Roll No. _____ NLCS/12/English core(301)/75

# Pre Board Exam 2024 – 2025

**Time Allowed :** 3 : 00 Hrs. **Maximum Marks :** 80

## Section – A Reading

**Q.1 Read the passage given below :**

1. What do we typically do when we find our children doing something we don't approve of? We become reactive parents. Often, we pepper our reactions with lectures, When it doesn't work and predictably so; we end up screaming and dole out a punishment. And our children react with anger, resentment or 'can't-be-bothered' attitude.
2. Buddhist Zen Master Thich Nhat Hanh put it beautifully when he described how each child has both negative seeds of anger, despair hatred, fear and violence and wholesome seeds of love, happiness, compassion and forgiveness. According to him, what will blossom depends on the seeds we nurture.
3. A parenting and educational approach that's gaining a large following internationally, called the Nurtured Heart Approach (NHA) by Howard Glasser, is very much in keeping with this Zen approach. The three main aspects of this approach are :
   - Refuse to energize negativity
   - Relentlessly energize their positives
   - Reset : Do not react negatively and stay clam when the child does something wrong.

   Parents following this approach commit to not saying or doing anything that may fuel negativity in the child. But the parent has to make sure she / he does this very calmly, without any anger or resentment.
4. While on a mission to cut the negative, the parent looks for every opportunity to energize the positive in the child. This is done through persistently appreciating the goodness in he child in the smallest of ways : You were really generous about sharing your pizza with your sister; I appreciate the hard work you have put in your project; It takes courage to stand up to a bully. If you observe, the appreciation is not about saying 'excellent", 'amazing' or 'good', which is really an empty praise and does not speak much to the child. Qualifying a praise, on the other hand, gives the child direction and she / he begins to understand what qualities, values and strengths are appreciated. These are also necessary ingredients of life skills and success.
5. This approach is not merely about noticing when the child is being good, it is about recognizing the child's worth at every step. It's about aligning his energy in believing that the has great qualities, which are being identified and validated by the parents at every step. He realizes that there is no pay off's in it. So, start building your child's inner wealth-there is nothing to lose.

**Answer the following Questions, based on the given passage :** **12**

1. Complete the following sentence with an appropriate word:
   "-- we end up screaming and dole out punishment". In the given sentence, the author criticize the dash approach of the parents.
2. Explain in about 40words, when and how do parents become reactive. 2
3. In the line 'what will bloom will depend on the seeds we nurture' ---- what seeds does the author refer to?
   (a) Seasonal seeds (b) Societal news (c) Parental Attitude (d) Value and emotions
4. Explain in about 40 words why does NHA focus on reforming parents to reform children. 2
5. Share evidence from the text, in about 40 words, to support the view that parents, appreciate the goodness of the child at every opportunity. 2

6. In para 5, in what way does 'This approach' differ from the earlier approach?
7. Select the option that can be classified as qualifying a praise as explained in the passage.
   (a) You can be more helpful (b) You demonstrated patience while teaching your junior
   (c) Use your skill to be an excellent sportsman (d) You have to be amazing in your work
8. The phrase 'to cut the negative' in para 4 most nearly means :
   (a) To reduce wasteful expenditure (b) to stop criticizing
   (c) to eliminate challenges (d) to humiliate someone
9. Read the five headlines (a) - (e) given below :
   (a) New age parenting (b) Children – A Rebellious Generation (c) Channelizing Energy
   (d) Teacher – A Nation Builder (e) Skill Development – Careers Ahead
   Identify the option that displays the headlines that Does /Do not correspond with the occurrences in the text.
   (A) (a) and (e) (B) (c) and (e) (C) (b) Only (D) (a) and (c)

**Q.2 Read the passage given below : 10**

1. We're all familiar with the usual reasons workers cite for wanting to stay way even after lockdowns have long ended : flexible schedules, not having to commute, and of course, increased productivity. However, productivity isn't the only reason people want to stay away from the office. We recently surveyed 1,000 remote workers to find out what's really remote workers to find out what's really keeping them tied to their work-from-home lives.
2. The findings include : 72% want to be able to take a nap or exercise during the day. Nearly three out of four remote workers surveyed stated that the ability to take a nap or workout during the workday was one of the reasons they wanted to stay home though these activities may very well increase worker productivity, there's no doubt that a nap on the kitchen couch would be frowned upon in the office.
3. 73% want to be able to watch TV while they work. Three out of four respondents again say that being able to entertain themselves with TV, podcasts, music, or other media is one of the reasons they want to keep their work from home lifestyle.
4. 62% cite concerns about their appearance. Well over half of respondents stated that are concerned about their co-worker seeing them in person again after such a long time apart. Whether its weight loss or gain, not having the right clothes, or another concerned about appearance, most would rather not have to worry about the way look to their co-workers outside a zoom call.
5. When asked to choose the reason that most affects their desire to keep working from home, predictable answers like caring for children and lack of a commute were still the most common number one reasons. 14% of respondents state that working remotely was so important to them, that they would not go back to work in person even if their employers required it.

**Answer the following question, questions, based on the given passage :**

(i) '-- these activities will increase producvity'. By 'productivity' the author refers to –
   (a) Product produced (b) efficiency of the employee
   (b) Time spent by the employee (d) number of activities

(ii) What change in the work place would bring those people back to office who want amusement?
   (a) Giving long breaks (b) free coffee & tea
   (c) Building entertaining lounge (d) Spacious conference hall

(iii) As per the survey, why do health conscious people prefer to work from home?

(iv) Complete the following sentence appropriately :
   The passage ends on a note that some people are resolved to --------- .

(v) Explain one inference that can be drawn from para 1 about the reason for people preference to work from home. 2

(vi) State whether the statement given below is True or False :
The survey reveals that people deeply miss socializing in the work from home style.

(vii) Explain in your own words how appearance is one of the factors – for people's preference for work from home. 2

(viii) As per the survey, what top priorities of people prevent them from going to office?

## Section – B Creating Writing Skills

**Q.3 Attempt ANY ONE of the two, in about 50 words : 4**

(A) P . S. Public School, Aram Nagar has opened a gym for the benefits of students. As sports Captain, draft notice informing students about the facilities available in the gym, timings & other details.

(B) The RWA of Ganga Society, Pushp Nagar has planned to start free Yoga classes for its residents. You are Sharmila Tiwari, the president of RWA, Draft a notice informing residents about the proposal, timing, venue and other details.

**Q.4 Attempt ANY ONE of the two in about 50 words : 4**

(A) You are Mr. Srikanth Sharma. You have recently built a new house in the hills of Uttrakhand, Draft a letter inviting your brother and his family to spend a few days with you in your new home. Include relevant details.

(B) You are Mr. Shyam Sundar, Professor of Psychology, you are invited by S.K.M. Collage, Mahboob Nagar to be the keynote speaker at its Annual Conclave on 'Student Health -- . The Emotional Impact of Social Media', Draft a reply letter expressing your inability to accept the invitation and also cite a reason for refusal.

**Q.5 Attempt ANY ONE of the two, in 120 – 150 words : 5**

(A) You are Sujata / Suresh, a qualified fashion designer. You came across the given advertisement in a newspaper and wish to apply for the position advertise. Write a letter of application along with bio-data for the same.

**We are Hiring!**

**Apparel Designer**

| | |
|---|---|
| Required Qualification : | Graduation in Fashion design |
| Experience : | Minimum 2 years in relevant field. |
| Skills : | Creativity, Computer designing of apparels, aptitude for sewing, business sense, indepth knowledge of fabric drafting |

Apply to the Director, Estella house of Fashion 26, M.G. Road, Kanthapuram

(B) You are Jyoti / Jagan of Park Avenue, Karampur. You feel sad to notice that people litter the roads with utter disregard for sanitation and cleanliness. As a responsible citizen. Write a letter to the editor of a national daily highlighting the need for educational institutions to instill civic responsibility among school children. You may use the following clues along with you own ideas to compose this letter.

* Cleanliness drive
* Spreading awareness campaigns
* Eco club activities in schools
* Volunteer for clean up
* Workshops, seminars

**Q.6 Attempt ANY ONE of the two questions in 120 – 150 words : 5**

(A) With the advancement of Science and Technology, basic communication has adversely impacted the Social skills of today's youth. You are Girish / Girya of class XII. Write an article for you school magazine highlighting the adverse effects of technology and the ways to enhance social skills among the younger generation to prevent Social awkcoandness.
You may use the following clues along with your own ideas to draft the article.

Impact :
- Decrease in face to face communication
- Lack of engagement
- Inability to converse
- Poor interpersonal skills

Suggestion
- Improve conversational & communication skills
- Personal interaction, develop collaborative skills
- Outdoor sports & activities

(B) The members of your school Drama Club, recently put up a street play at the Central Park of your city. The theme of the play was Education Club, write a report on the event to be published in you school newsletter. Use the following clues along with your own ideas to compose the report :

* Date, venue, time
* No. of participants
* Performance followed by interactive session with spectators star actors- Response
* People's feedback / response

## Section – C Literature

**Q.7 Read the given extracts & Answer the questions for ANY ONE of the two given. 6**

(A) *"The hurt to the scenery wouldn't be my complaint*
*So much as the trusting sorrow of what is unsaid :*
*Here far from the city we make our roadside stand*
*And ask for some city money to feel in hand*
*To try if it will not make on being expand,*
*And give us the life of the moving pictures' promise*
*That the party in power is said to be keeping from us"*

. (i) Fill in the blank with reference to the context.
The road side stand was made by the ---------- & it was ---------- .
(a) city people, near their houses (b) Villagers, at their courtyards
(c) Poor people, far from the city (d) local people, on the mountains

(ii) Identify the phrase from the extract that suggests the following :
"The poet does not want to accuse the rustics of spoiling the beauty of the landscape.

(iii) State whether the given statement is True OR False.
The city people wanted to feel the money in their hands.

(iv) Complete the sentence appropriately.
The promise made by the government was that ---------- .

(v) What wouldn't be the poet's complaint?
(a) The beauty of nature (b) The beauty of people
(c) The hurt to the scenery (d) The hurt to the buildings

**OR**

(B) *Perhaps the Earth can teach us*
*As when everything seems dead*
*And later proves to be alive.*
*Now I'll count up to twelve*
*And you keep quiet and I will go.*

(i) Identify the tone of the poem in the first line of the extract.

(ii) State whether the given statements is True OR False, with reference to the extracts.
The Earth can teach us that these is no life under apparent stillness.

(iii) Identify the phrase that he has said what he intended to say.

(iv) Complete the sentence appropriately.
The poet wants to convey the message that ---------- .

(v) The poet uses a conversational style and personal pronouns 'you', 'we' and 'I' because ---- .
(a) he wants to establish contacts easily.
(b) he tries to reach out to the reader.
(c) he wants us to be friendly with the whole mankind
(d) third person talking is ineffective.

(vi) Which poetic device has been used in the second live of the extract?
(a) Alliteration (b) Transferred Epithet (c) Metaphor (d) Paradose

**Q.8 Read the given extracts and answer the questions for ANY ONE of the two given : 4**

(A) I was walking home from school one day, an old bag hanging from my shoulder. It was actually possible to walk the distance in ten minutes. But usually it would take me thirty minutes at the very least to reach home. It would take me from half an hour to an hour to dawdle along, watching all the fun and games that were going on, all the entertaining novelties and oddities in the streets, the shops and the bazaar.

(i) 'The entertaining novelties' as stated in the passage include ---------- .
(a) A performing money (b) stunt performances (c) Puppet shows (d) All of these

(ii) The word 'dawdle' as used in the extract means ---------- .

(iii) Why did Bama take so much time to reach her home?

(iv) What can be gathered about the speaker from the given lines?

**OR**

(B) Yes, I have taken the obvious step : I talked to a psychiatrist friend of mine, among others. I told him about the third level at grand central station, and he said it was a warking dream wish fulfillment. He said I was unhappy. That made my wife kind of mad, but he explained that he means the modern world is full of insecurity, fear, war, worry and all the rest of it and that I just want to escape.

(i) What did the narrator go to a Psychiatrists?
(a) Because he went through an experience no one else did.
(b) Because he was unhappy and wanted to know why.
(c) Because he was depressed.
(d) Because he wanted to meet him.

(ii) What is waking dream wish fulfillment according to the psychiatrist in the lesson?

(iii) What was the third level?

(iv) The psychiatrist explains to charley that ---------- .

**Q.9 Read the given extracts and answer the questions for ANY ONE of the two given ---------- . 6**

(A) When if passed the town hall, there was a crowd in front of the bulletin board, for the last two years all our bad news had come from there the lost battles, the draft, the orders of the commanding officer and I thought to myself, without stopping – "What can be the matter. Now"?

Then as I hurried by as fast as I could go, the blacksmith, wachter, who was there, with his apprentice, reading the bulletin, called after me," Don't go so fast bub : You'll get to your school in plenty of time!"

I thought he was making fun of me, and reached M. Hamel's little garden all out of breadth.

(i) From where had all the bad news come for the last two years?

(a) School (b) Bulletin-board (c) Prussia (d) Alsace

(ii) What did the blacksmith say to Franz?

(a) To read the bulletin-board (b) To get his homework completed

(c) To hurry to the school (d) To not go so fast

(iii) Complete the sentence appropriately---------- .

In the above extract, M. Hamel's little garden has been referred to as ---------- .

(iv) How do you understand watcher the blacksmith's advice to Franz?

(v) Why do you think Franz was late for his lesson?

(vi) Do you think Franz had even thought of bad news to be the last French lesson?

**OR**

(B) This settlement was adopted unanimously by the commission. Gandhi explained that the amount of the refund was less important than the fact that the landlords had been obliged to surrender part of the money and with it, part of then prestige. Therefore as far as the peasants were concerned, the planters had behaved as lords above the law. Now the peasant saw that he had rights and defenders. He learned courage.

(i) Why is it that the big planters agreed to pay the refund to small farmers?

(ii) Replace the underlined word with its antonym from the extract.

The party has now **<u>abandoned</u>** its policy of free trade.

(a) Adopted (b) Obliged (c) Defenders (d) Concerned

(iii) What did the peasants learn from this incident?

(iv) As per the settlement how much was to be refunded.

(a) 50% (b) 75% (c) 25% (d) 20%

(v) Why does Gandhiji accept only that percent of settlement?

(vi) The phrase 'Lords above the law' in the extract means ---------- .

**Q.10 Answer ANY FIVE of the following six Questions, in about 40 – 50 words : 5×2=10**

(i) How do you think the author's life might have been impacted after her interactions with the children and then families mentioned in lost spring?

(ii) Explain the possible seasons for Gandhi's quick popularity among the peasants of champaran?

(iii) Would you say that the poem Aunt Jennifer's tigers ends on a note of hope?

(iv) 'Life is what it is all about' How is keeping quiet related to life?

(v) In the last line of the poem my mother at sixty six, why does the poet use the word 'smile' repeatedly?

(vi) What is the advantage of writing novels as maintained by Umberto Eco?

**Q.11 Attempt ANY TWO of the following three Questions in about 40 – 50 words : 2×2=4**

(i) 'It is not merely age but experience that counts'. With reference to any one example from the text, comment on how Derry found Mr. Lamb different from other adults he had encountered?

(ii) What did the psychiatrist think about Charley's stamp collection? Why did Cherley not agree with him?

(iii) What sort of hunt did the Maharaja offer to organize for the high ranking British officer? What trait of the officer does it reveal?

**Q.12 Answer ANY ONE of the following two Questions in about 120 – 150 words : 5**

(A) According to Keats, nature has a positive sublimating effect on the minds of humans? Discuss.

(B) Mukund Padmanabhan was gifted the 'Penguin Book of Interviews – An Anthology from 1859 to the Present Day' edited by Christopher Silvester after interviewing Eco. He shared his thought on his personal blog exploring his own concerns about interviewing a distinguished writer like Eco, followed by an evaluation of the interview in light of his reading. As Mukund Padmanabhan, write the blog post.

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

(A) Apparent illogicality something turns out to be a futuristic projection, Discuss with reference to the Third level.

(B) The actual pain or inconvenience caused by a physical impairment is often much less than the sense of alienation felt by the person with disabilities. What is the kind of behavior that the person expects from others? Answer with reference to the lesson on the face of it?

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Roll No. _____ NLCS/12/Mathematics Core(041)/15

# Pre Board Exam 2024 – 2025

**Time Allowed :** 3 : 00 Hrs. **Maximum Marks :** 80

**General Instructions :**

(i) This Question paper contains 38 questions. All Questions are compulsory.
(ii) This Question paper is divided into five Sections A, B, C, D and E.
(iii) In **Section A** Question No. 1 to 18 are Multiple Choice Questions (MCQs) and questions No. 19 and 20 are Assertion Reason Based Questions of 1 Marks each.
(iv) In **Section B** Questions No. 21 to 25 are Very Short Answer (V.S.A.) type Question, carrying 2 Marks each.
(v) In **Section C** Questions No. 26 to 31 are Short Answer (S.A.) type Question carrying 3 marks each.
(vi) In **Section D** Questions No. 32 to 35 are long Answer (L.A.) type Questions carrying 5 Marks each.
(vii) In **Section E** Questions No. 36 to 38 are Case Study Based Questions carrying 4 Marks each
(viii) There is no overall choice. However, an internal choice has been provided in 2 Questions in Section B 3 Questions in Section C 2 Questions in Section D and one subpart each in 2 Questions of Section E.
(ix) Use of calculator is not allowed.

## Section – A [Ques. No. 1 to 20 carry 1 Mark each]

Q.1 Assume X, Y, Z, W and P are matrices of order 2×n, 3×k, 2×P, n×3, and P×k respectively. If n=P, then the order of matrix 7×–5Z is :

(a) n×3 (b) P×n (c) P×Z (d) Z×n

Q.2 Find the area of triangle with vertices (0,0), (4,2) and (1,1) –

(a) 1sq unit (b) 2sq unit (c) 0sq unit (d) 5 sq unit

Q.3 Let A be a non-singular square matrix of order 3×3. Then $|adj A|$ is equal to –

(a) $|A|$ (b) $3|A|$ (c) $|A|^3$ (d) $|A|^2$

Q.4 Differentiate $xy=e^{x^3}$ w.r.t. $x$–

(a) $3x^2e^{x^3}$ (b) $x^2e^{x^3}$ (c) $x^3e^{x^3}$ (d) $x^2e^{x^2}$

Q.5 The angle between the lines $\frac{x}{2}=\frac{y}{2}=\frac{z}{1}$ and $\frac{x-5}{4}=\frac{y-2}{1}=\frac{z-3}{8}$ is –

(a) $\cos^{-1}\left(\frac{2}{3}\right)$ (b) $\cos^{-1}\left(\frac{3}{4}\right)$ (c) $\frac{\pi}{3}$ (d) $\cos^{-1}\left(\frac{5}{6}\right)$

Q.6 The solution of $\frac{dy}{dx}+2y=1$ satisfying $y(0)=0$ is –

(a) $y=\frac{1-e^{-2x}}{2}$ (b) $y=\frac{1+e^{-2x}}{2}$ (c) $y=1+e^x$ (d) $y=\frac{1+e^x}{2}$

Q.7 The value of objective function $Z=2x+3y$ at corner point (3,2) is–

(a) 9 (b) 5 (c) 15 (d) 12

Q.8 If $\theta$ is the angle between two vectors $a$ and $b$, then $a.b\geq 0$ only when.–

(a) $0<\theta<\pi/2$ (b) $0\leq\theta\leq\pi$ (c) $0<\theta<\pi$ (d) $0\leq\theta\leq\pi/2$

Q.9 The value of $\int_0^{\pi/2}\cos x e^{\sin x}dx$ is –

(a) $e-1$ (b) 0 (c) 1 (d) –1

Q.10 If A is any square matrix, then –

(a) $A - A^t$ is symmetric (b) $A - A^t$ is skew symmetric (c) $A + A^t$ is symmetric (d) both b & c

Q.11 Solution of LPP maximize $Z=2x-y$ subject to $x+y\le 2, x, y\ge 0$ –

(a) 0 (b) 1 (c) 4 (d) 2

Q.12 The value of P for which the vectors $2\hat{i}+P\hat{j}+\hat{k}$ and $-4\hat{i}-6\hat{j}+26k$ are perpendicular to each other is–

(a) $-17/3$ (b) 3 (c) –3 (d) $17/3$

Q.13 Let A be a non singular matrix of the order n×n then $|adjA|$ is equal to–

(a) $|A|$ (b) $|A|^{n-1}$ (c) $n|A|$ (d) $|A|^n$

Q.14 The probabilities of A, B and C of solving a problem are $\frac{1}{6}, \frac{1}{5}$ and $\frac{1}{3}$ respectively. What is the probability that problem is solve.

(a) $5/9$ (b) $4/9$ (c) $1/3$ (d) $1/7$

Q.15 Which of he following transformation reduce the differential equation $\frac{dz}{dx}+\frac{z}{x}\log z=\frac{z}{x^2}(\log z)^2$ into the form $\frac{du}{dx}+uP(x)=Q(x)$ –

(a) $u=e^x$ (b) $u=\log x$ (c) $u=(\log z)^2$ (d) $u=(\log z)^{-1}$

Q.16 Find $|x|$, if for a unit vector $(2x-3a).(2x+3a)=91$ –

(a) 5 (b) $\sqrt{17}$ (c) $\sqrt{15}$ (d) $\sqrt{19}$

Q.17 If $x\sin(a+y)=\sin y$ then $\frac{dy}{dx}$ is equal to–

(a) $\frac{\sin a}{\sin(a+y)}$ (b) $\frac{\sin^2(a+y)}{\sin a}$ (c) $\frac{\sin a}{\sin^2(a+y)}$ (d) $\frac{\sin(a+y)}{\sin a}$

Q.18 If a line makes angles $\frac{\pi}{4}, \frac{3\pi}{4}$ with $x-axis$ and $y-axis$ respectively, then the angle which it makes with $z-axis$ is–

(a) $\pi$ (b) $\pi/2$ (c) $0°$ (d) both $0°$ and $\pi$

Q.19 Assertion (A) :If $x$ is real, then the minimum value of $x^2-8x+17$ is 1.

Reason (R) : If $F(x)>0$ at a critical point then the value of the function at the critical point will be the minimum value of the function –

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R in False (d) A is false but R is true

Q.20 Assertion (A) :Let a relation defined from set A = {1, 2, 5, 6} to A is R = {(1,1), (1,6), (6,1)} then R is symmetric relation.

Reason (R) : A relation R in set A is called symmetric If (a,b) $\in$ R

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false (d) A is false but R is true

## Section – B [ 21 to 25 carry 2 Marks each]

Q.21 Find the value of $\sin\left[2\cot^{-1}\left(\frac{-5}{12}\right)\right]$.

**OR**

Find $\tan^{-1}(-1)$.

Q.22 Find the maximum and minimum value of $g(x)=-|x+1|+3.$

Q.23 Determine the values of $f(x)=x^x, x>0$ for which $f$ is ircreasing or devreasing.

OR

Prove that the function $f(x)=4x^3-18x^2+27x-27$ is increasing on R.

Q.24 Evaluate $\int \frac{dx}{\cos x+\cos ecx}$.

Q.25 An edge of a variable cube is increasing at the rate of 10cm/sec. How fast the volume of the cube is increasing when the edge is 5cm long?

**Section – C [ Ques. No. 26 to 31 carry 3 Marks each]**

Q.26 Evaluate $\int_0^1 \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)dx.$

Q.27 The bag A contains 8 white and 7 black balls white the bag B contains 5 white and 4 black balls. One ball is randomly picked up from the bag A and mixed up with the balls in bag B. Then a ball is randomly drawn out from it. Find the probability that ball drawn is white.

Q.28 Evaluate : $\int \frac{dx}{\cos(x+a)\cos(x+b)}$. **OR** Evaluate $\int_0^1 \frac{\log(1+x)}{1+x^2}dx.$

Q.29 In the differential equation show that it is homogeneous and solve it. $\frac{dy}{dx}=\frac{x^2+y^2}{2xy}$.

**OR**

Find a solution of $x(x^2-1)\frac{dy}{dx}=1$ which satisfy the condition $y=0$ when $x=2.$

Q.30 Solve the linear programming problem graphically minimize $z=30x+20y$.

$$Sub\ to: x+y\le 8$$
$$x+4y\ge 12$$
$$5x+8y=20$$
$$x,y\ge 0$$

Solve the following LPP graphically maximize $z=5x+3y$

$$Sub\ to: 3x+5y\le 15$$
$$5x+2y\le 10$$
$$x,y\ge 0$$

Q.31 Differentiate the function :

$$\cot^{-1}\left[\frac{\sqrt{1+\sin x}+\sqrt{1+\sin x}}{\sqrt{1+\sin x}-\sqrt{1+\sin x}}\right], 0<x<\pi/2.$$

**Section – D [ Ques. No. 32 to 35 carry 5 Marks each]**

Q.32 Find the area of the region bounded by the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1.$

Q.33 Let A={1, 2, 3----------9} and R be the relation in A×A defind by (a, b) R (c, d) If a + d =b + c for (a, b), (c, d) in A×A Prove that R is equivalence relation and also obtain the equivalence class of [25].

**OR**

Let $\angle$ be the set of all lines in $xy$ plane and R be the relation in $\angle$ define as R = {($\angle_1$ | | $\angle_2$)}. Show that R is on equivalence relation. Find the set of all lines related to the line $y=2x+4.$

Q.34 If $A=\begin{bmatrix}2 & -3 & 5\\ 3 & 2 & -4\\ 1 & 1 & -2\end{bmatrix}$, Find $A^{-1}$ . Using $A^{-1}$. Solve the system of equations

$2x-3y+5z=11, 3x+2y-4z=-5, x+y-2z=-3.$

Q.35 Find the shortest distance between the lines $\vec{r}=(\hat{i}+2\hat{j}+3\hat{k})+\lambda(\hat{i}-3\hat{j}+2\hat{k})$ and $\vec{r}=\left(4\hat{i}+5\hat{j}+6\hat{k}\right)+\mu\left(2\hat{i}+3\hat{j}+\hat{k}\right).$

**OR**

Find the shortest distance between the given lines $\vec{r}=\left(6\hat{i}+3\hat{k}\right)+\lambda\left(2\hat{i}-\hat{j}+4\hat{k}\right)$

$\vec{r}=\left(-9\hat{i}+j-10\hat{k}\right)+\mu\left(4\hat{i}+\hat{j}+6\hat{k}\right).$

## Section – E [ Ques. No. 36 to 38 carry 4 Marks each]

Q.36 Read the following text carefully and answer the questions that follow :

To teach the application of probability a maths teacher arranged a surprise game, for 5 of his students homely Govind, Grish, Vinod Abhishek and Ankit. He took a bowl containing tickets numbered 1 to 50 and told the students go one by one and draw two tickets simultaneously from the bowl and replace if after noting the numbers.

1. Teacher ask Grish, what is the probability that tickets drawn by Ankit, shows and even number on first ticket and odd number on sec and ticket. 1
2. Teacher ask Govind what is the probability that tickets are drawn by Abhishek, shows a Prime number on one ticket and a multiple of 4 on other ticket. 1
3. Teacher asks Abhishek, what is the probability that tickets drawn by Vinod shows a multiple of 4 on one ticket and multiple of s on other ticket. 2

OR

Teacher asks Vinod, What is the probability that both tickets drawn by Grish shows odd number.

Q.37 Read the following text carefully and answer the questions that follow :

Three slogan on chart papers are to be placed on a school bulletin board at the points A, B and C displaying A (Hub of learning ) B (creating a be her word for tomorrow ) and (Education comes first ).

The coordinate of these points are (1, 4, 2)(3, –3, –2 ) and (–2,2,6) respectively.

1. Let $a,b$ and $c$ be the position vectors of points A, B and C respectively find $a+b+c$. 1
2. What is the area of ΔABC. 1
3. Suppose if the given slogans are to be placed on a straight line, then find the value of $|a\times b+b\times c+c\times a|$. 2

OR

If $a=2\hat{i}+3\hat{j}+6\hat{k}$ then find the unit vector in the direction of vector $a$. 2

Q.38 Read the following text carefully and answer the following question.

In an elliptical sport field, the authority wants to design a rectangular soccer field with the maximum passible area. The sport field is given by the graph $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1.$

1. If the length and the breadth of rectangular field be $2x+2y$ respectively. Then find the area of function in terms of $x$
2. Find the critical point of the function.
3. Use first derivative terst to find the length $2x$ and width $2y$ of soccer. Field (in terms of a and b) that maximize its area. 2

OR

Use second Derivative thest to find the length $2x$ and width $2y$ of soccer field (in terms of a and b) that maximize its area. 2

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Roll No. _____ NLCS/12/Chemistry(043)/26

# Pre Board Exam 2024 – 2025

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

**General Instructions :**

Read the following instruction carefully :

(i) There is 33 Questions.
(ii) Section – A consists of 16 Multiple Choice Questions carrying 1 Mark each.
(iii) Section – B consists of 5 Short Answer Questions carrying 2 Marks.
(iv) Section – C consists of 7 Short Answer Questions carrying 3 Marks each.
(v) Section – D consists of 2 Case Based Questions carrying 4 Marks each.
(vi) Section – E consists of 3 Long Answer Questions carrying 5 Marks each.
(vii) All Questions are compulsory.
(viii) Use of log tables and calculator is not allowed.

## Section – A

Q.1 The unit of cell constant is represented as –

(a) $Ohm^{-2}\ cm^{-1}$ (b) $cm^2$ (c) $cm^{-1}$ (d) $Ohm\ cm^{-1}$

Q.2 Which of the following Electrolyte is not preferred in a salt Bridge?

(a) KCl (b) $KNO_3$ (c) $NH_4NO_3$ (d) NaCl

Q.3 The number of ions formed on dissolving one molecule of $FeSO_4.(NH_4)_2SO_4.6H_2O$ in water is :

(a) 3 (b) 4 (c) 5 (d) 6

Q.4 Enantiomers differ only in –

(a) Boiling point (b) Rotation of polarized light (c) melting point (d) solubility

Q.5 Which of the following is an effect of exposure to low levels of dichloromethane in the air?

(a) Slightly impaired vision (b) Dizziness (c) Nausea (d) Numbess in fingers

Q.6 Identify the nucleophile that attacks the carbocation in the second step of acid catalyzed hydration of alkenes.

(a) $OH^-$ (b) $H_2O$ (c) $H^+$ (d) $H_3O^+$

Q.7 Williamson's synthesis of preparing dimethyl ether is an –

(a) $SN^1$ reaction (b) Elimination reaction (c) $SN^2$ reaction (d) Nucleophilic addition reaction

Q.8 The compound formed as a result of oxidation of ethyl benzene by $KMnO_4$ is –

(a) Benzyl Alcohol (b) Acetophenone (c) Benzophenone (d) Benzoic acid

Q.9 Amides may be converted into amines by a reaction named after :

(a) Hoffmann Bromomide (b) Claisen (c) Perkin (d) Kekule

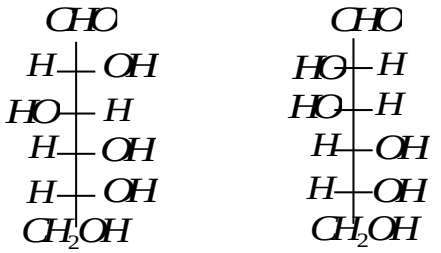
Q.10 For the transformation of M-bromo benzenediazonium chloride into bromobenzene the reagent used is –

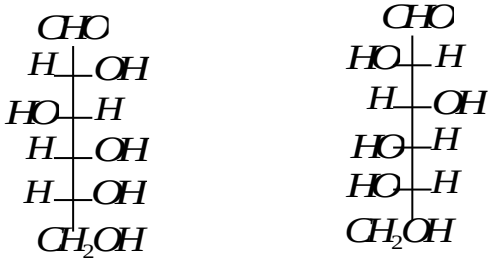
(a) $LiAlH_4$ (b) $H_3PO_2$ (c) $H_3O^+$ (d) $H_2/Pt$

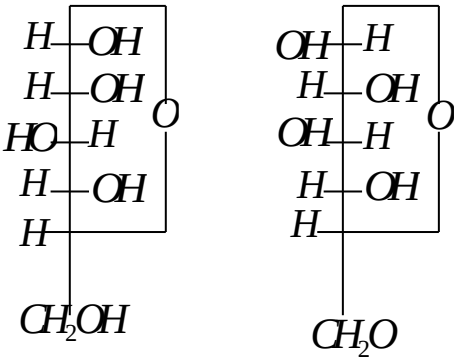
Q.11 The sequence of $\alpha$–amino acids in a polypeptide chain in a protein is called its –

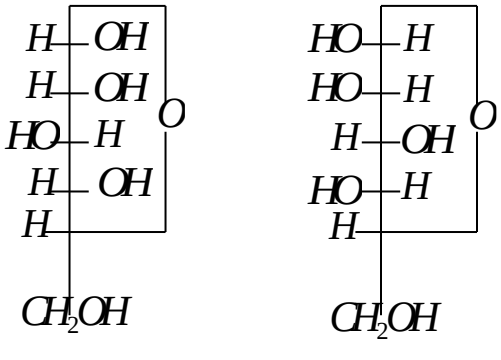
(a) Tertiary structure (b) primary structure (c) Secondary structure (d) None of these

Q.12 Which of the following pairs represents anomers –

(a) 

(b) 

(c) 

(d) 

**In the following Questions (Ques. No. 13 -16) a statement of assertion (A) followed by a statement of Reason (R) us given. Choose the correct Answer out of the following choices :**

A. Both (A) & (R) are true and (R) is the correct explanation of (A).

B. Both (A) & (R) are true but (R) is not the correct explanation of (A).

C. (A) is the true but (R) is false D. (A) is false but (R) is true.

Q.13 Assertion (A) : The primary valances are non-ionisables.
Reason (R) : They are satisfied by the negative ions.

Q.14 Assertion (A) : Tert-Butyl bromide undergoes Wurtz reaction to give 2,2,3,3 – tetramethyl butane.
Reason (R) : In Wurtz reaction, alkyl halides react with sodium in dry enter to give hydrocarbon containing double the number of carbon atoms present in the halides.

Q.15 Assertion (A) : Phenol is weaker acid than p-nitrophenol.
Reason (R) : $^{-}$NO2 group is $O^{-}$ direacting.

Q.16 Assertion (A) : Acetanilide is less basic than aniline.
Reason (R) : Acetylation of aniline results in decrease of electron density on nitrogen.

## Section – B

Q.17 What is the value of Van't Hoff factor (i) for (a) NaCl (b) $K_4[Fe(CN)_6]$

Q.18 Identify the order of a reaction from the following rate constant $K=2.3\times10^5$.

Q.19 What is the effect of adding a catalyst on :
(a) Activation Energy (Ea), and (b) Gibbs Energy ($\Delta G$) of a reaction?

Q.20 What happens when benzene is treated with Benzoyl chloride in presence of anhydrons $AlCl_3$?

Q.21 What are Zwitter ions? Give an example.

**OR**

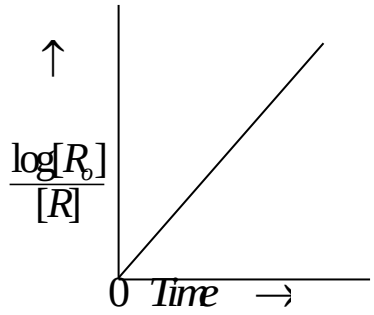
What is denaturation of protein?

## Section – C

Q.22 (a) Write the name of the cell which is generally used in hearing aids. Write the reactions taking place at the anode and the cathode of this cell.

(b) How much charge is required for the reduction of 1 mol of $Zn^{+2}$ to $Zn$?

Q.23 Observe the group shown in figure and Answer the following Questions :




(a) What is the order of the reaction?
(b) What is the slope of the curve?
(c) Write the relationship between k and t½ (Half life period) ?

Q.24 (i) How the conversion of $Na_2CrO_4$ to $Na_2Cr_2O_7$ is carried out?
(ii) Arrange $Ti^{+3}$, $Cr^{+3}$, $Ni^{+3}$, $Cu^{+}$ in the increasing order of their magnetic moments.

Q.25 Write the structure of the major organic product in each of the following reactions :

(i) $(CH_3)_3C\,Br + KOH \xrightarrow{Ethanol,heat}$ (ii) $CH_3CH_2Br + KCN \xrightarrow{aq.ethanol}$

(iii) $CH_3CH_2CH{=}CH_2 + HBr \xrightarrow{peroxide}$

Q.26 (i) Carry out conversion of p-nitrotoluene to 2-Bromobenzoic acid.
(ii) How do you convert propan-2-0 $\ell$ to 2-methylpropan-2-0 $\ell$

Q.27 Give the structures of products A,B,C in following reaction :

(i) $CH_3CH_2Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B \xrightarrow[0^oC]{HNO_2} C$

(ii) $CH_3COOH \xrightarrow[\Delta]{NH3} A \xrightarrow{NaOH+Br_2} B \xrightarrow[AlC,NaOH]{CHCl_3} C$

Q.28 (i) Why are carbohydrates are generally optical active?
(ii) How will you obtain the following from glucose
(a) Gluconic acid (b) n-hexane

## Section – D

Q.29 The potential of each electrode is known as electrode potential. Standard electrode potential is the potential when concentration of each species taking part in Electrode reaction is unity and the reaction is taking place at 298K. By convention, the standard electrode potential of Hydrogen (SHE) is 0.0v. The Electrode potential value for each electrode process is a measure of relative tendency of the active species in the process to remain in the oxidized / reduced form. The negative electrode potential means that the redox couple is stronger reducing agent than $H^+/H_2$ couple. A positive electrode potential means that the redox couple is a weaker reducing agent than the $H^+/H_2$ couple. Metals which have higher positive value of standard reduction potential form the oxides of greater thermal stability.

(i) What is meant by reference electrode?
(ii) Platinum is used in the standard hydrogen electrode. Give reason.
(iii) Calculate the emf of the following cell at 298k;

$$Fe_{(s)}\left|Fe^{+2}_{(0.001M)}\right|\left|H^{+}_{(1M)}\right|H_{2(g)}(1bar),Pt_{(S)}$$ (given $E^o$cell=+0.44V)

Q.30 Iron and steels are the most important construction materials. Their production is based on the reduction of iron oxides, the removal of impurities and the addition of carbon and alloying metals such as Cr, Mn and Ni some compounds are manufactured for special purpose such as TiO for the pigment industry and $MnO_2$ for use in dry battery cells. The battery industry also requires Zn and Ni/ Cd. The elements of group 11 are still worthy of being called coinage metals, although

silver and gold are restricted to collection items and the contempory UK 'copper' coins are copper coated steel – the 'silver' UK coins are a Cu/ Ni alloy. Many of metals and their compounds are essential catalysts in the chemical industry. $V_2O_5$ catalyst the oxidation of $SO_2$ in the manufacture of sulphuric acid, $TiCl_4$ with $Al(CH_3)_3$ forms the basis of ieglar catalysts used to manufacture polyethene iron catalysts used in the Haber process for the production of ammonia from $N_2/H_2$ mixtures. Nickel catalysts enable the hydrogenation of fats to proceed.

(i) Highest oxidation states of d-block metals are usually seen in –
(a) Oxides (b) Fluorides (c) Chlorides (d) All of the above

(ii) Higher oxidation states in transition metals are more covalent than lower oxidation states because :
(a) Higher oxidation states involve more f-electron than lower oxidation state
(b) Lower Oxidation state is unstable
(c) Higher oxidation state involve more s & p electrons than lower oxidation state.
(d) Higher oxidation states involve more d-electrons than lower oxidation staes.

(iii) Zinc has highest ionisation potential because :
(a) It is a transition element (b) It forms strong metallic bonds
(b) It has fully filled $(n-1)d^{10}nS^2$ Configuration (d) It is one of the highly reactive metals.

(iv) Bonds formed by transition elements among themselves:
(a) Covalent (b) Metallic (c) ionic (d) None of the above

## Section – E

Q.31 (i) Define Raoult's law.

(ii) What happens when acetone is added to pure ethanol?

(iii) State Henry's law. Calculate the solubility of $CO_2$ in water at 298 K under 760mmhg. ($K_H$ for $CO_2$ in water at 298 K is $1.25\times10^6$mmHg)

**OR**

(i) Write two differences between ideal solution and non-ideal solutions.

(ii) Explain by help of henry's law.
(a) Painful condition known as bends
(b) Feeling of weakness and discomfort in breathing at high altitude.

Q.32 (i) The hexa aquamanganese (II) ion contains five unpaired electrons while the hexacyano ion contains
only one unpaired electron. Explain using crystal field theory.

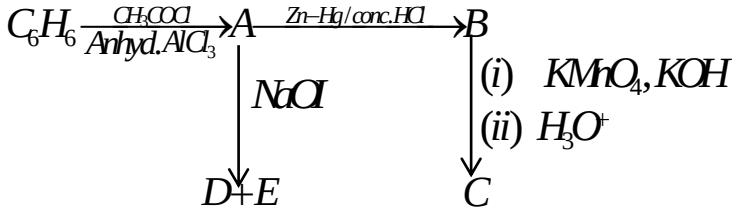
(ii) $[Fe(CN)_6]^{-2}$ and $[Fe(H_2O)_6]^{+2}$ are of different colours in dilute solutions. Why?

**OR**

(i) Why $[NiCl_4]^{-2}$ is paramagnetic while $[Ni(CO)_4]$ is diamagnetic, even though both are tetrahedral?

(ii) What type of isomerism is shown by the complex $[Co(en)_3]Cl_3$ draw isomers.

Q.33 (i) Write the structure of A, B, C, D and E in the following reactions :




(ii) Write the chemical reaction involved in Wolff-Kishner reduction.

OR

Short note on Aldol condension.

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Roll No. _____ NLCS/12/Physics(042)/26

# Pre Board Exam 2024 – 2025

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

**General Instructions :**

(i) There are 33 Questions in all. All Questions are compulsory.
(ii) This Questions paper has five sections : Section – A, Section – B, Section – C, Section – D and Section – E.
(iii) All the sections are compulsory.
(iv) Section – A contains Sixteen Questions. Twelve M.C.Q. 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.
(v) There is no overall choice. However, an internal choice has been provided in one Question in Section – B, One Question in Section – D and all Three Questions in Section – E. You have to attempt only one of the choice in such Questions.
(vi) You many use the following value of physical constant wherever necessary.

$C=3\times10^{8}$m/s
$m_e=9.1\times10^{-31}$ kg
$e=1.6\times10^{-19}$ c
$\mu_0=4\pi\times10^{-7}$ Tm $A^{-1}$
$h=6.63\times10^{-34}$ Js
$\in_0=8.854\times10^{-12}$ $C^2N^{-1}$ $m^{-2}$
Avogadro's number $=6.023\times10^{23}$ per gm mole

## Section – A

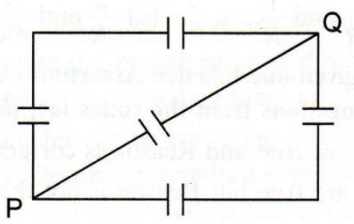
Q.1 When two point charges are placed at a certain distance r in air , they exert a force F on each other, find the distance at which these charges will experience the same force when kept in a medium of dielectric constant k.–

(a) $\frac{r}{k}$ (b) $r$ (c) $\frac{r}{\sqrt{k}}$ (d) $r\times\sqrt{k}$

Q.2 A 5μc charge is taken from a point A to point B. The amount of work done during the process is 8mJ. Find the potential difference between the points.

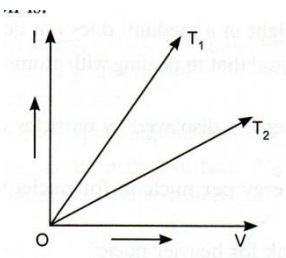
(a) 1600V (b) 160V (c) 16V (d) 16KV

Q.3 Find the effective capacitance between the pint P and Q in the given circuit of the five identical capacitors, each of capacity C.



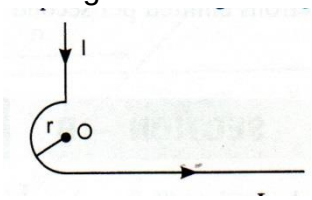

(a) $\frac{C}{2}$ (b) 2C (c) 5C (d) $\frac{C}{5}$

Q.4 The current and voltage graph for a certain material are plotted at two temperatures $T_1$ and $T_2$ as shown below. The conclusion is –




(a) $T_1<T_2$ (b) $T_1>T_2$ (c) $2T_1=T_2$ (d) $T_1=T_2$

Q.5 What is the magnetic induction at point O in the given figure?




(a) $\frac{\mu oI}{4\pi r}$ (b) $\frac{\mu oI}{4r}$

(c) $\frac{\mu oI}{4r}-\frac{\mu oI}{4\pi r}$ (d) $\frac{\mu oI}{4r}+\frac{\mu oI}{4\pi r}$

Q.6 A proton and $\alpha$–particle enter normally at the same velocities into a uniform magnetic field. Find the ratio of the radii of their paths.

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

Q.7 A diamagnetic gas when allowed to ascend in between poles of a magnet spreads across the field. The statement is –

(a) True (b) False (c) True for paramagnetic gas (d) Not applicable

Q.8 Which physical quantity remains unchanged in a transformer?

(a) Voltage (b) Amplitude (c) Current (d) Power

Q.9 Find the induced emf across the terminals of a coil of self Inductance 40mH, when the currect flowing through it is raised from 1A to 11A in 4 milisecond –

(a) 40V (b) 440V (c) 100V (d) 0.4V

Q.10 The potential drop across a resistance and an inductance joined in series with an a.c. source are 16V and 12V respectively. What is the total potential drop across the circuit?

(a) 28V (b) 32V (c) 24V (d) 20V

Q.11 Which e.m. waves are used in radars and communication through satellite?

(a) IR radiation (b) Radio waves (c) Microwaves (d) None of the above

Q.12 Calculate the short and long wavelength limits of Lymen series of H-atom.

(a) $\frac{1}{R}and\frac{4}{3R}$ (b) $\frac{4}{3R}and\frac{1}{R}$ (c) $\frac{2}{R}and\frac{3}{4R}$ (d) $\frac{R}{2}and\frac{4R}{3}$

**For Question No. 13 to 16 Two statements are given one labeled Assertion (A) and the other labeled Reason**

**(R). Select the correct Answer to these Questions from the codes (a), (b), (c) and (d) as given below.**

(a) If both Assertion and Reason (R) are true and Reason (R) is correct explanation of Assertion (A).

(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion (A).

(c) If Assertion (A) is true but Reason (R) is false

(d) If both Assertion (A) and Reason (R) are false

Q.13 Assertion (A) :The speed of light in glass is independent of colour of light.
Reason (R) : The speed of the light in a medium does not depend on its wavelength.

Q.14 Assertion (A) :Putting P type semiconductor slab directly in physical contact with n type semiconductor slab can not form the P N Junction.
Reason (R) : The roughness at contact will be much more than inter atomic crystal spacing and continuous flow of charge carriers is not possible.

Q.15 Assertion (A) :An electron has a higher potential energy when it is at a location associated with a negative value of potential and has a lower potential energy when at a location associated with a positive potential.
Reason (R) : Electron more from a region of higher potential to a region of lower potential.

Q.16 Assertion (A):Propagations of light through an optical fibre is due to total internal reflection taking place at the core – cladding interface.
Reason (R) : The necessary condition for T.I.R. is i>ic.

**Section – B**

Q.17 To find out the electric potential at an generated point at angle $\theta$ due to dipole.

Q.18 Deduce the expression for the magnetic field at a point on the axis of a current carrying circular loop of Radius R, situated at a distance $x$ from the centre. What is the value of the magnetic field at the centre of the loop?

Q.19 In a plane electromagnetic wave, the electric field oscillator sinusoidally with amplitude 48 $vm^{-1}$. Find the amplitude of the oscillating magnetic field.

Q.20 Write two necessary condition on which total internal reflection depends?

Q.21 the ground state energy of hydrogen atom is –13.6ev. If an electon makes a transition from any energy level –1.51ev to –3.4ev, calculate the wavelength or the spectral line emitted and name the series of hydrogen spectrum to which it belongs.

**OR**

(a) Why is the mass of nucleus always less than the sum of the masses of its constituents?

(b) Define mass defect of a nucleus.

## Section – C

Q.22 Define mutual Inductance. Find expression for coefficient of mutual inductance for two long solenoid coaxial coils.

Q.23 Explain how a moving coil galvanometer can be converted in to (a) an ammerter (b) a voltmeter by suitable combination of resistance. Derive the required expression.

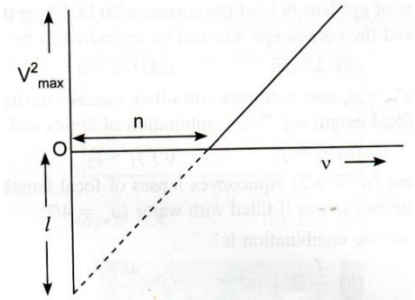
Q.24 An alternating potential of 100V and 50 Hz is applied across a series circuit having an inductance of 5H, a resistance of 100Ω and a variable capacitance. At what value of capacitance will the current in the circuit be in phase with the applied voltage?

**OR**

A series LCR circuit is connected to an ac source. Using the phases diagram, derive the expression for the impedance of the circuit. Plot a graph to show the variation of current with frequency of the source, explaining the nature of its variation.

Q.25 State Einstein's photoelectric equation explaining the symbol used:

Light of frequency $\upsilon$ is incident on a photosensitive surface. A graph of the square of maximum speed of electron ($\upsilon^2$max) V/s $\upsilon$ is obtained as shown here.




Using Einstein's photoelectric equation obtain the expression for (i) Plank's constant (ii) work function of the given photosensitive material in terms of parameters $\ell_1 n$ and $m$ (the mas of the electron).

Q.26 (a) Distinguish between nuclear fission and nuclear fusion. Explain the release of energy in both the process.

(c) Calculate the energy released in Mev in the deuterium – tritium fusion reaction.

$${}^1_1H + {}^3_1H \rightarrow {}^4_2He + n$$

Given that

$$m({}^2_1H) = 2.014102u$$
$$m({}^3_1H) = 3.016049u$$
$$m({}^4_2He) = 4.002603u$$
$$m_n = 1.008665u$$
$$1u = 931.5meV/c^2$$

Q.27 In the experiment on diffraction due to a single slit. Show that –

(a) The intensity of diffaction fringes decreases as the order (n) increase.

(b) Angular width of the centre maximum is twice that of the first order secondary maximum.

Q.28 Describe briefly, with the help of a diagram, the role of the two important process involved in the formation of p-junction.

## Section – D

Q.29 Read the following paragraph and answer the question that follows:

The bending of light waves around the corners of obstacles or apertures and sprading into the reagions of geometrical shadow is called diffraction of light. The size of the obstacle or aperture should be of the order of wavelength of light used. Interference is the superposition of light waves from two different wave front originating from the same source, while the diffection is the interaction of light waves from different parts of the same wave point.

(i) The essential condition for diffraction of light to occur is that the size of the aperture.
- (a) Must be less when compared to the wave length of light.
- (b) Must be more when compared to the wavelength of light.
- (c) Must be comparable to the wavelength of light.
- (d) Should not be compared to the wavelength of light.

(ii) Single slit diffraction is completely immersed in water without changing any other parameter. How is the width of the centre maximum affected?

(a) Insignificant (b) Increases (c) Decreases (d) Become zero

(iii) The main difference in interference and diffraction is –
- (a) Diffraction is due interaction of light from the same wave front whereas interference is the interaction of waves from two isolated sources.
- (b) Diffraction is due to the interaction of light from the wave front, whereas interference is the interaction of two waves derived from the same source.
- (c) Diffraction is due to the interaction of waves derived from the same source, whereas interference is the bending of light from same wave front.
- (d) There is no difference between interference and diffraction.

(iv) The phenomenon of interference is based on –

(a) Conservation of momentum (b) Conservation of energy

(c) Quantum nature of light (d) Conservation of momentum and energy

**OR**

To observe diffraction the size of the obstacle.

(a) Should be $x/2$, where as $x$ is wave length. (b) Should be of the order of wavelength

(c) has no relation to wavelength (d) Should be much large than the wave length

Q.30 Read the following paragraph and answer the questions that follow :

If a donor impurity is diffused into one side of a crystal and an acceptor impurity impurity into the other, the boundary between those regions is called a p-n junction. Due to diffusion free electrons of n section combine with holes of 'P' section. This produces an electric field and prevents the electrons and holes from crossing the junction. The small region in the vicinity of p-n junction is called depletion layer.

(i) In an intrinsic semiconductor,

(a) There are no free electrons. (b) There are only holes.

(b) Free electrons are thermally produced (d) None of these

(ii) What causes the barriers layer in p-n junction?

(a) Doping (b) Recombination (c) Barrier potential (d) Ions

(iii) When the reverse voltage increase from 5V to 10V the depletion layer.

(a) Become larger (b) become smaller (c) is unaffected (d) breaks down

(iv) If the temperature of a piece of germanium increases its conductance.
(a) Increase (b) decreases (c) remains unchanged (d) become zero

## Section – E

Q.31 (a) A dielectric slab of thickness t is kept between the plates of a parallel plate capacitor separated by a distance d. Derive an expression for the capacity of the capacitor.

(b) Using Gauss's law find the electric field intensity due to a linear charge distribution of infinite length at a point r distance away from it.

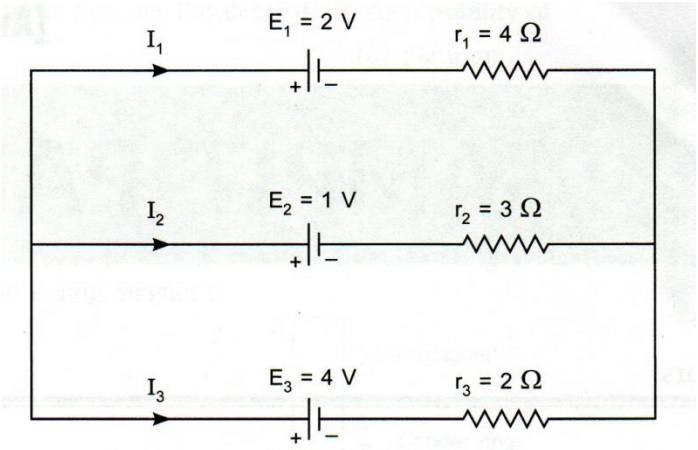
**OR**

(a) Find the potential energy of an electric dipole placed in a uniform electric field.

(b) In which orientation, a dipole placed in a uniform electric field is in (i) stable (ii) unstable equilibrium

(c) An electric dipole with dipole moment $4\times10^{-9}m$ is aligned at 30° with direction of uniform electric field of magnitude $5\times10^{4}\,N/C$. Calculate the magnitude of the torque acting on the dipole.

Q.32 State Kirchhoff's laws. Use these rules to write the expression for the current $I_1, I_2$ and $I_3$ in the circuit diagram shown.




**OR**

(a) Two cells of emf's $E_1$ and $E_2$ and internal and internal resistance $r_1$and $r_2$ are connected in prarallel. Obtain the expression for the emf and internal resistance of a single equivalent cell that can replace this combination.

(b) Define drift velocity and find its expression.

Q.33 (a) Find out the relation between focal length, reflective index and radius of curvature for a convex lens (lens maker's formula).

(b) At what distance should an object be placed from a convex lens of focal length 15 cm to obtain image real & three time enlarge the size of object?

**OR**

(a) Draw a diagram for compound microscope for general adjustment and find out relation for magnification.

(b) Write the advantages of reflecting type telescope.

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Roll No. _____ NLCS/12/Biology(044)/14

# Pre Board Exam 2024 – 2025

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

**General Instructions :**

(i) All Questions are compulsory.
(ii) The Question paper has 5 sections and 33 Questions.
(iii) Section – A has 16 Questions of 1Mark each;
Section – B has 5 Questions of 2 Marks each;
Section – C has7 Questions of 3 Marks each;
Section – D has 2 Case Based Questions of 4 Marks each and
Section – E has 3 Questions of 5 Marks each.
(iv) 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.
(v) Wherever necessary neat and labelled diagram should be drawn.

## Section – A

Q.1 ELISA technique is based on the principle of :–
(a) DNA replication (b) antigen antibody interaction
(c) Pathogen and antigen interaction (d) antigen and protein interaction

Q.2 BOD of waste water is estimated by measuring the amount of –
(a) total organic matter (b) biodegradable organic
(c) oxygen evolution (d) oxygen consumption

Q.3 Occasionally, a single gene may express more than one effect. The phenomenon is called –
(a) multiple allelism (b) mosaicism (c) Pleiotrophy (d) polygeny

Q.4 'Heat shock' method in Bacterial transformation is to facilitate –
(a) The expression of antibiotic resistance gene
(b) The uptake of DNA through the transport protein of the membrane
(c) The uptake of DNA through the transient pores in the bacterial cell walls
(d) The binding of DNA to the bacterial cell walls

Q.5 Match the column I with the column II and select the correct option –

| Column I | | Column II | |
|---|---|---|---|
| (A) | Harmone-releasing IUD | (1) | Sterlization in males |
| (B) | Oral contraceptive | (2) | Suppression of gonadotropin |
| (C) | Vasecotomy | (3) | Progestasert |
| (D) | Lactational amenorrhoea | (4) | Implant under the skin |
| | | (5) | Suppression of ovulation and implantation |

(a) A-3,B-5, C-1, D-2 (b) A-5, B-4, C-1, D-2
(c) A-2, B-4, C-1, D-3 (d) A-4, B-5, C-1, D-2

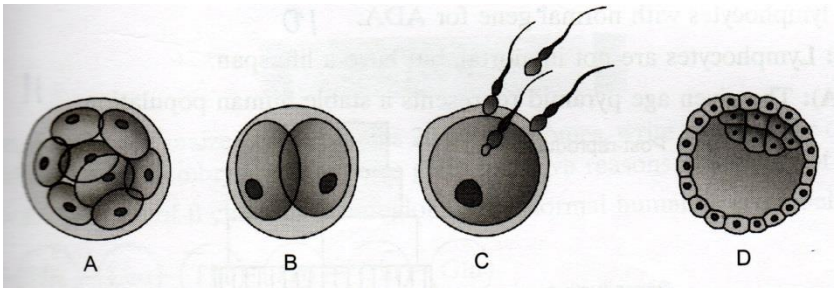
Q.6 Match the items in column I with those in column II and select the correct option –

| Column I | | Column II | |
|---|---|---|---|
| (A) | Biological control | (1) | Methanobacterium |
| (B) | Ladybird Beetle | (2) | Monascus purpureus |
| (C) | Mycorrhizae | (3) | Pricoderma species |
| (D) | Activated sludge | (4) | Aphids |
| | | (5) | Glomus |

(a) A-3, B-4, C-5, D-1 (b) A-4, B-3, C-5, D-1 (c) A-5, B-4, C-2, D-3 (d) A-5, B-3, C-2, D-1

Q.7 Pyramid of numbers is –
(a) always upright (b) always inverted
(c) either upright or inverted (d) neither upright nor inverted

Q.8 The following diagram shows the different stages in the human embryonic development – Identify the correct libeling's for A, B, C and D and select the correct option from the given table below :




| | A | B | C | D |
|---|---|---|---|---|
| (a) | Blastocyst | Cleavage | Fertilization | Morula |
| (b) | Morula | Fertilization | Cleavage | Blastocyst |
| (c) | Morula | Cleavage | Fertilization | Blastocyst |
| (d) | Blastula | Fertilization | Cleavage | Morula |

Q.9 The phenomenon of "industrial melanism" demonstrate –
(a) Natural selection (b) induced mutation (c) genetic drift (d) geographical isolation

Q.10 Interferons formed by our body during a viral infection are a part of –
(a) Physiological Barriers (b) cellular barriers (c) Physical barriers (d) cytokine barriers

Q.11 Amensalism is an interspecific interaction between two species, where –
(a) One species is harmed and other is benefited
(b) One species is harmed and the other is neutral
(c) One species is benefited and the other is neutral
(d) both the species are harmed

Q.12 Which of the following forest is known as the "lungs of the planet Earth –
(a) Taiga forest (b) Tundra forest (c) Amazon rainforest (d) Rainforest of North East India

**Question No. 13 to 16 are Assertion – Reason (A-R) Answer these Questions selecting the appropriate option given below:**

(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true and R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

Q.13 Assertion (A) : A stable population is depicted by bell shaped age pyramid.
Reason (R) : The proportion of individuals in reproduction age group is higher than those in pre-reproductive age group.

Q.14 Assertion (A) : A patient of ADA deficiency requires periodic or repeated infusion of genetically engineered lymphocytes with normal gene for ADA.
Reason (R) : For the first time in 1990, M. Blease and W.F.Andresco of National Institute of Health, attempted gene therapy

Q.15 Assertion (A) : Leaf Butterfly and stick insect show mimicry to dodge their enemies.
Reason (R) : Mimicry is a method to acquire body colour blending with the surroundings.

Q.16 Assertion (A) : In angiosperms, the development of embryosac or the female gametophyte described as monosporic.
Reason (R) : In angiosperms there is a single gametophyte in an ovule.

## Section – B

Q.17 How is cancerous cell different from a normal cell?

Q.18 How is 'stratification' represented in a forest ecosystem?

**OR**

"Pyramid of energy is always upright". Explain.

Q.19 What is the number of chromosomes in the following cells of human female:
(i) Primary oocyte (ii) Ootid ovum (iii) Secondary Oocyte (iv) Follicle cells

Q.20 Why DNA is more stable than RNA, Give your statement in support of your answer?

Q.21 Name the source organism of Taq. polymerase. Explain its role in PCR.

## Section – C

Q.22 With diagram show the 7-celled and 8 nucleate nature of female gametophyte.

Q.23 Write the types of sex-determination mechanisms the following classes show. Give an example of each type:
(i) Female XX and male XO (ii) Female ZW and male ZZ
(iii) Female XX and male XY

Q.24 (a) Select the analogous structure from the combination given below:
(i) Forelimbs of whales and bats (ii) Eyes of octopus and mammals
(iii) Tuber of sweet potato and potato
(iv) Thorns of bougainvilea and tendrils of cucurbita
(b) State the kind of evolution they represent.

Q.25 Write the function fo adenosine deaminase enzyme. State the cause of ADA deficiency in humans. Mention a possible permanent cure for a ADA deficiency patient.

Q.26 Draw the well labeled diagram to show human foetus within the uterus.

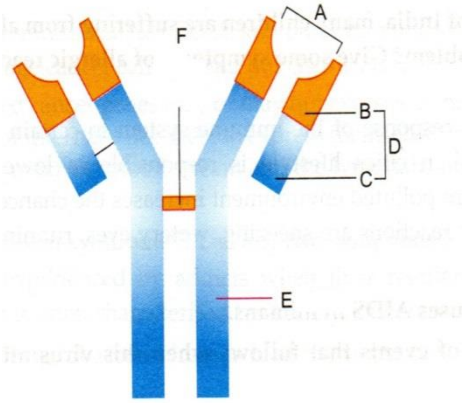
Q.27 Write the events that take place when a vaccine for any disease into the human body.

Q.28 (a) Make a flow chart to show biodiversity conservation.
(b) What is IUCN red list?

## Section – D

**Question No. 29 and 30 are Case Based Questions.**

Q.29 (i) Identify (a) in the diagram of an antibody molecule given above.




(a) Heavy chain (b) light chain
(c) Antiqen binding site (d) None of above

(ii) Name the type of cells that produce this molecule.
(a) B-lympocyte (b) T-lymphocytes
(c) Host cell (d) All of above

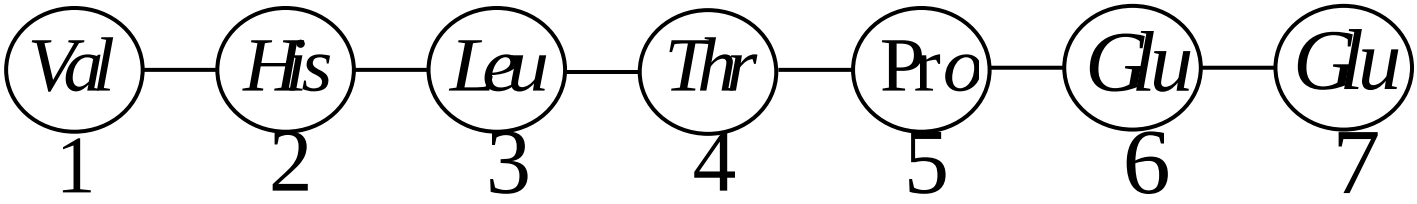
(iii) Heavy and light chains are represented by :
(a) $L_2H_2$ (b) $H_2L_2$ (c) $H_2H_2$ (d) $L_2L_2$

(iv) Heavy and light chain are connected by :
(a) Peptide bond (b) Glycosidic bond
(c) Disulphide bond (d) Hydrogen bond

**OR**

(iv) Antibodies are also known as ---------- .
(a) Globulins (b) Colastrum (c) Immunoglobulins (d) Immunization

Q.30 A relevant portion of $\beta$ chain of haemoglobin of a normal human is given below :



The codon for the sixth amino acid is GAG. The sixth codon GAG mutates to GAA as a result of mutation 'A' and into GUG as a result of mutation 'B'. Haemoglobin structure did not change as a result of mutation 'B' leading to sickle shaped RBC's.

Answer the following Questions of the basis of above passage :

(i) Sickle cell anaemia is an ---------- disease.
(a) X-linked (b) autosomal dominant (c) autosomal recessive (d) Y linked

(ii) Sickle cell anaemia is caused by mutation in a gene called ---------- .
(a) SSS (b) BBH (c) HBB (d) SCA

(iii) In sickle cell anaemia, the shape of RBC changes from Biconcave disc to ---------- .
(a) Rectangular shape (b) Sickle shape (c) Rod shape (d) Horse shoe shape

(iv) In above disease, Glutamic acid is replaced by :
(a) Proline (b) Valine (c) Methionine (d) Leucine

**OR**

Effect of sickle cell anaemia :
(a) Blood capillanies are clogged (b) Oxygen transport suffer
(c) both a and b (d) None of above

## Section – E

Q.31 Describe the experiment that proves DNA is a genetic material by Avery, Macleod and McCarty with diagrams.

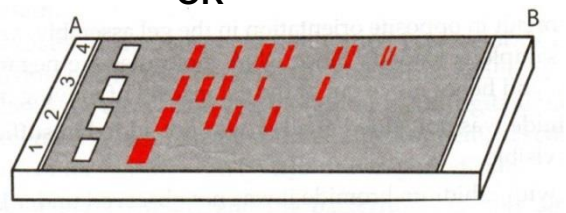
**OR**


Study the mRNA segment given above which is complete to be translated into a polypeptide chain.

(a) Write the codon 'a' and 'b' (b) What do they code for?
(c) How is peptide bond formed between two amino acids in ribosome

Q.32 Name any two natural cloning vectors. Give reasons that make them act as cloning vectors. Write two characteristics the engineered vectors are made to posses.

**OR**




(a) Mark the positive and negative terminals.
(b) What is the charge carried by DNA molecule and how does it help in its separation?
(c) How the separated DNA fragments are finally separated?

Q.33 (a) Describe in sequence the process of microsporogenesis in angiosperms with diagram / flow chart
(b) What is an anatropous ovule? 4+1=5

**OR**

What is oogenesis? Give a brief account of oogenesis till the formation of ootid (Ovum) with diagram.

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