+(c-a)^2+(a-b)^2}}$

$= \frac{ab-ac+bc-ab+ac-bc}{\sqrt{a^2+b^2+c^2}\sqrt{(b-c)^2+(c-a)^2+(a-b)^2}} = 0 = \cos 90^0$

$\Rightarrow \theta = 90^0$

26. $p = \frac{1}{3}$ and q = 1 - p $= 1 - \frac{1}{3} = \frac{2}{3}$

n = 5, r = 4, 5 and P (X = r) = ${}^nC_r p^r q^{n-r}$

P (Four or more success) = P (X = 4) + P (X = 5)

$= {}^5C_4\left(\frac{1}{3}\right)^4\left(\frac{2}{3}\right)^1 + {}^5C_5\left(\frac{1}{3}\right)^5 = 5\times 2\times\left(\frac{1}{3}\right)^5 + \left(\frac{1}{3}\right)^5 = \frac{11}{243}$

Section C

27. We are given that f : R $\rightarrow$ R is the function defined by f(x) = $4x^3$ + 7, then we need to show that f is a bijection.

The given function is f : R $\rightarrow$ R such that f(x) = $4x^3$ + 7

To show f is bijective, we are required to show that f is one-one as well as onto.

One-One function

Now,let $x_1, x_2 \in$ R such that $f(x_1) = f(x_2)$,

$\Rightarrow 4{x_1}^3 + 7 = 4{x_2}^3 + 7$

$\Rightarrow 4{x_1}^3 = 4{x_2}^3$

$\Rightarrow {x_1}^3 - {x_2}^3 = 0$

$\Rightarrow (x_1 - x_2)({x_1}^2 + x_1x_2 + {x_2}^2) = 0$

$\Rightarrow \quad (x_1-x_2)\left[\left(x_1+\frac{x_2}{2}\right)^2 + \frac{3}{4}x_2^2\right] = 0$

$\Rightarrow$Either $x_1 - x_2 = 0$.....(i)

or, $\left[\left(x_1+\frac{x_2}{2}\right)^2 + \frac{3}{4}x_2^2\right] = 0$.....(ii)

But, Eq. (ii) is not possible as $x_1, x_2 \in R$

$\therefore x_1 - x_2 = 0 \Rightarrow x_1 = x_2$

Thus, $f(x_1) = f(x_2)$

$\Rightarrow x_1 = x_2, \forall\, x_1, x_2 \in R$

Therefore, f(x) is a one-one function.

Onto function

Now,let $y \in R$ (codomain) be any arbitrary number.

Then, $f(x) = y \Rightarrow 4x^3 + 7 = y \Rightarrow 4x^3 = y - 7$ which is a real number. [$\because y \in R$]

Thus, for every $y \in R$(codomain), there exists

$x = \left(\frac{y-7}{4}\right)^{1/3} \in R$ (domain) such that

$f(x) = f\left[\left(\frac{y-7}{4}\right)^{1/3}\right] = 4\left[\left(\frac{y-7}{4}\right)^{1/3}\right]^3 + 7$

$= 4\left(\frac{y-7}{4}\right) + 7 = y - 7 + 7 = y$

Thus,f(x) is an onto function.Thus, we have arrived at the conclusion that f(x) is both one-one and onto, hence, it is a bijective.

28. Given, $f(x) = \frac{\sqrt{2}\cos x - 1}{\cot x - 1}, x \neq \frac{\pi}{4}$

Therefore, $\lim\limits_{x \to \frac{\pi}{4}} f(x) = \lim\limits_{x \to \frac{\pi}{4}} \frac{\sqrt{2}\cos x - 1}{\cot x - 1}$

$= \lim\limits_{x \to \frac{\pi}{4}} \frac{(\sqrt{2}\cos x - 1)\sin x}{\cos x - \sin x}$

$= \lim\limits_{x \to \frac{\pi}{4}} \frac{(\sqrt{2}\cos x - 1)}{(\cos x - sinx)} . \frac{(\sqrt{2}\cos x + 1)}{(\sqrt{2}\cos x + 1)} . \frac{(\cos x + \sin x)}{(\cos x + \sin x)} . \sin x$

$= \lim\limits_{x \to \frac{\pi}{4}} \frac{2\cos^2 x - 1}{\cos^2 x - \sin^2 x} . \frac{\cos x + \sin x}{\sqrt{2}\cos x + 1} . (\sin x)$

$= \lim\limits_{x \to \frac{\pi}{4}} \frac{\cos 2x}{\cos 2x} . \left(\frac{\cos x + \sin x}{\sqrt{2}\cos x + 1}\right) . (\sin x)$

$= \lim\limits_{x \to \frac{\pi}{4}} \frac{(\cos x + \sin x)}{\sqrt{2}\cos x + 1} \sin x$

$= \frac{\frac{1}{\sqrt{2}}\left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}\right)}{\sqrt{2}.\frac{1}{\sqrt{2}} + 1} = \frac{1}{2}$

Thus, $\lim\limits_{x \to \frac{\pi}{4}} f(x) = \frac{1}{2}$

If we define $f\left(\frac{\pi}{4}\right) = \frac{1}{2}$, then f(x) will become continuous at $x = \frac{\pi}{4}$ Hence for f to be continuous at $x = \frac{\pi}{4}, f\left(\frac{\pi}{4}\right) = \frac{1}{2}$

OR

Let $y = (\log x)^{\cos x}$ .....(i)

Taking log on both sides, we have

$\Rightarrow \log y = \log (\log x)^{\cos x} = \cos x \log(\log x)$

$\Rightarrow \frac{d}{dx}\log y = \frac{d}{dx}[\cos x \log(\log x)]$

$\Rightarrow \frac{1}{y}\frac{dy}{dx} = \cos x \frac{d}{dx}\log(\log x) + \log(\log x)\frac{d}{dx}\cos x$ [By Product rule]

$\Rightarrow \frac{1}{y} . \frac{dy}{dx} = \cos x \frac{1}{\log x}\frac{d}{dx}(\log x) + \log(\log x)(-\sin x)$

$\Rightarrow \frac{1}{y} . \frac{dy}{dx} = \frac{\cos x}{\log x} . \frac{1}{x} - \sin x \log(\log x)$

$\Rightarrow \frac{dy}{dx} = y\left[\frac{\cos x}{x \log x} - \sin x \log(\log x)\right]$

$\Rightarrow \frac{dy}{dx} = (\log x)^{\cos x}\left[\frac{\cos x}{x \log x} - \sin x \log(\log x)\right]$

29. We have, $x\frac{dy}{dx} + 2y = x^2 (x \neq 0)$

$\Rightarrow \frac{dy}{dx} + \left(\frac{2}{x}\right) \cdot y = x$ ...(i)

This is linear differential equation of the form

$\frac{dy}{dx} + Py = Q$, here $P = \frac{2}{x}$ and Q = x.

$\therefore \text{IF} = e^{\int \text{P} dx} = e^{\int (2/x) dx} = e^{2 \log x} = e^{\log x^2} = x^2$

The general solution is given by

$y \cdot IF = \int (\text{IF} \times Q) dx + C$

$\Rightarrow \quad y \cdot x^2 = \int x^2 \times x dx + C$

$\Rightarrow \quad y \cdot x^2 = \int x^3 dx + C$

$\therefore \quad y \cdot x^2 = \frac{x^4}{4} + C$ ...(ii)

On putting x = 2, y = 1 in Eq. (ii), we get

$1 \cdot 2^2 = \frac{2^4}{4} + C \Rightarrow 4 = 4 + C \Rightarrow C = 0$

$\therefore \quad y \cdot x^2 = \frac{x^4}{4}$ [from Eq. (ii)]

$\Rightarrow \quad y = \frac{x^2}{4}$

which is the required particular solution.

30. Given, $I = \int \frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha} dx$

$= \int \frac{(2\cos^2 x - 1) - (2\cos^2 \alpha - 1)}{\cos x - \cos \alpha} dx \left[\because \cos 2\theta = 2\cos^2 \theta - 1\right]$

$= \int \frac{2(\cos^2 x - \cos^2 \alpha)}{(\cos x - \cos \alpha)} dx$

$= \int \frac{2(\cos x - \cos \alpha)(\cos x + \cos \alpha)}{(\cos x - \cos \alpha)} dx [\because a^2 - b^2 = (a+b)(a-b)]$

$= \int 2(\cos x + \cos \alpha) dx$ [$\because$here $cos\alpha$ is a constant]

$\therefore I = 2(sinx + cos\alpha \times x) + C$

$\therefore I = 2(sinx + x\cos\alpha) + C$

31. **Case (i) :** S_1 = {5 red balls, 5 black balls}

$\Rightarrow n(S_1) = 10$

Let us draw a red balls first, i.e., A_1 = {5 red balls}

$\Rightarrow n(A_1) = 5$

$P(A_1) = \frac{n(A_1)}{n(S_1)} = \frac{5}{10} = \frac{1}{2}$

Now after adding 2 balls of the same colour, i.e., when the first draw gives a red ball, two additional red balls are put in the urn so that its contents are 7 (5 + 2) red and 5 balck balls. When the first draw gives a black ball, two additional black balls are put in the urn so that its contents are 5 red and 7 (5 + 2) black balls.

Total balls = S_2 = {7 red balls, 5 black balls}

$\Rightarrow n(S_2) = 12$

Let us draw a red balls first, i.e., A_2 = {7 red balls}

$\Rightarrow n(A_2) = 7$

$P(A_2) = \frac{n(A_2)}{n(S_2)} = \frac{7}{12}$

$\therefore$ P (a red ball is drawn) $= \frac{1}{2} \times \frac{7}{12} = \frac{7}{24}$

Case (ii) : When a black ball is drawn, i.e., A_2 = {5 red balls}

$\Rightarrow n(A_2) = 5$

$= P(A_1) = \frac{n(A_2)}{n(S_1)} = \frac{5}{12}$

Now after adding 2 balls of the same colour, i.e.,

S_2 = {5 red balls, 7 black balls}

$\Rightarrow n(S_2) = 12$

Let us draw a red balls first, i.e., A_2 = {5 red balls}

$\Rightarrow n(A_2) = 5$

$P(A_2) = \frac{n(A_2)}{n(S_2)} = \frac{5}{12}$

$\because$ P (a red ball is drawn) $= \frac{1}{2} \times \frac{5}{12} = \frac{5}{24}$

Therefore, required probability in both cases

= Probability that first ball is red and then second ball after two red are added in the urn is also red + Probability that first ball is black and second is red $= \frac{7}{24} + \frac{5}{24} = \frac{12}{24} = \frac{1}{2}$

OR

According to the question,We are required to find the mean number of heads in three tosses of a coin.
In order to find the mean , we shall write the probability distribution table for ' the given experiment and then, we find mean by using formula,E(X)=$\sum x_i P(x_i)$
Let X be a random variable denoting the number of heads when a coin is tossed three times.
Sample space of given experiment is
S = {HHH, TTT, HHT, HTH, THH, TTH, THT, HTT}
X can take values 0, 1, 2 and 3.
Now, P(X = 0) = P (no head occur)= $\frac{1}{8}$
P(X = 1) = P (one head occur)= $\frac{3}{8}$
P(X = 2) = P (two heads occur)= $\frac{3}{8}$
P(X = 3) = P (three heads occur)= $\frac{1}{8}$
Therefore, probability distribution is as follows:

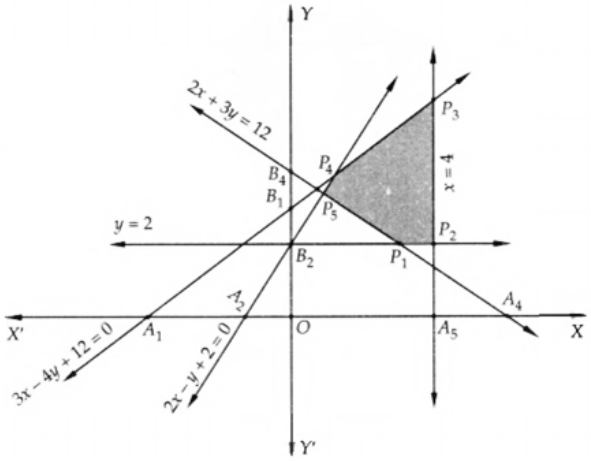
x	0	1	2	3
p(x)	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

Now, for finding mean,we construct following table:

X	**P (X)**	**$X_i P_i$**
0	1/8	0
1	3/8	3/8
2	3/8	6/8
3	1/8	3/8
Total		12/8

Therefore, $\text{Mean} = \sum X_i P(X_i) = \frac{12}{8} = \frac{3}{2}$

32. The given LPP can be re-written as:
Maximize or Minimize Z = 3x + 5y
Subject to
3x - 4y $\geq$ -12
2x - y $\geq$ - 2
2x + 3y $\geq$ 12
x $\leq$ 4
y $\geq$ 2
x $\geq$ 0
Converting the inequations into equations, we obtain the following equations 3x - 4y = -1 2, 2x - y = - 2, 2x + 3y = 12, x = 4, y = 2 and x = 0.
These lines are drawn on suitable scale. The shaded region $P_1P_2P_3P_4P_5$ shown in Figure represents the feasible region of the given LPP.



The values of the objective function at these points are given in the following table:

Point (x, y)	Values of the objective function Z = 3x + 5y
$P_1(3, 2)$	$Z = 3 \times 3 + 5 \times 2 = 19$
$P_2(4, 2)$	$Z = 3 \times 4 + 2 \times 5 = 22$
$P_3(4, 6)$	$Z = 3 \times 4 + 5 \times 6 = 42$
$P_4(\frac{4}{5}, \frac{18}{5})$	$Z = 3 \times \frac{4}{5} + 5 \times \frac{18}{5} = \frac{102}{5}$
$P_5(\frac{3}{4}, \frac{7}{2})$	$Z = 3 \times \frac{3}{4} + 5 \times \frac{7}{2} = \frac{79}{4}$

Clearly Z assumes its minimum value 19 at x = 3 and y = 2. The maximum value of Z is 42 at x = 4 and y = 6.

Section D

33. LHS = I + A

$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} + \begin{bmatrix} 0 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 0 \end{bmatrix} = \begin{bmatrix} 1 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 1 \end{bmatrix}$$

$$\text{RHS} = (I - A)\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$$

$$= \left(\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} 0 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 0 \end{bmatrix}\right)\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$$

$$= \begin{bmatrix} 1 & \tan\frac{\alpha}{2} \\ -\tan\frac{\alpha}{2} & 1 \end{bmatrix}\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$$

$$= \begin{bmatrix} \cos\alpha + \tan\frac{\alpha}{2}\sin\alpha & -\sin\alpha + \tan\frac{\alpha}{2}\cos\alpha \\ -\tan\frac{\alpha}{2}\cos\alpha + \sin\alpha & \tan\frac{\alpha}{2}\sin\alpha + \cos\alpha \end{bmatrix}$$

$$= \begin{bmatrix} \cos\alpha + \frac{\sin\frac{\alpha}{2}}{\cos\frac{\alpha}{2}}\sin\alpha & -\sin\alpha + \frac{\sin\frac{\alpha}{2}}{\cos\frac{\alpha}{2}}\cos\alpha \\ -\frac{\sin\frac{\alpha}{2}}{\cos\frac{\alpha}{2}}\cos\alpha + \sin\alpha & \frac{\sin\frac{\alpha}{2}}{\cos\frac{\alpha}{2}}\sin\alpha + \cos\alpha \end{bmatrix}$$

$$= \begin{bmatrix} \cos\alpha + \frac{\sin\frac{\alpha}{2}}{\cos\frac{\alpha}{2}}\sin\alpha & -\sin\alpha + \frac{\sin\frac{a}{2}}{\cos\frac{\alpha}{2}}\cos\alpha \\ -\frac{\sin\frac{\alpha}{2}}{\cos\frac{\alpha}{2}}\cos\alpha + \sin\alpha & \frac{\sin\frac{\alpha}{2}}{\cos\frac{\alpha}{2}}\sin\alpha + \cos\alpha \end{bmatrix}$$

$$= \begin{bmatrix} \frac{\cos\alpha\cos\frac{\alpha}{2}+\sin\frac{\alpha}{2}\sin\alpha}{\cos\frac{\alpha}{2}} & \frac{-\sin\alpha\cos\frac{\alpha}{2}+\sin\frac{\alpha}{2}\cos\alpha}{\cos\frac{\alpha}{2}} \\ \frac{-\cos\alpha\sin\frac{\alpha}{2}+\cos\frac{\alpha}{2}\sin\alpha}{\cos\frac{\alpha}{2}} & \frac{\sin\alpha\sin\frac{\alpha}{2}+\cos\frac{\alpha}{2}\cos\alpha}{\cos\frac{\alpha}{2}} \end{bmatrix}$$

$$= \begin{bmatrix} \frac{\cos\left(\alpha-\frac{\alpha}{2}\right)}{\cos\frac{\alpha}{2}} & \frac{-\sin\left(\alpha-\frac{\alpha}{2}\right)}{\cos\frac{\alpha}{2}} \\ \frac{\sin\left(\alpha-\frac{\alpha}{2}\right)}{\cos\frac{\alpha}{2}} & \frac{\cos\left(\alpha-\frac{\alpha}{2}\right)}{\cos\frac{\alpha}{2}} \end{bmatrix} = \begin{bmatrix} 1 & -\tan\frac{\alpha}{2} \\ \tan\frac{\alpha}{2} & 1 \end{bmatrix} = LHS$$

OR

We have, $\begin{vmatrix} 1 & \cos C & \cos B \\ \cos C & 1 & \cos A \\ \cos B & \cos A & 1 \end{vmatrix} = 0$

$\therefore LHS = \begin{vmatrix} 1 & \cos C & \cos B \\ \cos C & 1 & \cos A \\ \cos B & \cos A & 1 \end{vmatrix} = 0$

Expanding along R_1

$= 1\left(1-\cos^2 A\right) - \cos C\left(\cos C - \text{Cos}\, A.\cos B\right) + \cos B\left(\cos C.\cos A - \cos B\right)$

$= \sin^2 A - \cos^2 C + \cos A.\cos B.\cos C + \cos A.\cos B.\cos C - \cos^2 B$

$= \sin^2 A - \cos^2 B + 2\cos A.\cos B.\cos C - \cos^2 C$

$= -\cos(A+B).\cos(A-B) + 2\cos A.\cos B.\cos C - \cos^2 C$

$\left[\because \cos^2 B - \sin^2 A = \cos(A+B).\cos(A-B)\right]$

$= -\cos(-C).\cos(A-B) + \cos C\left(2\cos A\cos B - \cos C\right)[\because \cos(-\theta = \cos\theta)]$

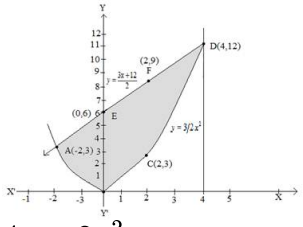
$= -\cos C\left(\cos A.\cos B = \sin A.\sin B - 2\cos A.\cos B + \cos C\right)$

$= \cos C\left(\cos A.\cos B - \sin A.\sin B - \cos C\right)$

$= \cos C\left(\cos(A+B) - \cos C\right)$

$= \cos C\left(\cos C - \cos C\right) = 0 = RHS$ Hence proved.

34.



$4y = 3x^2$.....(1)

2y = 3x + 12.....(2)

From (2), $y = \frac{3x+12}{2}$

Using this value of y in (1), we get,

x^2 - 6x - 8 = 0

$\Rightarrow$ (x + 2) (x - 4) = 0

$\Rightarrow$ x = -2, 4

From (2),

When, x = -2, y = 3

When, x = 4, y = 12

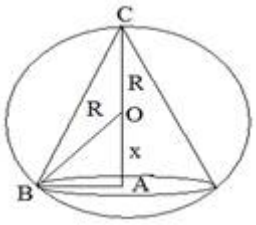
Thus, points of intersection are, (-2, 3) and (4, 12).

Area $= \int_{-2}^{4} \frac{3x+12}{2} dx - \int_{-2}^{4} \frac{3}{4}x^2 dx$

$= \frac{1}{2}\left[\frac{3x^2}{2} + 12x\right]_{-2}^{4} - \frac{3}{4}\left[\frac{x^3}{3}\right]_{-2}^{4}$

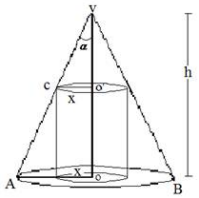
$\frac{1}{2}[(24+48) - (6-24)] - \frac{1}{4}[64 - (-8)]$

= 45 - 18 = 27 sq units.

35. 

$v = \frac{1}{3}\pi r^2 h \left[r^2 = \sqrt{R^2 - x^2}\right]$
$V = \frac{1}{2}\pi.\left(R^2 - x^2\right).(R + x)$
$\frac{dy}{dx} = \frac{1}{3}\pi\left[\left(R^2 - x^2\right)(1) + (R + x)(-2x)\right]$
$= \frac{1}{3}\pi\left[(R + x)(R - x) - 2x(R + x)\right]$
$= \frac{1}{3}\pi(R + x)\left[R - x - 2x\right]$
$= \frac{1}{3}\pi(R + x)(R - 3x)$....(1)
Put $\frac{dv}{dr} = 0$
R = - x (neglecting)
R = 3x
$\frac{R}{3} = x$
On again differentiating equation (1)
$\frac{d^2v}{dx^2} = \frac{1}{3}\pi[(R + x)(-3) + (R - 3x)(1)]$
$=\frac{d^2v}{dx^2}\Big]_{x=\frac{R}{3}} = \frac{1}{3}\pi\left[\left(R + \frac{R}{3}\right)(-3) + \left(R - 3.\frac{R}{3}\right)\right]$
$\frac{1}{3}\pi\left[\frac{4R}{3} \times -3 + 0\right]$
$= \frac{-1}{3}\pi 4R$
$\frac{d^2v}{dx^2} < 0$ Hence maximum
Now $v = \frac{1}{3}\pi\left[\left(R^2 - x^2\right)(R + x)\right]\left[x = \frac{R}{3}\right]$
$v = \frac{1}{3}\pi\left[\left(R^2 - \left(\frac{R}{3}\right)^2\right)\left(R + \left(\frac{R}{3}\right)\right)\right]$
$= \frac{1}{3}\pi\left[\frac{8R^2}{9} \times \frac{4R}{3}\right]$
$v = \frac{8}{27}\left(\frac{4}{3}\right)\pi R^3$
$v = \frac{8}{27}$ Volume of sphere
Volume of cone $= \frac{8}{27}$ of volume of sphere.

OR



$\frac{vo'}{x} = \cot\alpha$
$vo' = x\cot\alpha$
$oo' = h - x\cot\alpha$
$V = \pi x^2.(h - x\cot\alpha)$
$V = \pi x^2 h - \pi x^3\cot\alpha$
$\frac{dv}{dx} = 2\pi xh - 3\pi x^2\cot\alpha$
For maximum/minimum
$\frac{dv}{dx} = 0$
$2\pi xh - 3\pi x^2\cot\alpha = 0$

$x = \frac{2h}{3}\tan\alpha$

$\frac{d^2v}{dx^2} = 2\pi h - 6\pi x\cot\alpha$

$\frac{d^2v}{dx^2}\Big]_{x=\frac{2h}{3}\tan\alpha} = \pi(2h-4h)$

Volume is maximum at $x = \frac{2h}{3}\tan\alpha$

Maximum volume is

$V = \pi.x^2(h - x\cot\alpha)$

$= \pi\left(\frac{2h}{3}\tan\alpha\right)^2\left[h - \frac{2h}{3}\tan\alpha\cot\alpha\right]$

$= \pi.\frac{4h^2}{9}\tan^2\alpha.\frac{h}{3}$

$V = \frac{9}{27}\pi h^3\tan^2\alpha$

36. Let the equation of the plane be

$\frac{x}{a} + \frac{y}{b} + \frac{z}{c}$ = 1 ...(i)

where a, b, c are variables.

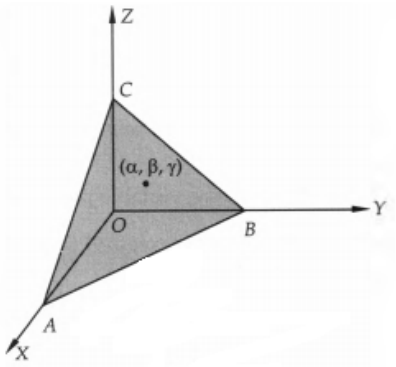
This meets X, Y and Z axes at A (a, 0, 0), B (0, b, 0) and C (0, 0, c).

Let (α, β, γ) be the coordinates of the centroid of triangle ABC. Then,

$\alpha = \frac{a+0+0}{3} = \frac{a}{3}, \beta = \frac{0+b+0}{3} = \frac{b}{3}, \gamma = \frac{0+0+c}{3} = \frac{c}{3}$ ...(ii)

The plane (i) is at a distance 3p from the origin.

∴ 3p = Length of perpendicular from (0,0,0) to the plane (i)



$\Rightarrow \quad 3p = \frac{\left|\frac{0}{a}+\frac{0}{b}+\frac{0}{c}-1\right|}{\sqrt{\left(\frac{1}{a}\right)^2+\left(\frac{1}{b}\right)^2+\left(\frac{1}{c}\right)^2}}$

$\Rightarrow \quad 3p = \frac{1}{\sqrt{\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}}}$

$\Rightarrow \quad \frac{1}{9p^2} = \frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}$ ...(iii)

From (ii), we have a = 3α, b = 3β and c = 3γ.

Substituting the values of a, b, c in (iii), we obtain

$\frac{1}{9p^2} = \frac{1}{9\alpha^2} + \frac{1}{9\beta^2} + \frac{1}{9\gamma^2}$

$\Rightarrow \quad \frac{1}{p^2} = \frac{1}{\alpha^2} + \frac{1}{\beta^2} + \frac{1}{\gamma^2}$

Hence, the locus of (α, β, γ) is

$\frac{1}{p^2} = \frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2}$ or, $x^{-2} + y^{-2} + z^{-2} = p^{-2}$.

Solution

Class 12 - Biology

Confidence -I (2019-20)

Section A

1. **(a)** Follicular atresia
   Explanation: In some females during reproductive cycle regression and disappearance of ovarian follicles occurs this stage is called follicular atresia. It is due to hyper-secretion of progesterone hormone.

   OR

   (b) Copper-T
   Explanation: Copper-T is a contraceptive method under intra uterine contraceptive device which prevents the implantation and reduce the motility of sperm. It is implanted inside the uterus and works up to five years. So, it is the best method for spacing between two children.
2. **(d)** Certain types of cancer
   Explanation: Electron therapy or electron beam therapy (EBT) is a kind of external beam radiotherapy where electrons are directed to a tumor site.
   Cancerous cells are killed by radiation therapy to treat certain types of cancer. As cancer cells divide rapidly and can be easily killed by radiation.

   OR

   (b) I-131
   Explanation: Radioactive iodine (I-131), an isotope of iodine that emits radiation, is used for medical purposes. When a small dose of I-131 is swallowed, it is absorbed into the bloodstream in the gastrointestinal (GI) tract and concentrated from the blood by the thyroid gland, where it begins destroying the gland's cells.Iodine is essential for production of thyroxin hormone.
3. **(d)** 1 - 3 - 4 - 2
   Explanation: 1 - 3 - 4 - 2
4. **(d)** Restriction enzyme
   Explanation: In genetic engineering, restriction enzymes (or restriction endonucleases) are used to cut DNA into smaller fragments. The cuts are always made at specific nucleotide sequences. Different restriction enzymes recognise and cut different DNA sequences. These fragments are joined together using another enzyme called ligase.
5. **(b)** Impact of human interference and pollution on biotic and abiotic environments
   Explanation: UNESCO's Man and the Biosphere Programme (MAB) is an Intergovernmental Scientific Programme that was launched in 1971. It aims to establish a scientific basis for the improvement of relationships between people and their environments. It has been launched to study human environment, impact of human interference and pollution on biotic and abiotic environments and conservation strategies.

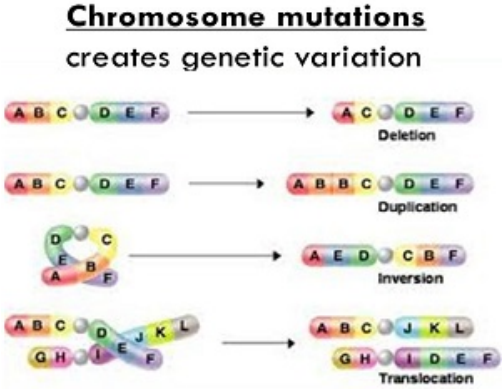
Section B

6. - **Parthenocarpy** is the development of fruit from the ovary without fertilization. Such fruits do not contain any seeds. This phenomenon takes place only in plants. For example- Banana.
   - **Parthenogenesis** is the development of an embryo without fertilization in animals while in plants, it is a part of apomixis. For example- Honeybee, Rotifers, *Ulothrix* (green algae).

   OR

   A pollen tube carrying two male gametes, enter a ovule and release two male gametes which fuse with two different structures in a embryo sac (the egg and two polar nuclei). Hence for fertilization of 10 ovules, 10 pollen grains are required and not 5 pollen grains.
7. Artificial birth control measures are as follows:
   i. Use of contraceptives such as a condom, diaphragm, cervical cap, IUDs and oral pills and vaginal tablets, jellies, pastes, and creams.
   ii. The surgical operation, namely vasectomy, and tubectomy.

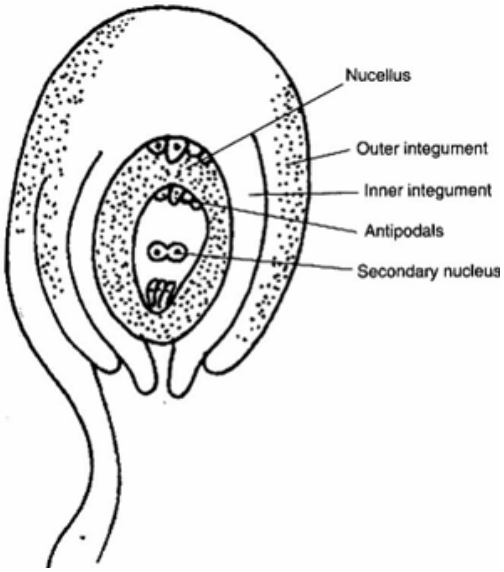
8. A mutation involving a long segment of DNA. These mutations can involve deletions, insertions, or inversions of sections of DNA. In some cases, deleted sections may attach to other chromosomes, disrupting both the chromosomes that loses the DNA and the one that gains it. Also referred to as a chromosomal rearrangement.



9. i. 'a' - Vector DNA and 'b' - Foreign DNA.
   ii. DNA ligase.
10. Biofortified maize and wheat are considered nutritionally improved, because of following reasons:
    (i) Maize hybrids have twice the amount of amino acid, lysine and tryptophan as compared to existing maize hybrids.
    (ii) Atlas 66 has been used as a donor for developing wheat varieties with improved protein content.
11. These genetically engineered lymphocytes are not immortal, the patient requires periodic infusion of such genetically engineered lymphocytes.
    If the gene isolate from marrow cells producing ADA is introduced into cells at early embryonic stages, it could be a permanent cure.
12. (i) Productivity
    (ii) Decomposition
    (iii) Energy flow
    (iv) Nutrient cycling

Section C

13. Mode of pollination in
    a. Vallisneria - hydrophily
    b. Water lily - Entomophily

    In Vallisneria, a dioecious plant, male flowers abscise from the submerged spadix and rise to the surface of the water. The female flowers are brought to the surface of the water by uncoiling of their long stalks. They have large sticky trifid stigmas. The male flowers come in contact with the stigma of female flowers. The anther bursts and pollination is brought about. After getting pollinated, the female flowers are pulled back inside water by coiling of the stalk.
14. 

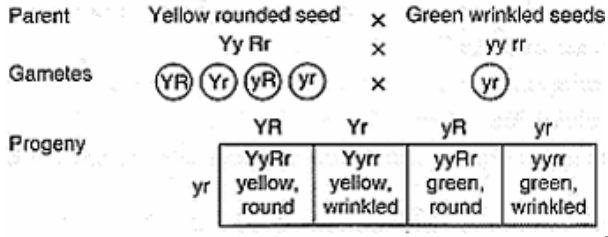
15. (a) Dominant character shows in F_1 generation, while the recessive character remains hidden.
    (b) The alleles are similar in homozygous, while they are dissimilar in heterozygous. Homozygous individuals

can carry either dominant or recessive alleles but not both but heterozygous individual has both dominant and recessive alleles.
(c) Crossing one set of two contrasting characters is called monohybrid cross. Crossing one set of 4 contrasting characters is called dihybrid cross.

OR

i. It is a test cross

ii.



	YR	Yr	yR	YR
yr	YyRr yellow, round	Yyrr yellow, wrinkled	yyRr green, round	yyrr green, wrinkled

The test cross ratio is 1 : 1 : 1 : 1

iii. The principle of segregation.

16. **(i) Variations: -** There are differences among all individuals. These differences are called variations. According to Darwin, the variations are gradual (continuous) and those, which are helpful in the adaptations of an organism towards its surroundings would be passed on to next generation, while the other disappears.
(ii) Formation of new species - Darwin considered that useful variations are transmitted to the offspring and appear more prominently in succeeding generations. After some generations these continuous and gradual variations in the possessor would be so distinct that they form a new species.

17. i. a to a' is 5' $\rightarrow$ 3'. No more amino acid will be added to this polypeptide chain because of the encounter of stop codon, UAA.
ii. TCA codes for serine. Anticodon of tRNA for serine is UCA.
iii. The untranslated regions are required for efficient translation process. They are present before the initiation codon at the 5' end and after the stop/termination codon, at the 3' end.

18. i. The desirable characters a farmer looks for in his sugarcane crop are:
- High sugar content
- High yield
- Thick stems
- Ability to grow all over India
- Disease resistance

ii. Sugarcane is grown in North India, i.e. *Saccharum Barberi* had poor sugar content and low yield, while the sugarcane is grown in South India, i.e. Saccharum officinarum had thicker stems and higher content of sugar, but it could not be grown in North Indian climatic conditions.

19. Advantages of GMOs are as follows:
i. Tolerance against abiotic stresses, such as cold, drought, salt, heat.
ii. Reduce dependence on chemical pesticides.
iii. Reduce post-harvest losses.
iv. Increased efficiency of mineral usage by plants.

20. (i) The alien species become invasive and cause a decline or extinction of indigenous species.
e.g. the Nile Perch introduced into Lake Victoria in east Africa led to the extinction of more than 200 species of Cichild fish in the lake.
(ii) Habitat loss and fragmentation deprive the organisms of their natural home and hence leads to their extinction.
When large habitats are broken up into small fragments, mammals and birds which require large territories and certain animals with migratory habits are seriously affected. This leads to decline in their population.
e.g. When the Amazon forest is cut and cleared for conversion into grasslands, many species are affected due to destruction of their habitat.

OR

A) Pesticide is entering into food chain which is resulting in biomagnifications. Higher level of pesticide is responsible for death of fish eating birds.

B) As an alternative to pesticide, biocontrolling agent can be used to remove pest. Biopesticides such as neem extract can be used as sprayes to prevent pest attack.

Values

•Problem solving

•Critical thinking

•Concern towards nature

21. i. The insertion of recombinant DNA within the coding sequence of enzyme a-galactosidase results in the inactivation of the enzyme called insertional inactivation. The colonies do not produce a blue colour in the presence of chromogenic substrate and are identified as recombinant colonies whereas non-recombinant colonies produce blue colour from the chromogenic substrate, due to the presence of the activated enzyme.

ii. The method is referred as "insertional inactivation" because the enzyme α-galactosidase produced is inactivated due to insertion of alien DNA within the coding sequence of the enzyme, which acts as a selectable marker to differentiate recombinant colonies from non-recombinant one.

Section D

22. i. Fertilisation takes place in Fallopian tube (W) and implantation takes place in uterus (Y).

ii. Endometrium.

iii. In a test for rape, vagina is analysed for the presence of fructose. It is not produced anywhere in the human body except semen (contributed by seminal vesicles). Therefore, its presence in the vagina indicates coitus/sexual intercourse.

23. i. When BOD of sewage gets reduced, it is passed into a settling tank. The bacterial flocs settle in the tank and the sediment is called activated sludge. A small amount of activated sludge is pumped back into the aeration tank to serve as inoculum.

ii. The remaining major part of the sludge is pumped into large tanks called anaerobic sludge digesters, where other kinds of bacteria, which grow anaerobically, digest the bacteria and the fungi in the sludge. During this process, bacteria produce a mixture of gases, such as methane, hydrogen sulphide and carbon dioxide, which form biogas.

The effluent from secondary treatment is generally released into natural water bodies. It helps to reduce water pollution and water-borne diseases.

24. i. A-High BOD due to sewage discharge.

B-Increase in dissolved oxygen due to sewage decomposition.

ii. Microorganisms involved in biodegradation of organic matter consume a lot of oxygen. Therefore, there is a sharp decline in dissolved oxygen. When the sewage is completely degraded, oxygen concentration again increases.

iii. Low dissolved oxygen (DO) primarily results from excessive algae growth caused by phosphorus. Nitrogen is another nutrient that can contribute to algae growth. As the algae die and decompose, the process consumes dissolved oxygen. This can result in insufficient amounts of dissolved oxygen available for fish and other aquatic life.

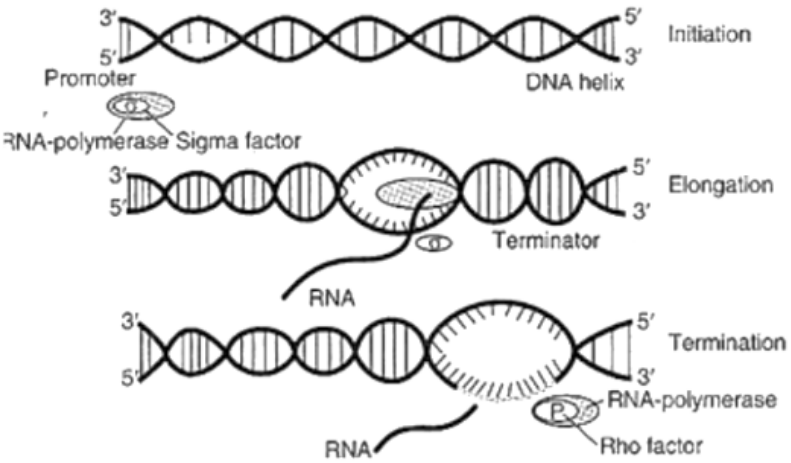
Section E

25.

Klinefelter syndrome	**Turner syndrome**
It is due to trisomy (2n+1) of sex chromosome.	It is due to monosomy (2n-1).
Genetic Sex: XXY; generally female because of the presence of two X chromosomes.	XO; genetically sexless.
The individual has 47 Chromosomes(44+XXY).	The individual has 45 chromosomes. (44+X).
Gonadal sex:	

Testes present, but atrophied, gonadally male, presence of testis is due to Y chromosome.	No ovary; no testes; no gonadal sex.
Phenotype male, outward appearance male; penis, vas deferens, seminal vesicles present, but small sized, no spermatogenesis; sterility present.	Phenotype female, outward appearance; female; vulva, vagina and uterus present, but breasts do not develop owing to the absence of estrogens; no menstruation; sterility present.
Clinical symptoms: Male with slowly degenerating testes, enlarged breasts.	Short stature, webbed neck, female with poorly developed breasts and degenerated ovaries and rudimentary sexual characteristics.

OR



Transcription in prokaryotes

26. a. A hybrid produced by the fusion of somatic cells of two varieties or species is called a somatic hybrid. The process of producing somatic hybrids is called somatic hybridization.
Various steps involved in the process are as follows:
    i. The cell wall of the cells of selected parents is digested with macerozymes (A combination of enzymes, pectinase and cellulose). The plant cells lacking cell wall are called protoplasts.
    ii. The fusion between protoplasts is induced by Poly Ethylene Glycol (PEG) or by a very brief high voltage electric current.
    iii. The fused protoplasts are allowed to grow on the culture medium.
    iv. Soon they regenerate cell wall and begin to divide forming a callus from which hybrid plantlet is formed.

    b. Uses: Somatic hybrid may be used for:
    i. Gene transfer
    ii. Production of useful allopolyploids.

OR

There are many factors which motivate youngsters to take to alcohol or drugs such as
i. Pleasure or for fun sake
ii. Curiosity
iii. Desire to do more work
iv. The gesture of defiance to elders, partners and friends
v. Social pressure
vi. Feeling of independence
vii. Liking of taste
viii. Desire for excitement
ix. Desire to escape from such realities of life as disappointments, frustrations and failures
x. Unhappy married life and
xi. Desire to offset the effect of hardships and monotonous daily life.

All the victims of alcohol/drug abuse are sick persons. They need the attention of family members and friends to give up the habit. This is possible under proper medical supervision.

i. The physician should prescribe the habituating drugs only to a genuine person.
ii. Pharmacists should not sell these drugs without a physician's prescription.
iii. Parents should keep a watch on children and should check then from using drugs as soon as they find signs of addiction in them.
iv. Social workers/policemen, if they find a drug abuser should inform the parents or de-addiction centre.
v. The addict may have psychological problems at home, at work or with society. The help of family members, social workers and employers may be taken in this work.
vi. Attempts should be made to help the alcoholics achieve and maintain a high level of motivation towards abstinence.

27. Ozone formed in the troposphere is bad ozone' as it acts as an air pollutant and harms plants and animals.
Ozone formed in the upper part of the atmosphere called stratosphere is 'good ozone'.
It acts as a shield absorbing UV radiations from the sun.
Ozone gas is continuously formed by the degrade it into nascent oxygen and the two combine to form ozone in the stratosphere.

$$O_2 \xrightarrow{UV} \underbrace{[O] + [O]}_{\text{Nascent oxygen}}$$

$$O_2 + O \longrightarrow O_3$$

UV rays further cause photodissociation of ozone into O_2 and [O] but the two combine to produce O_3 again.

$$O_3 \xrightarrow{UV} O_2 + [O]$$

$$O_2 + [O] \xrightarrow{UV\ radiations} O_3$$

There should be a balance between production and degradation of ozone in the stratosphere.
Balance has been disrupted due to the enhancement of ozone degradation by **chlorofluorocarbons** (CFCs).

OR

a. Hydrarch succession is succession of plants which take place in wetter areas and the successional series progress from hydric (excessive wet) to the mesic condition (medium water condition).
b. **Pioneer species** are these are the species that invade a bare area while the **climax community** is a community which it is in near equilibrium with the environment. The pioneer species of hydrarch succession are phytoplankton while of xerarch succession are lichens. The climax community of both hydrarch and xerarch succession is a forest although the species involved during the process are different for both types of successions.
c. In secondary succession, the species that invade depend on the condition of the soil, availability of water, the environment and the seeds and propagules already present.
The rate of secondary succession is faster than the primary succession because the soil is present for secondary successions which is absent for primary succession.