Roll No. _____ **NLCS/12/English (301)/95**

Pre Board Exam 2025 – 2026

Time Allowed: 3: 00 Hrs. **M M: 80**

General Instructions

Read the following instructions very carefully and follow them:

i. This question paper has 13 questions. All questions are compulsory.

ii. This question paper contains three sections: Section A: Reading Skills, Section B: Creative Writing Skills, Section C: Literature.

iii. Attempt all questions based on specific instructions for each part. Write the correct question number and part thereof in your answer sheet.

iv. Adhere to the prescribed word limit while answering the questions.

SECTION-A READING SKILLS (22 MARKS)

1. Read the following passage carefully. **12**

1. The revolution in information technology (IT), far from helping India to leapfrog to a post- industrial society, threatens to rupture the social fabric by enriching a few at the cost of many.
2. In a very short time and quiet unexpectedly, India has risen to considerable eminence in the world of information technology. This year, software products are expected to account for $ 5.7 billion in exports and will account for a quarter of the growth in the economy, which is expected to grow nearly seven percent. Within eight years, predicts a recent study by McKinsey & Co. and the National Association of software & service companies (Nasscom), India's annual IT exports could hit $ 50 billion, about 33 percent of global software exports. Such a surge is expected to generate 2.2 million jobs and push or growth rate near the double digits that many East Asian tigers enjoyed before the 1997 crash.
3. For the rapidly growing middle class, which was desperate to make its presence felt but remained mired in the great Indian Outback of the global economy and regretfully watched the industrial revolution pass it by, this is the moment they have been waiting for. When countries like Japan and Germany, the objects of India admiration, should come knocking on our doors to solicit our talent to invigorate their industry, it is indeed redemption of sorts. And IT is the cause of it all.
4. The big question is, will IT do an encore for India as a nation and not just for the wafer thin percentage of IT literate. Indians, mostly the poster boys of the IIT's?
5. IT has, as yet; failed to touch the lives of the average citizen and India is nowhere close to being a knowledge economy or society. As per the International Data Corporation (IDC), in a survey of 55 countries, India ranks 54th on its Information Society Index.
6. The fact is, it is a straight forward reflection of the deep inequality of our education system which breeds of few 'geniuses' at the cost of the entire nation. A study by former director of the National Centre for Software Technology, R. Narasimhan, points out that nowhere is the digital divide more glaring than in IT education. The report warns that India's 'obsession' with the software industry and its exports orientation is leading to the churning out of unemployable students on one hand and bright whiz-kids on the other. While the latter are lured away by overseas employers, the former remain unemployable.
7. Narasimhan cautions against the 'hype' associated with the phenomental growth of India's software industry defying rational explanations and built up into a 'mystique of sort' which breeds false hopes.
8. India's software industry is a poor employment generator. In the mid-nineties, some 20,000 people were actively employed in software export services. In contract, there were three million registered unemployed graduates in the Nineties. While the 'Narasimhan Study' doesn't mention number of jobs lost due to computerization, one could comfortably add a million to the number.

Answer the following questions, based on the passage above.

a) According to para 1, what impact does information technology have on social threads? 1

b) Why is the digital divide clearly visible in IT revolution? 1

c) Read and complete the following sentence suitably. 1

It is a time of pride for the middle class in India because developed industrial nations will require Indian software professionals to invigorate their industry.

Choose the correct response from the two options to complete the sentence.

_____ is responsible for it. i) Information technology ii) Middle class

d) Complete the sentence appropriate with one description or characteristics with reference to paragraph 7. 1

Narasimhan's report cautious against the 'hype' surrounding the _____ .

e) Select the option that clarifies the reason for growth in export of Indian software products and national economy. 1

i)Global recession ii)Liberalised economy

iii)Public private cooperation iv) Eminence of information technology

f) Provide one textual evidence to support the view that, 'IT has failed to touch the lives of the average Indians'. 2

g) In the line, "A study by former director of the National Centre for Software Technology, R.Narasimhan, points out that nowhere is the digital divide more glaring than in IT education."

What does the word 'glaring' refer to? (Paragraph 6). 1

h) Complete the analogy with 1 word from paragraph 5. 1

i)fail ii) failure iii) failed iv) foul

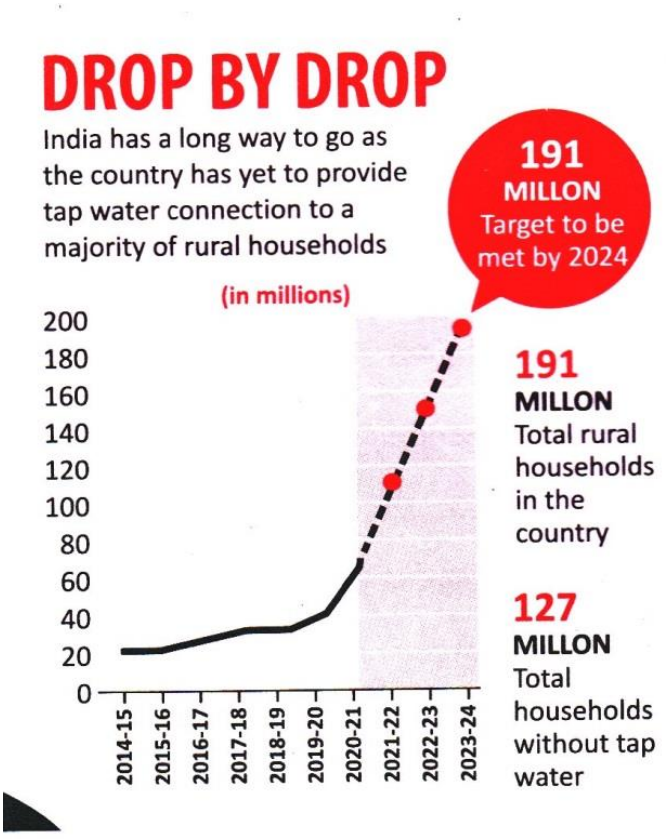
i) According to a recent study by McKinsey & Co.and Nasscom, how much % of India's annual IT exports could hit global software exports? 1

i)13% ii) 24% iii) 43% iv) 33%

j) What does Narasimhan's report highlight about IT software industry? 2

2. Read the passage carefully: **10**

1. At the headquarters of the Union Jal Shakti Ministry in New Delhi, Bharat Lal, additional secretary and director, Jal Jeevan Mission, clicks on his computer to check on the progress of the government's massive programme to ensure that every rural houshold has a functional tap connection for drinking water by 2024. The dashboard of the ministry website flashes that 127,000 households across the country have been provided with a functional tap connection on that particular day. Next, he checks the total number of households that have been provided these tap connections since the mission was launched by Prime Minister Narendra Modi on August 15, 2019. The figure stands at 38.46 million. That's phenomenal progress considering that prior to that date, only 32 million households had received functional tap connections since Independence.



2. Yet, despite the Jal Jeevan Mission fast tracking supply, only around 36.9 %, or a little more than a third of the 191 million households, have piped water supply. That about 63% of india's rural population still has to step outside their homes and wait in queues, sometimes for hours, to get their rural daily requirement of water should be a matter of shame for a country and its leaders.
3. That's why Lal and his colleagues are pursuing the Jal Jeevan Mission, which promises to provide functional tap water connections to all rural households apart from schools by 2024, with missionary zeal and keeping a hawk's eye on the calendar. While there have been massive efforts to provide drinking water in the past, including the National Drinking Water Mission launched by Rajiv Gandhi

in 1986, none compares with magnitude of the task the Jal Jeevan Mission has set for itself. To meet its 2024 target under the 'Har Ghar Nal Se JAL'(Tap water in every house) programme as it is called, the government has to provide annually 30 million new households with tap water for the next four years.

4. Money is not an issue, with the Narendra Modi government setting aside 3.6 lakh crore to accomplish it. But what the Jal Jeevan Mission team is doing is injecting a massive amount of technology to monitor the progress of the mission,apart from pushing for standardisation of pipes, taps and other equipment needed to provide tap water. Lal can zero in on any district in the country or any village to find out the progress achieved in terms of infrastructure being provided and water being supplied. It is such constant monitoring that ensures that not only the quantity of water supplied but its quality too is being checked.

On the basis of your understanding of the above article, answer the following questions:

1. Infer two ways in which technology is playing a crucial role in scripting the success of the Jal Jeevan Mission (Water is Life Mission). Answer in about 40 words. 2
2. Complete the given sentence appropriately: 1
   The chief aim of 'Jal Jeevan Mission', according to para 1 is to _____ .
3. Complete the sentence. 1
   The phrase 'a matter of shame' (Para 2) refers to _____ .
4. Which of the following lists the most likely reason for success of the Jal Jeevan mission?
   a)Availability of resources and manpower b) Political will and activism
   c)Public agitations for tapped water connections
   d)Computer technology led monitoring system 1
5. What do expressions 'missionary zeal' and 'a Hawk's eye' suggest about the government's attitude to the Jal Jeevan Mission? Answer in about 40 words. 2
6. Which of the following is NOT mentioned in para 4 among the different points being monitored by the Jal Shakti Ministry? 1
   a)Progress of the Jal Jeevan Mission b)Quality of equipment being used
   c)Quantity and quality of water d)Human resources engaged in the mission
7. State TRUE or FALSE: 1
   Nearly two thirds of rural households in India still lack a tapped water connection.
8. The concluding sentence of the passage highlights the ____ that has ensured the ___ of the Jal Jeevan Mission. 1
   a) Purpose, success b) vision, design
   c) technology, monitoring d)mechanism, effectiveness

SECTION B: WRITING SKILLS (18 marks)

Q.3 Attempt ANY ONE of the TWO in about 50 words: 4

(A) Every year a Book Exhibition is held in the central amphitheatre of your city in the month of March. Your school has received a circular from the District Head inviting your students and teachers to attend it. Write a notice informing the students about the exhibition and encouraging them to give consent for the same. Mention all the relevant details. You are Mrinalini / Mahesh, student head, Cultural Club of Global Rise Sr. Sec. School, Chennai.

(B) You are Dheeraj Jain, Secretary of J.P. Narain Housing Society, RWA, Meerut, Draft a notice in not more than 50 words stating that the second instalment of maintenance charges may be paid by the members of the society before the due date.

Q.4 Attempt ANY ONE of the TWO in about 50 words. 4

(A) You are Priyamvada/ Priyesh Verma. You have received a letter from your friend to attend her father's retirement party. Unfortunately, you cannot attend it due to some prior engagements. Write a letter of reply expressing your inability to make it to the celebration.

(B) On 30th November, your school is going to hold its Annual Sports Day. You want Mr. Dhanraj Pillai, a noted hockey player to give away the prizes to the budding sports persons of the school. Write a formal invitation in about 50 words requesting him to grace the occasion. You are Karun/Karan, Sports Secretary, Sunrise Global School, Agra.

Q.5 Attempt ANY ONE of the TWO in about 120-150 words. 5

(A) You are Neeraj/ Neerja residing at 2/23, Venus apartments, Amit Colony, Mumbai. You have observed with the increasing concern that people waste a lot of water and it results in shortage of water too. Write a letter in 120-150 words to the editor of the Hindustan times, expressing your concern about it.

- Water –most precious
- More wastage of water
- Leakage of pipes
- Heavy fines should be imposed

(B) Deepika Shaikh, a resident of Tilak Road, New Delhi read an advertisement for the post of a stenographer of a renowned company in the city. He decides to apply for the same. Write Deepika's application to the Personnel Manager, Procter and Gamble (P&G) Ltd, New Delhi.

PROCTER & GAMBLE LTD (P&G)
WANTED
STENOGRAPHER

WHO DO WE NEED?
Fresher, Experienced, both are welcome.
Required : 10+2pass out
Skills: Excellent communication skills & ability to take dictation.

Send your resume to : The Personnel Manager, Procter & Gamble Ltd, 7/24, New Ashoka Estate, Barakhamba Road, New Delhi 110001

Q.6 Attempt ANY ONE of the TWO in 120-150 words. 5

(A) In certain states of India, there is a great imbalance in the male-female ratio. This is the result of special treatment given to boys in the family. Why is it so? How can we change this mind set? Write an article in 120-150 words on 'Gender Discrimination in Society'. Take hints from the given clues. You are Karan/Karuna.

- India – a male –dominated society
- Birth of a boy is a boon
- Birth of a girl is a curse
- Girl child – a liability
- Girl child denied the advantage of proper education
- Education –only remedy

(B) You are Manav/Manjari of Maharaja Agrasen Public school Patna. Your school has recently organised a Blood Donation Camp on the occasion of Gandhi Jayanti. Write a report as the editor of your school magazine on this widely acclaimed activity in about 120-150 words. You can use the clues given below along with your own ideas.

- Blood donation camp in school premises
- In collaboration with Red cross society
- Qualified doctors/efficient volunteers & staff
- A huge success for a great social cause
- Nutritious refreshment

SECTION C: LITERATURE (40 marks)

Q.7 Attempt ANY ONE of the extracts given below and answer the questions that follows. 6

A.

The little old house was out with a little new shed.
In front at the edge of the road where the traffic sped.
A roadside stand that too pathetically pled.
It would not be fair to say for a dole of bread,
But for some of the money, the cash, whose flow support.
The flower of cities from sinking & withering faint.

a) Select the option to fill in the blank: 1

The little new stand was made in front of_____.

i) In the middle of the road ii) behind the tree

iii) Outside the house iv) at the edge of the road

b) They make their roadside stand far from the city because _____. 1

Why was a shed made outside the little house?

i) Because there was a lot of space outside the house.

ii) Because people had demanded it

iii) Because people wanted bread. iv) To earn some money cash

c) Which word in the above lines means 'feeble'. 1

d) Who is the "flower of cities"? 1

e) How will the roadside stand save the cities from sinking? 2

B. Aunt Jennifer's fingers fluttering through the wool
Find even the ivory needle hard to pull
The massive weight of uncle's wedding band
Sits heavily upon Aunt Jennifer's hand.

a) Why was it so hard for Aunt Jennifer to pull the ivory needle?

b) What did marriage bring for Jennifer?

i) Unhappiness at workplace ii) Loss of freedom in her old house

iii) Loss of freedom & burden of responsibilities

iv) Responsibilities of children.

c) The rhyme scheme of the lines is

i) abab ii) aabb iii) abba iv)aaba

d) Uncle's wedding band was like a….. on Aunt's finger.

i) burden ii) token of love

iii) reminder of his affection iv) memories of good times

e) What do Aunt Jennifer's fluttering hands through her wool in the stanza tell us?

i) The lost freedom & fear in mind ii) Her old age & trembling hands.

iii) Her love for tigers & other cats' species.

iv) Her love for embroidery & knitting.

f) What issues does he poem, 'Aunt Jennifer's tiger's address?

Q.8 Attempt ANY ONE of the extracts given below and answer the questions that follow: 6

A. 'She thinks money grows on trees, don't she Dad? Said little Derek, hanging on the back of his chair. Their mother sighed. Sophie watched her back stooped over the sink and wondered at the incongruity of the delicate bow which fastened her apron strings. The delicate seeming bow and the crooked back. The evening had already blacked in the windows and the small room was steamy from the stove and cluttered with the heavy breathing man in his vest at the table and the dirty washing piled up in the corner. Sophie felt tightening in her throat. She went to look her brother Geoff.

a) The description of her house reveals…..

i) The pathetic condition of her home ii) the upper middle class British life

iii) The affluent conditions of her life iv) all of these

b) Find out a word from the extract which means the same as 'strangeness'

c) 'Sophie felt tightening in her throat.' Pick the option that lists Sophie's feelings in the context.

1. Anxious 2. Annoyed 3. Uneasy 4. Terrified

i) 1 and 3 ii) 2 and 3 ii) 1 and 4 iv) 2 and 4

d) Derek thought his sister to be _____

e) It could be inferred that Sophie's mother was fatigues and burdened. Choose the option listing the elements from the basis of this inference

1. Her sigh 2. Her delicate 3. Her apron's strings 4. Her crooked back

i) 1 and 2 ii) 3 and 4 iii) 2 and 3 iv) 1 and 4

f) Who was the heavy breathing man in his vest?

B. This gang of nationally integrated make-up men could turn any decent-looking person into a hideous crimson hued monster with the help of truckloads of pancakes and a number of other locally made potions and lotions. Those were the days of mainly indoors shooting, and only five percent of the film was shot outdoors. I suppose the sets and studio lights needed the girls and to be made to look ugly in order to look presentable in the movie. A strict hierarchy was maintained in the makeup department.

a) The gang of makeup men is formed as 'nationality integrated' because…….. 2

b) Of the four options given of the word, 'Presentable' select the options that matches in meaning with its usage in the extract: 1

i) To appear smart ii) to look attractive

iii) To act in the movies iv) to make the actors look decent in the movie.

c) How could the gang of makeup men turn a decent looking person into a hideous monster? 1

i) By beating them black & blue ii) By putting them in a drum of paint

iii) By using truckloads of pancakes iv) Using local portions and lotions which is true.

i) (A) ii) (A) & (B) iii) (A), (B) & (C) iv) (C) & (D)

d) Mostly the films were shot indoors. How much percentage of films was shot outdoors? 1

e) Why did the studio lights & sets needed the girls and boys to look ugly? 1

i) So that they could act in films ii) so that they didn't get many films

iii) So that they were hated by audience iv) so that they look presentable in the movie.

Q.9 Attempt ANY ONE of the extracts given below and answer the questions that follow. 4

A. Annan told me all these things and he added, "Because we are born into this community, we are never given any honour or dignity or respect; we are stripped of all that. But if we study and make progress we can throw these dignities, so study with care and learn all you can. If you are ahead in your lesson, people will come to you of their own accord and attach themselves to you 'Work hard & learn. '

a) What is the only remedy for this malaise?

i) knowledge & degrees ii) Logic & discourse

iii) Open rebellion iv) None of these

b) Did the girl follow this advice? How do you know?

i) She became a teacher & novelist ii) She became a sportsperson of renown

iii) She enjoyed Gandhian Movement iv) She plodded ahead carrying her cross

c) What similarities do you notice in the two accounts narrated?

I Both submitted to social atrocities.

II Both accepted their fate

III. Both strived hard to change the course of their life

IV Both educated themselves to get a foot hold and change society.

i) (I) & (III) ii) (III) & (IV) iii) (I) & (II) iv) (II) & (III)

d) To what genre & writing do these accounts belong?

i) Biography ii) Autobiography iii) Fiction iv) Fantasy

B. But at this moment the door opened and she looked out, a dark blue woollen haori over her kimono. She came to him affectionately and put her arm through his as he stood, smiled and said nothing.

a) Who is she in the above lines?

b) What is a kimono'!

i) Loose, knee length Japanese garment ii) Coat like garment.

iii) Japanese robe with wide sleeves iv) Japanese shirt

c) Where were the two standing?

d) Where had they first met?

Q.10 Answer ANY FIVE of the following in about 40- 50 words each: 10

1. What can be inferred from Rajendra Prasad's recorded upshot of the lawyer consultations, at Motihari? [Reference - the senior lawyer replied, they had come to advise and help him; if he went to jail there would nobody to advice and they would go home, What about the injustice to the Share croppers, Gandhi demanded.

2. Douglas uses sensory details to create a vivid image of the unfortunate experience in the pool. What might be the impact on the reader if the narration were more informative than sensory? (Deep water)

3. How does the setting of the remote forest location in 'The Rattrap ' contribute to the overall tone and mood of the story?

4. Umberto Eco, with reference to "The Name of the Rose" says, I think if I had written The Name of the Rose ten years earlier or ten years later, it wouldn't have been the same. What could he have meant? (The Interview)

5. What does the story of Subbu's success in the film industry reveal about the importance of loyalty, creativity, and versatility on this field? (Poet & Pancakes)

6. 'And such too is the grandeur of the dooms; we have imagined for the mighty dead.' Explain the inference you can draw from the phrase mighty dead. (A thing of Beauty)

Q.11 Answer ANY TWO of the following three questions in 40-50 words: 4

1. Why was Charlie fascinated with Galesburg? [The Third level]

2. 'I must get rid of this man for your sake' said Dr. Sadao. How will you describe Dr. Sadao as a husband with reference to the above line? [The Enemy]

3. What does the play 'On the face of it', Suggest about the importance of empathy in overcoming prejudice and stereotypes?

Q.12 Answer ANY ONE of the following two questions in 120-150 words each: 5

A. 'But will keep. A bower quiet for us.(A Thing of Beauty)

Perhaps the Earth can teach us
as when everything seems dead
and later proves to be alive. (Keeping Quiet)

Based on ideas from 'Keeping Quiet' and 'A Thing of Beauty', as a President of Eco Club of your of your school, draft a speech on the important of preserving nature for the benefit of mankind.

You may begin like this.

Good Morning to one and all!

After reading both the poems, I strongly believe……..

B. She gave a little cry a little cry of joy. She found a small rattrap,…….(The Rattrap)

Saheb-e-Alam received a pair of discarded shoes with a hole in one of them. In spite of this he was very happy. (Lost Spring)

Compare the joy that both Edla and Saheb experience after receiving their respective gifts.

Q.13 Answer ANY ONE of the following two question in 120-150words: 5

A. Imagine you are Derry speaking at the funeral of Mr. Lamb's optimism and the change he brought about in your attitude towards life. (On the face of it)

You may begin like this

Dear friends

I will be eternally grateful to Mr. Lamb.

B. After having escaped from Japan with the help of Dr. Sadao, Tom (the prisoner of war) writes an article highlighting how Sadao's actions demonstrated the importance of humanity and living in harmony. (Enemy)

You may begin like this.

Humanity is a value that binds us together....

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Roll No. _____ NLCS/12/Biology(044)/12

Pre Board Exam 2025 – 2026

Time Allowed : 3 : 00 Hrs. **Maximum Marks : 70**

Instructions-

1.All questions are compulsory .

2.The question paper has 5 sections and 33 questions .

3.Section A has 16 questions of one mark each, section B has 5 questions of 2 mark each ,section C has 7 questions of 3 mark each, section D has two questions of 4 mark each and Section E has three questions of 5 mark each.

4.There is no overall choice, however internal choices have been provided in some questions .A student has to attempt only one of the alternatives in such questions.

5.Wherever neat and properly labelled diagram should be drawn.

SECTION -A

Question number 1 to 12 are MCQ, only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

Q.1 Which one of the following statement about spermatogenesis is incorrect –

A. The spermatids are formed when the secondary spermatocytes complete meiosis II.
B. The spermatids transform into spermatozoa in the process called spermiogenesis
C. The spermatids are haploid cells and contain 23 autosomes
D. There is no cell division involved in the process of spermiogenesis.

Q.2 Give given below are two columns ,In column I the names of four contraceptive devices are given and In column II the mode of action of contraceptives are given

Select the correct match-

Column 1. Contraceptive devices	Column 2 Mode of action
(P) Lippes loop.	1.inhibition of ovulation
(Q) surgical method	2. Phagocytosis of sperms in the uterus
(R) Progestasert.	3. Block the transport of gametes
(S) Saheli.	4. Make the uterus unsuitable for implantation.

Option :

(A) P-2,Q-3,R-4,S-1 (B) P-3,Q-1,R-2,S-4 (C)P-2,Q-1,R-2,S-4 (D)P-1,Q-2,R-3,S-4

Q.3 Given below is a sample of a portion of DNA stand giving the base sequence on the opposite strand what is so special shown in it.

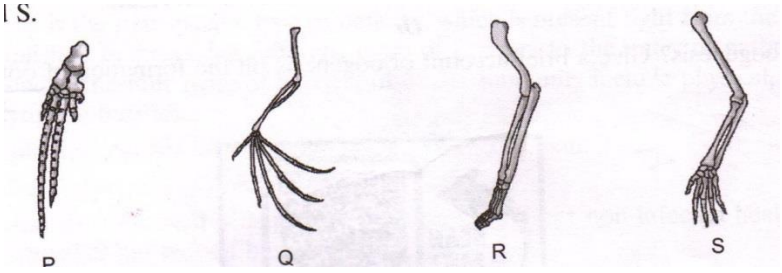
5’_____GAATTC_____3’
3’_____CTTAAG_____5’

(a) Rpplication completed (b) Deletion mutation
(c) Start codon at 5 ‘end. (d) Palindromic sequences of base pair

Q.4 During DNA fingerprinting the seperated DNA fragments are visualised after staining the DNA with

(a) Agarose (b) Ethidium bromide (c) Safranine (d) Ethyl alcohol

Q.5 The figure given below show the structure of different vertebrates which are labelled as P,Q,R,S



Which one of the following statement is incorrect for this?

A. They share similarities in the pattern of bones in the forelimbs.
B. They indicate common ancestry .
C. P and q are adapted for different functions i.e. swimming and flying and thus they are analogous organs .
D. They are the result of divergent evolution.

Q.6 Source organism of Statin molecule -

A Tricoderma polysporum(fungus) B. Monascus purpureus (fungus)
C. Lactobacillus D. Aspergillus Niger

Q.7 First recombinant DNA was constructed by

(A) Karl Ereky (B) Hershey and Chase
(C)Stanley Boyer & Herbert Boyer (D) None of above.

Q.8 The first clinical gene therapy was done for the treatment of -

A. AIDS b)cancer c)cystic fibrosis d) SCID(severe combined immunodeficiency)

Q.9 'Koel ' is an example of parasitic bird, has evolved the technique of laying eggs in the nest of crow that explain -

(a) Broad parasitism (b) Co- evolution (c) competition (d)predation

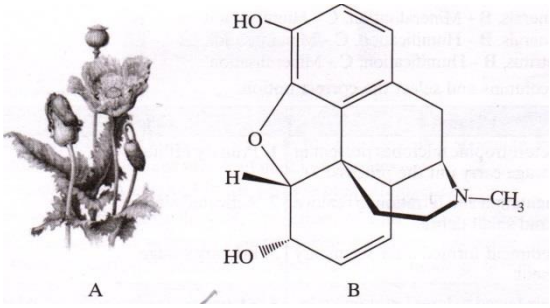
Q.10 Which one is the mis match pair -

(A) Shark and sucker fish –predation (B) Algae and fungi in lichens- mutalism
(C) orchids growing on trees -commensalism.
(D) Cuscuta growing on other flowering plants- parasitism

Q.11 Who proposed that first form of life could have come from pre existing nonliving organism

(a) S.L Miller (b) Oparin and Haldane (c) Charles Darwin (d) Alfred Wallace.

Q.12 Identify A and B in the given figure -



A. (a) Papaver somniferum, (b) Chemical structure of morphine
B. (a) Cannabis sativa, (b) Delta 9 tetrahydrocannibinoid
C. (a) Cannabis sativa (b) Chemical structure of morphine
D. (a) Papaver somniferum (b) skeletal structure of cannabinoids molecule.

Question number 13 to 16 are Assertion- Reason followed by a statement of Reason is given. Choose the correct answer out of the following choices –

(A) Assertion and Reason are correct statement and Reason is the correct explanation of Assertion.
(B) Assertion and Reason are the correct statement but reason is not the correct explanation of Assertion.
(C) Assertion is true but Reason is false statement .
(D) Assertion is false but Reason is true statement

Q.13 **Assertion** -predators are organisms which feed on other individuals.
Reason- Prey species have evolved various defences to lessen the impact of predation.

Q.14 **Assertion** -Vertical stratification of different species occupying different levels is called stratification .
Reason- tree occupies top vertical strata, shrub the second, herbs and grasses occupied the bottom layers.

Q.15 **Assertion**- Restriction enzyme cut the stands of DNA a little away from the centre of the palindrome to produce the sticky ends.
Reason -Stickiness of the end facilitates the action of enzymes DNA polymerase.

Q.16 **Assertion** -Exine of pollen grain is made up of sporopollenin which is resistany to high temperature ,strong acids or alkaline as well as enzymatic degradation .
Reason- Sporopollenin is absent in the region of germ pores .

SECTION -B

Q.17 Write the four features of Homo* erectus(Java man)

Q.18 Name the hormones produced only during pregnancy in human females .Mention their source organ .

Q.19 (A) Name the host where the sexual and their asexual reproduction of malarial parasites occurs respectively .
(B) Name the toxin responsible for appearance of symptoms of malaria in humans.

Q.20 Define humification and mineralisation.

Q.21 (1) Write the correct expanded form of IUCN
(2) What is meant by alien species ?

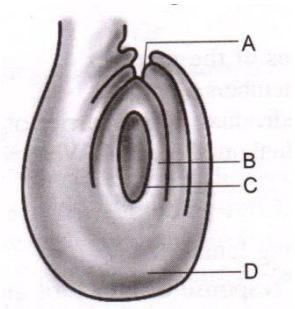
OR

What are exponential and logistic growth curve ?Define them with diagram.

SECTION -C

Q.22 What is bioreactor used for? Name a commonly used bio reactor and any two of its components .

Q.23 Identify the parts labelled A,B,C,D in the given figure .Give the significance of A and C.



Q.24 List and explain the events that follow the journey of human zygote until the implantation

Q.25 (a) Bt cotton is known to be a best resistant GM crops ?How does Bt cotton gets its insect resistance.?
(b) Why is pro insulin so called? How is insulin different from it ?
(c) Name the first transgenic cow? Which gene was introduced in this cow.

Q.26 select the homologous structures from the combination given below and justify your answers .
A. forelimbs of whale and bat
B. tuber of potato and sweet potato
C. Eyes of the octopus and of mammals
D. Thorns of bougainvillea and tendrils of cucurbeta .

Q.27 Name and describe any three causes of biodiversity losses .

Q.28 Fill in the blanks

Name of disease ,	scientific name of pathogen,	symptoms
1. _____(a) ___,	haemophilus influnzae,	_____(b) _____
2. Ringworm	_____(c)_____	Dry lesions on body.
3. ____(d)_____ ,	_____(e)___	internal bleeding,fever etc
4. Typhoid	_____(f)___	Sustain high fever (39 to 40 degree Celsius) and loss of appetite.

OR

Microbes can be used to decrease the use of chemical fertilizers and pesticides . Explain how this can be accomplished.

SECTION -D

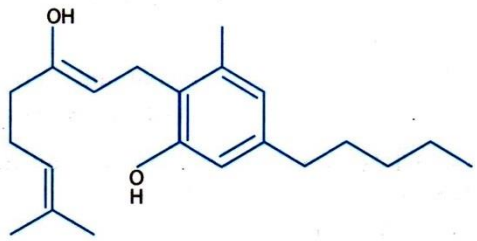
Q.29 Human blood groups are determined by A,B, AB and O blood groups.
A woman with blood group O married a man with AB blood group .
Answer the following question on the basis of above statement .

1. The alleles involved in this inheritance are
   (a) IA (b) IB (c) IA IB. (d) IAIB and i
2. The F1 generation with ____ and _____blood group
   (a) A (b) B (c) O (d) A&B blood group
3. ABO blood group is an example of -
   (a) multiple allelism (b) codominance (c) incomplete dominance (d) pleotropism
4. Which blood group is called universal donor –
   (a) AB (b) O (c) B (d) A

OR

4. Which blood group doesn't contain antigens –
   (a) A (b) O (c) AB (d) B

Q.30 Study the figure given below and answer the question that follow –



1. Plant source of cocaine is -
   (a) Erythtroxylum coca (b) A tropa belladona
   (c) Tobacco plant (d) Cannabis sativa
2. Identify the about picture .It is of_____
   (a) morphine (b) cannabinoid molecule
   (c) hallucinogens (d) tobacco
3. Which harmful drugs obtained from latex of poppy plant
   (a) Morphine (b) heroine (c) LSD (d) tobacco
4. Which useful drugs obtained from latex of poppy plant
   (a) Heroine (b) morphine (c) LSD (d) alcohol

OR

effects of use of Charas, ganja on human body
   (a) R espiratory failure (b) mental illness
   (c) cardiovascular system effected (d) slow down the body function.

SECTION- E

Q.31 (A) Draw the sectional view of ovary and show primary follicle, tertiary follicle ,graffian follicle and Corpus luteum and it 3
(B) Mention the function of Fimbriae and isthmus in female reproductive system 2

OR

(A) Explain artificial hybridization 2
(B)Draw the well labelled diagram of embryo development in dicots . 3

Q.32 How would you find genotype of a tall tea plant bearing white flowers ?Explain with the help of across. Name the type of cross you would use.

OR

Write the difference between the following -
A) Monohybrid and Dihybrid cross (write 3-3differences) 3
B) DNA and RNA (write 2-2 difference) 2

Q.33 (A)Explain PCR with diagram . 3
(B) Write the role of following in biotechnology - 2
Restriction s enzyme and chilled ethanol

OR

A)Explain gel electrophoresis with diagram . 3
B)Write the use of following in biotechnology - 2
Vector and plasmid.

****

Roll No. _____ NLCS/12/Chemistry(043)/23

Pre Board Exam 2025 – 2026

Time Allowed : 3 : 00 Hrs. **Maximum Marks : 70**

GENERAL INSTRUCTIONS: Read the following instructions carefully.

(a) There are 33 questions in this question paper with internal choice.

(b) SECTION A consists of 16 multiple-choice questions carrying 1 mark each.

(c) SECTION B consists of 5 short answer questions carrying 2 marks each.

(d) SECTION C consists of 7 short answer questions carrying 3 marks each.

(e) SECTION D consists of 2 case-based questions carrying 4 marks each.

(f) SECTION E consists of 3 long answer questions carrying 5 marks each.

(g) All questions are compulsory.

(h) Use of log tables and calculators is not allowed.

SECTION-A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

Q.1 A conductivity cell contains electrodes made up of:

A. Silver B. Copper C. Platinum D. Zinc

Q.2 The counter ion in the coordination compound $[Co(NH_3)_5(NO_2)]Cl_2$ is

A. Ammine B. Cobalt C. Chloride D. Nitro

Q.3 Which one of the following first row transition elements is expected to have the highest third ionization enthalpy?

A. Iron (Z = 26) B. Manganese (Z = 25)

C. Chromium (Z = 24) D. Vanadium (Z = 23)

Q.4 Two among the three components of DNA β-D-2-deoxyribose and a heterocyclic base. The third component is:

A. Adenine B. Phosphoric acid C. Sulphuric acid D. Uracil

Q.5 Hoffmann Bromamide degradation reaction is given by:

A. $ArNO_2$ B. $ArNH_2$ C. $ArCH_2NH_2$ D. $ArCONH_2$

Q.6 Identify the Freon from the following compounds:

A. CCl_2F_2 B. CCl_2Br_2 C. $CH_2Cl–CHCl_2$ D. $CHCl_2–CHCl_2$

Q.7 When phenyl methyl ether is heated with HI, it produces:

A. Methyl chloride and Iodobenzene B. Benzene and Methanol

C. Iodobenzene and Methanol D. Phenol and Methyl iodide

Q.8 The value of Henry's constant K_H is:

A. greater for gases with higher solubility B greater for gases with lower solubility

C. constant for all gases D not related to the solubility of gases

Q.9 For the reaction X + 2Y → P, the differential form equation of the rate law is:

A. $\frac{2d[P]}{dt} = \frac{-d[Y]}{dt}$ B. $\frac{-d[P]}{dt} = \frac{-d[X]}{dt}$ C. $\frac{+d[X]}{dt} = \frac{-d[P]}{dt}$ D. $\frac{-2d[Y]}{dt} = \frac{+d[P]}{dt}$

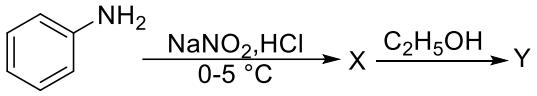
Q.10 A compound $CaCl_2.6H_2O$ undergoes complete dissociation in water. The Van't Hoff factor (i) is:

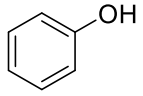
A. 9 B. 6 C. 4 D. 3

Q.11 What amount of electric charge is required for the reduction of 1 mole of MnO_4^- into Mn^{2+}?

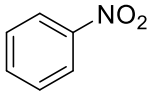
A. 1F B. 5F C. 4F D. 6F

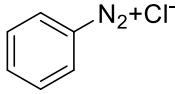
Q.12 In the given reaction sequence, the structure of Y would be:



A 

B 

C 

D 

For Questions number 13 to 16, two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

Q.13 **Assertion (A)**: Separation of Zr and Hf is difficult.
Reason (R): Zr and Hf have similar radii due to lanthanoid contraction.

Q.14 **Assertion (A)**: p-methoxyphenol is a stronger acid than p-nitrophenol.
Reason (R): Methoxy group is electron-donating group whereas nitro group is electron-withdrawing.

Q.15 **Assertion (A)**: Secondary aliphatic amines react with nitrous acid to form aliphatic diazonium salts which being unstable, liberate nitrogen gas quantitatively.
Reason (R): Nitrogen gas evolved on reaction with nitrous acid can be used for the estimation of proteins and amino acids.

Q.16 **Assertion (A)**: Starch forms colloidal solution with water.
Reason (R): Starch contains 80-85% of amylopectin which is insoluble in water.

SECTION-B

Question No. 17 to 21 are very short answer questions carrying 2 marks each.

Q.17 Reactant 'A' underwent a decomposition reaction. The concentration of 'A' was measured periodically and recorded in the table given below: **2**

Time/hour	[A]/M
0	0.40
1	0.20
2	0.10
3	0.05

Based on the above data, predict the order of the reaction and write the expression for the rate law.

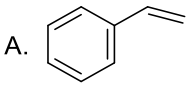
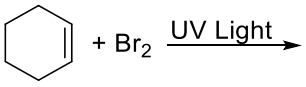
Q.18 Write the chemical equation when: **1+1=2**
(a) Butan-2-one is treated with Zn(Hg) and conc. HCl.
(b) Two molecules of benzaldehyde are treated with conc. NaOH.

Q.19 (a) define Fuel cell. Write two advantages of fuel cell over ordinary cell. **2**

OR

(b) predict the products of electrolysis in each of the following: **1+1=2**
(i) A dilute solution of H_2SO_4 with platinum electrodes
(ii) An aqueous solution of $CuCl_2$ with platinum electrodes

Q.20 Draw the structures of major monohalo products in each of the following reactions: **1+1=2**

A.  B. 

Q.21 What is meant by essential amino acids? Why are amino acids amphoteric in nature? **2**

SECTION C

Question No. 22 to 28 are short answer questions, carrying 3 marks each

Q.22 What will be the vapour pressure of a 1 molal aqueous solution of $MgCl_2$, assuming dissociation of $MgCl_2$ to be 70 mole percent? (Vapor pressure of pure water at 25°C is 23.8 mmHg) **3**

Q.23 Explain the following: **1+1+1=3**

I. Toluene on treatment with Cl_2 in sunlight gives benzyl chloride whereas when treated with Cl_2 in dark gives o-chlorobenzene and p-chlorobenzene.

II. Finkelstein reaction is carried out in the presence of dry acetone.

III. neo pentyl chloride has lower boiling point than isopentyl chloride.

Q.24 Arrange the products obtained in the following cases in the increasing order of their P^{K_a} values: **3**

A. Oxidation of ethanol in presence of acidified potassium dichromate

B. Reaction of propanoic acid with Br_2 in the presence of red Phosphorus

C. Reaction of isopropyl magnesium bromide with carbon dioxide, followed by hydrolysis.

D. Reaction of propanoic acid with Cl_2 in the presence of red Phosphorous

Q.25 An aromatic compound 'A' with molecular formula C_8H_8O gives positive 2,4-DNP test. It gives yellow precipitate of compound 'B' on treatment with sodium hypoiodite. Compound 'A' does not react with Tollen's or Fehling's reagent; on drastic oxidation with $KMnO_4$ it forms a carboxylic acid 'C'. Elucidate the structures of A, B and C. Also give their IUPAC names. **3**

Q.26 The following initial rate data were obtained for the reaction: **3**

$2NO_{(g)} + Br_{2(g)} \rightarrow 2NOBr_{(g)}$

Expt. No	[NO]/mol L^{-1}	[Br_2]/mol L^{-1}	Initial Rate (mol L^{-1} s^{-1})
1	0.05	0.05	1.0×10^{-3}
2	0.05	0.15	3.0×10^{-3}
3	0.15	0.05	9.0×10^{-3}

(a) What is the order with respect to NO and Br_2 in the reaction?

(b) Calculate the rate constant (k).

(c) Determine the rate of reaction when concentration of NO and Br_2 are 0·4 M and 0·2 M, respectively.

Q.27 Carry out the following conversions. (Attempt any 3) **3**

I. Butan-2-one to 3-Methylpentan-3-ol

II. Anisole to 4-Methoxytoluene

III. Phenol to Benzene

IV. Chloroethane to Ethoxy ethane

Q.28 (i) which of the following are Lewis's acids? H_2O, BF_3, H^+, NH_4^+. **1½+1½=3**

(ii) the pH of 0.05M codeine solution is 9.95. calculate the ionisation constant and P^{K_b}.

SECTION-D

Question No. 29 & 30 are case-based/data -based questions carrying 4 marks each.

Q.29 Batteries and fuel cells are very useful forms of galvanic cell. Any battery or cell that we use as a source of electrical energy is basically a galvanic cell. However, for a battery to be of practical use it should be reasonably light, compact and its voltage should not vary appreciably during its use. There are mainly two types of batteries primary batteries and secondary batteries. In the primary batteries, the reaction occurs

only once and after use over a period of time the battery becomes dead and cannot be reused again, whereas the secondary batteries are rechargeable. Production of electricity by thermal plants is not a very efficient method and is a major source of pollution. To solve this problem, galvanic cells are designed in such a way that energy of combustion of fuels is directly converted into electrical energy, and these are known as fuel cells. One such fuel cell was used in the Apollo space programme. Answer the following questions: **1+1+2=4**

(a) How do primary batteries differ from secondary batteries?

(b) The cell potential of Mercury cell is 1·35 V, and remains constant during its life. Give reason.

(c) Write the reactions involved in the recharging of the lead storage battery.

OR

(c) Write two advantages of fuel cells over other galvanic cells.

Q.30 Aldehyde and ketones containing at least one α -hydrogen on treatment with a dilute alkali (NaOH, $Ba(OH)_2$, K_2CO_3 undergo self-condensation to form β-Hydroxy aldehyde or β-Hydroxyl ketones. B-Hydroxy aldehyde are also called Aldols. Therefore, this reaction is referred to as Aldol condensation. Aldehyde and ketones which do not have α-hydrogen atom they do not undergo aldol condensation. They undergo cross aldol condensation. **1+1+2=4**

(a) Which type of carbonyl compound undergo aldol condensation?

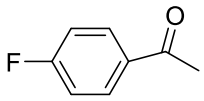
(b) Complete the following reaction.

$$HCHO + CH_3CHO \xrightarrow{\text{dil. NaOH}}$$

(c) Name the compound formed when two molecules of acetaldehyde undergo in self-condensation.

OR

(c) Write IUPAC name of:



Section E

Question No. 31 to 33 are long answer type questions carrying 5 marks each.

Q.31 Attempt either A or B

(A) (i) Give reasons: **2+3=5**

(I) $[Ni(CO)_4]$ is diamagnetic whereas $[NiCl_4]^{2-}$ is paramagnetic. [Atomic number: Ni = 28]

(II) CO is a stronger complexing agent than NH_3.

(III) The trans isomer of complex $[Co(en)_2Cl_2]^+$ is optically inactive.

(ii) Using Crystal Field theory, write the number of unpaired electrons in octahedral complexes of Fe^{3+} in the presence of:

(I) Strong field ligand (II) Weak field ligand [Atomic number : Fe = 26]

OR

(B) (i) Name the type of isomerism exhibited by the following compounds. Also draw their corresponding isomers.

(I) $[Co(NH_3)_6]\ [Cr(CN)_6]$ (II) $[Co(en)_3]^{3+}$ (III) $[Co(NH_3)_3(NO_2)_3]$

(ii) Differentiate between weak field and strong field ligands. How does the strength of the ligand influence the spin of the complex? **2+3=5**

Q.32 Attempt either A or B

(A) (i) Write the chemical equations involved in the preparation of potassium permanganate from pyrolusite ore (MnO_2).

(ii) Give reasons for the following:

(I) Sc (Atomic No. 21) salts are white.

(II) $E°_{Cu^{2+}|Cu}$ is positive whereas $E°_{Mn^{2+}|Mn}$ is negative.

(III) Transition metals have high enthalpies of atomisation. **2+3=5**

OR

(b) (i) Complete and balance the following chemical equations:

(I) $Cr_2O_7^{-2}$ + H_2S + $H^+ \rightarrow$

(II) Cu^{2+} + $I^- \rightarrow$

Give reasons:

(I) Separation of mixture of lanthanoids is difficult.

(II) Chromium has higher melting point than manganese.

(III) It is difficult to obtain oxidation state greater than two for Zn. **2+3=5**

Q.33 Attempt either A or B

A. Answer the following questions: **2+3=5**

I. Identify and give any one point of difference between the protein present in the hair and protein present in egg albumin.

II. Both glucose and sucrose have aldehydic group, then why does only glucose reduce Fehling's Reagent and not sucrose?

III. Why do amino acids behave as salts?

IV. What chemical change takes place during curdling of milk?

V. Doctor advised a 50-year-old woman enough exposure to sunlight and addition of fish and egg yolk to her diet. What is the possible disease diagnosed by the doctor?

OR

B. Answer the following questions: **2+3=5**

I. Identify and give any one point of difference between the carbohydrate present in cane sugar and carbohydrate present in milk.

II. Glucose is an aldohexose and a monosaccharide. Which oxidising agent should be used to bring about oxidation of only the aldehydic group present in glucose?

III. Amino acid HOOC-$CH_2CH(NH_2)CH_2COOH$. Predict whether the pH of this amino acid will be >7, 7 or <7.

IV. Name the two major molecular shapes formed due to the folding of secondary structure of proteins.

V. Ashish's gums bleed frequently. The doctor's prescription mentioned that Ashish is suffering from scurvy. Help

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Roll No. _____ NLCS/12/Physics (042)/23

Pre Board Exam 2025 – 2026

Time Allowed : 3 : 00 Hrs. **Maximum Marks : 70**

General Instructions:

1. There are 33 questions in all. All questions are compulsory.
2. This question paper has five sections: Section A, Section B, Section C, Section D and Section E.
3. All the sections are compulsory.
4. Section A contains sixteen questions, twelve MCQ and four Assertion Reasoning based of 1 mark each, Section B contains five questions of two marks each, Section C contains seven questions of three marks each, Section D contains two case study based questions of four marks each and Section E contains three long answer questions of five marks each.
5. There is no overall choice. However, an internal choice has been provided in two questions in Section B, one question in Section C and all three questions in Section E. You have to attempt only one of the choices in such questions.
6. Use of calculators is not allowed.
7. You may use the following values of physical constants where ever necessary

$C = 3 \times 10^8$ m/s
$Me = 9.1 \times 10^{-31}$ kg
$e = 1.6 \times 10^{-19}$ C
$\mu 0 = 4\pi \times 10^{-7}$ TmA−1
$h = 6.63 \times 10^{-34}$ Js
Avogadro's number = 6.023×10^{23} per gram mole

SECTION A

Q.1 Lenz's law is a consequence of the law of conservation of
(a) Charge. (b) Mass. (c) Momentum. (d) Energy.

Q.2 Which of the following statements about a pure germanium (Ge) crystal at absolute zero temperature are correct?
1.It behaves as a perfect insulator. 2.There are no free electrons in the conduction band.
3.The valence band is completely filled. 4.It behaves as a perfect conductor.
(a) Only 1 and 2 (b) Only 1, 2, and 3 (c) Only 2 and 4 (d) All 1, 2, 3, and 4

Q.3 The two alternating current values represented by y_1 = a sin (ωt) and y_2 = b cos (ωt) have a phase difference of?
(a) 0 (b) π π/2 π/4

Q.4 Which of the following statements about the focal length of a concave mirror is correct?
(a) It is maximum for red colour. (b) It is maximum for violet colour.
(c) It is maximum for yellow colour. (d) It is the same for all colours.

Q.5 Which of the following statements correctly describes a key characteristic of an atomic nucleus?
(a) It consists primarily of electrons and protons.
(b) It is held together by the electrostatic force between protons.
(c) It contains nearly all the mass of the atom.
(d) Its size is typically much larger than the overall atom.

Q.6 Which of the following statements about current provided by a battery are correct?
1. The current is maximum when the internal resistance is negligible compared to the external resistance
2. The power delivered to the external resistor is maximum when internal resistance is equal to external resistance
3. If internal resistance increases, the current supplied by the battery decreases.
4. When internal resistance is zero, the entire emf appears across the external circuit.
(a) Only 1 and 2 (b) Only 1, 2 and 3 (c) Only 2 and 3 (d) All 1.2.3 and 4

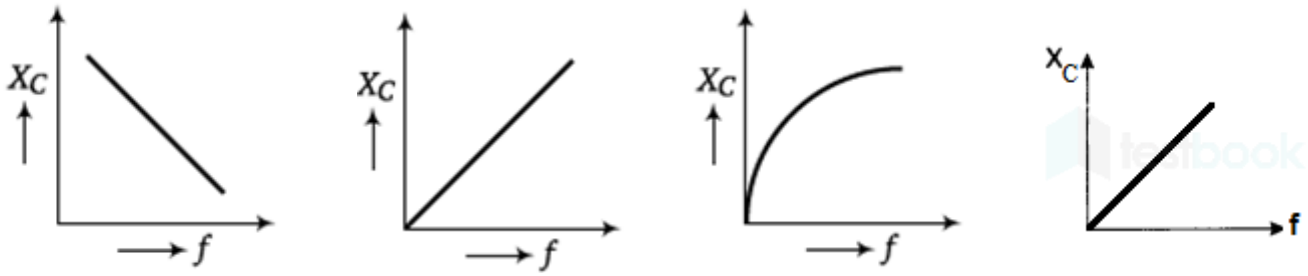
Q.7 Which one of the following characteristics is not associated with a ferromagnetic material?
(a) It is strongly attracted by a magnet
(b) It tends to move from a region of strong magnetic field to a region of weak magnetic field.
(c) Its origin is the spin of electrons
(d) Above the Curie temperature, it exhibits paramagnetic properties.

Q.8 In an AC generator, a coil with N turns, all of the same area A and total resistance R, rotates with Frequency ω in a magnetic field B. The maximum value of emf generated in the coil is:
(a) NABω (b) NABRω (c) NAB (d) NABR

Q.9 The difference in angular momentum associated with the electron in the two successive orbits of hydrogen atom is
(a) h/π (b) h/2π (c) h/2 (d) (n – 1)h/2π

Q.10 An electron having mass m and kinetic energy E enter in uniform magnetic field B perpendicularly, then it frequency will be:
(a) (eE)/qVB (b) 2πm/eB (c) eB/2πm (d) (2m)/(eBE)

Q.11 Which one of the following represents correctly the variation of the reactance of a capacitor (X) with the frequency (v) of applied A.C.?



(a) (b) (c) (d)

Q.12 Two conducting spheres A and B of radius a and b respectively are at the same potential. The ratio of the surface charge densities of A and B is
(a) b/a (b) a/b (c) a^2/b^2 (d) b^2/a^2

For Questions 13 to 16, two statements are given, one labelled Assertion (A) and other labelled Reason (R) . Select the correct answer to these questions from the options as given below.

(a)Both Assertion and Reason are true and Reason is the correct explanation of Assertion
(b)Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion
(c) Assertion is true, but Reason is false.
(d) Both Assertion and Reason are false

Q.13 **Assertion (A)**: Photoelectric effect demonstrates the wave nature of light
Reason (R) : The number of photoelectrons is proportional to the frequency of light

Q.14 **Assertion (A)**: The power of a lens is measured as the reciprocal of its focal length.
Reason (R) : A lens is said to have more power, if it can focus rays of light quite close.

Q,15 **Assertion (A)** : Interference is a phenomenon where the energy of light waves is redistributed, creating areas of high intensity (bright fringes or maxima) and low intensity (dark fringes or minima).
Reason (R) : The total energy within the interference pattern remains unchanged, equivalent to the sum of the energies of the individual interfering waves before they overlapped.

Q.16 **Assertion (A)**: When a parallel plate capacitor is connected across a battery and a dielectric slab with dielectric constant k is inserted between its plates, the energy stored in the capacitor increases by a factor of k.
Reason (R) : When the dielectric is introduced while the capacitor remains connected to the battery, the potential difference across the plates remains constant, but the amount of charge stored on the plates increases.

Section B

Q.17 Draw the complete V-I characteristic curve of a p - n junction diode.

Q.18 A cell of emf ε and internal resistance r is connected across a variable load resistance R. Draw two graphs showing the variation of
(i) emf (ε) vs load resistance (R).
(ii) potential difference (V) vs load resistance (R).

Q.19 Two identical coils, one of copper and another of aluminium are rotated with the same angular speed in an external magnetic field. In which coil (i) the induced end (ii) the induced current, will be more and why?

Q.20 Differentiate between nuclear fission and nuclear fusion.

OR

What is the effect on the velocity of photoelectrons, if the wavelength of incident light is decreased?

Q.21 What is Watt less current? When is the current in an AC circuit Wattless?

OR

Show that the work done by a magnetic field on a moving charged particle is always zero.

Section C

Q.22 Name the constituent radiation of electromagnetic spectrum which
(i) is used in satellite communication.
(ii) is used for studying crystal structure.
(iii) is similar to the radiations emitted during decay of radioactive nuclei.
(iv)has a wavelength range between 390 nm and 770 nm.
(v) is absorbed from sunlight by ozone layer
(vi) produces intense heating effect.

Q.23 (i)State any two postulates of Bohr's theory of hydrogen atom.
(ii) Find the angular momentum of an electron revolving in the first orbit in Bohr's hydrogen atom.

Q.24 (i)Draw a ray diagram of a compound microscope, when the final image is formed at least distance of distinct vision.
(ii) Write the expression for the magnification produced in this case explaining each term.

Q.25 Explain how you can convert a galvanometer to into an ammeter of given range.

OR

Derive an expression for the magnetic field intensity at a point on the axis of a bar magnet. What is the direction of the field?

Q.26 A potential difference V is applied to a conductor of length L, diameter D. How are the electric field E, the drift velocity v_d and the resistance R affected when
(I) V is doubled (II) L is doubled (III) D is doubled?

Q.27 Prove law's of reflections on the basis of wave theory of light?

Q.28 A 600 pF capacitor is charged by a 200 V supply, it is then disconnected from the supply and connected to another uncharged 600 pF capacitor. How much electrostatic energy lost in the process?

Section D (Case Study)

Q.29 The hydrogen spectrum comprises discrete bright lines on a dark background, commonly referred to as the hydrogen emission spectrum. There exists another type of spectrum for hydrogen, where dark lines appear on a bright background, known as the absorption spectrum.
Balmer derived an empirical formula based on his observations of a part of this spectrum. The formula is expressed

$1/\lambda = R(1/2^2 - 1/n^2)$

where n = 3,4,5,…….

Different series of hydrogen emissions occur based on transitions between energy levels:

- For the Lyman series, the emission is from the first state to the n-th state.
- For the Balmer series, the emission is from second state to the n-th state.
- For the Paschen series, the emission occurs from the third state to the n-th state.
- For the Brackett series, the emission occurs from the fourth state to the n-th state.
- For the Pfund series, the emission occurs from the fifth state to the n-th state.

(I) What is the shortest wavelength in the Balmer series of a hydrogen atom?

(a) 3637 ^{0}A (b) 5637 ^{0}A (c) 3765 ^{0}A (d) 5656 ^{0}A

(II) Find the number of spectral lines, when a hydrogen atom is excited from ground state to another state with principal quantum number of 4.

(a)1 (b) 3 (c) 5 (d) 6

(III) The ratio of wavelengths of the last line of Balmer series and the last line of the Lyman series is:

(a) 2:1 (b) 3:1 (c) 4:1 (d) 5:1

(IV) When a hydrogen atom is raised from the ground state to an excited state:

(a) both the KE and PE increase. (b) both the KE and PE decrease.

(c) PE decreased and KE increased. (d) PE increases and KE decreased.

Q.30 A p- junction diode is composed of a semiconductor crystal, typically made of silicon, with specific impurities added to create two distinct regions. One side, known as the n-type semiconductor, is doped to have an excess of negative charge carriers (electrons). Whereas the other side, called the p-type semiconductor, is doped to have an excess of positive charge carriers (holes).

When then and p-type materials are joined, a brief flow of electrons occurs from the n-side to the p-side, resulting in the formation of a depletion region at the junction. If a sufficiently high voltage is applied with the positive terminal connected to the p-side and the negative terminal to the n-side, the potential difference causes the diode to conduct, allowing current to flow. In contrast, when the voltage is applied in the reverse direction (positive terminal to n-side and negative terminal to p-side), the diode blocks the flow of current, preventing the electrons from moving in the opposite direction.

(i) Give two points of difference between forward biasing and reverse biasing of pot junction diode.

(ii) What is depletion region?

(iii) In an unbiased p-n junction, electrons diffuse from the n-region to p-region. Why?

Section E

Q.31 (a) State Gauss's theorem in electrostatics.

(b) Using Gauss's theorem, find an expression for the electric field intensity due to uniformly charged infinite plane sheet

(c) Two charges of magnitudes -2Q and +Q are located at points (a, 0) and (4a, 0) respectively, What is the electric flux due to these charges through a sphere of radius 3a with its centre at the origin?

OR

A parallel-plate capacitor is charged by a battery which is then disconnected. A dielectric slab is then inserted to fill the space between the plates. Explain the changes, if any, that occur in the values of

(a) charge on the plates, (b) electric field between the plates,

(c) potential difference between the plates, (d) capacitance and

(e) energy stored in the capacitor?

Q.32 A slit of width 25 mm is illuminated by a beam of light consisting of two wavelengths, 720 nm and 480 nm. The diffraction pattern is observed on a screen 1.0 m from the slit. Find:

(a) The distance of the second bright fringe from the central maximum pertaining to light of 720 nm.

(b) The least distance from the central maximum at which bright fringes due to both the wavelengths coincide.

(c) Draw the graph showing intensity distribution of fringes with phase angle due to diffraction through a single slit

OR

(a) For same value of angle of incidence, the angles of refraction in three media are 15°, 30° and 45° respectively. In which medium, the velocity of light will be minimum?

(b) Derive the relationship between angle of incidence, angle of prism and angle of minimum deviation for an equilateral prism.

Q.33 (a) Distinguish between diamagnetic and ferromagnetic substances in respect of

(i) intensity of magnetisation, (ii) behaviour in a non-uniform magnetic field and

(iii) susceptibility.

(b) A magnet of magnetic moment 25 Am^2 weighs 62.5 g. If the density of the material of the magnet is 7500 kg m^{-3} , find the intensity of magnetisation.

OR

(a) State Faraday's law of electromagnetic induction.

(b) A horizontal straight wire of length L extending from east to west is falling with speed v at right angles to the horizontal component of Earth's magnetic field B.

(i) Write the expression for the instantaneous value of the emf induced in the wire.

(ii) What is the direction of the emf ?

(iii) Which end of the wire is at the higher potential?

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