CH. CHHABIL DASS PUBLIC SCHOOL

WORKSHEETS

SESSION 2025-2026

CLASS XI

WORKSHEET INDEX

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(HORNBILL)
THE PORTRAIT OF A LADY

Q1 Why was it hard for the author to believe that the grandmother was once young and pretty?
Q2 The grandmother has been portrayed as a very religious lady. What details in the story create this impression?
Q3 The grandmother had a divine beauty. How does the author bring it out?
Q4 What proof do you find of friendship between the grandmother and grandson in the story?
Q5 The grandmother was a kind-hearted woman. Give examples in support of your answer.
Q6 "This was the turning point in our friendship." What was the turning point?
Q7 Draw a comparison between the author's village school education and city school education.
Q8 What was the happiest moment of the day for grandmother?
Q9 What was the last sign of physical contact between the author and the grandmother? Why did the author think that to be the last physical contact?
Q10 Everybody including the sparrows mourned the grandmother's death. Elaborate.
Q11 Describe the author's grandfather as he looked in his portrait.
Q12 How does the author describe his grandmother?
Q13 How does the author react to the idea of the grandmother being young at a point of time and playing games?
Q14 How did the grandmother prepare the author for going to school?
Q15 Why was the grandmother distressed by the education imparted in the city school?

CRITICAL THINKING QUESTIONS

1 To show your love for your grandmother, write a letter to her sharing your feelings for her.
2 Imagine that you stayed with your grandmother when you were four years old. Write a paragraph sharing all those moments spent with her.

3 Draw a pen portrait of your grandmother.

4 You are fond of writing diary. Narrate the story that your grandmother tells you.

5 The grandmother went to the station to receive her grandson. On the station she met her old friend. Write the conversation between the two regarding their grandson.
6 Grand mother has been portrayed as a very religious lady. What details in the story create this impression?

A PHOTOGRAPH

1. What does the word 'cardboard' denote in the poem? Why has this word been used?
2. What has the camera captured?
3. What has not changed over the years? Does this suggest something to you?
4. The poet's mother laughed at the snapshot. What did this laugh indicate?
5. What is the meaning of the line "Both wry with the laboured ease of loss."
6. What does "this circumstance" refer to?
7. The three stanzas depict three different phases. What are they?

CRITICAL THINKING QUESTIONS

1. We take photos as a return ticket to a moment otherwise gone. Do you agree? With reference to the poem ' A Photograph" , write an article showing importance of photographs.

2. Write a diary entry showing your feelings about your mother whenever you see her photograph.

3. The poet has paid a tribute to her mother. Similar instances can be seen in The Portrait of a Lady . This made you think that writing about a loved one is much better than building their statues or drawing their portraits. Do you agree? Write a paragraph on it.

4. Happy moments are short-lived but provide a lifetime memory. They provide a cushion to bear the difficulties which the future has in store for us. Prepare a speech for the morning assembly expressing your views on the topic.
5. The poet is missing her mother .What is the role of the mother in framing the personality of a child?

We're Not Afraid to Die….. If We Can All Be Together

1. What did the narrator plan to do? What preparations did he make for it?

2. Give a brief description of the narrator's boat. How had the narrator equipped and tested it?

3. How long did the narrator plan his voyage to last?

4. When and with whom did the narrator begin his voyage?

5. Whom did the narrator employ and why? When did he do so?

6. What happened on their second day out of Cape Town? What worried the narrator and why?

7. How did they celebrate the Christmas holidays?

8. How did the weather change on January 2? How did they feel?

9. What efforts were made to face the rough weather?

10. What sort of wave hit the ship? How did the narrator react?

11. What was the impact of the torrent on the narrator and Wavewalker?

12. How did the narrator manage to survive through the attacks of subsequent waves?

13. How did the narrator and the other members react to the presence of water in the ship?

14. "I had no time to worry about bumped heads," says the narrator. What problems do you think deserved his immediate attention?

CRITICAL THINKING QUESTIONS

1. On the occasion of your grandmother's birthday you want to give a thank you speech to your family. Prepare that.
2. Write a letter to your father who has gone abroad for a month for official work assuring him that in his absence you will take care of your family and instead of worrying for everyone he should focus on his work.
3. Write a travelogue describing one of your memorable journeys.
4. Sea journey has always fascinated you but you have never got the chance to experience it. Write a diary page expressing your feelings.
5. "Adventure is the essence of life." Write an article commenting on this topic.

Discovering Tut: The Saga Continues

1. Why is 5th January 2005 significant in Tutankhamun's saga?

2. How was the atmosphere when Tut's body was taken for C.T. scan?

3. How did the visitors to Tut's grave pay their respects to him?

4. What according to A.R. Williams were the thoughts of the visitors who stood silently near Tut's grave?

5. What was the Pharaoh's curse? Who refers to it and in what context?

6. "The mummy is in very bad condition because of what Carter did in the 1920s." Who was Carter? What did he do to the mummy?

7. What problem did Carter face when he reached the mummy? How did he find a way out?

8. How did Carter defend his action of cutting the mummy free?

9. List some of the adornments and golden objects of Tut's body.

10. Why do you think the royals carried so much gold to grave?

11. What is so special about the contents of Tut's tomb?

12. Which evidence proves the burial of Tut in March or April?

13. How did Carter's men treat Tut's body while removing gold?

14. What startling fact came to light in 1968 through X- ray?
15. How was Tut's body carried to the CT Scanner?

16. What snag did the million dollar scanner develop? How was it set right?

17. Why do you think Zahi Hawass smiled and felt relieved?

CRITICAL THINKING QUESTIONS

Q1. Justify the title-'Discovering Tut: The Saga Continues'.
Q2. As Howard Carter, you are responsible for finding out the mummy of Tut. You wanted to protect the mummy and all the funerary treasures found with it.So, you had to resort to extreme methods . Now you are blamed for mishandling the mummy and damaging it . Write a page in your diary, expressing your feelings and giving explanation to counter all the blames levied upon you.
Q3. Imagine that you are Zahi Hawass and under your supervision, the CT scan of the mummy was successfully conducted. Write a letter to your deputy giving the details of the complete mission along with the problems that you faced .
Q4. What are the most intriguing questions that still haunt the discovery of the mummy of Tut ?
Q5. As a reporter, you visited King Tut's mummy in Egypt. You were amazed by the findings of the archaeologists. Make a diary entry expressing your views on what you found there.

THE LABURNUM TOP

Q.1 .What do you notice about the beginning and the ending of the poem?

Q.2.Why is the image of the engine evoked by the poet?

Q.3.What does the phrase 'her barred face identify mask' mean?

Q.4.Describe the laburnum top.

Q.5.What happened when the goldfinch came to the laburnum tree?

Q.6.How is the tree transformed during the bird's visit?

Q.7. To what is the movement of the goldfinch compared? What is the basis for the comparison?

Q.8. 'The whole tree trembles and thrills'. Explain the poetic device used by the poet.

Q.9.'She launches away, towards the infinite'. Explain the given line.

Q.10.Explain the line 'And the laburnum subsides to empty'.

Extract Based Questions

The laburnum top is silent, quite still

In the afternoon yellow September sunlight,

A few leaves yellowing , all its seeds fallen.

a) Why was the Laburnum top silent?

b) Why is September yellow?

c) What is the mood of the poet in these lines?

2. It is the engine of her family

She stokes it full, then flirts out to a branch end

Showing her barred face identity mask

a) Why has the word 'engine' been used to describe her family?

b) Who is 'she'? How does she stoke the engine?

c) What does the bird look like?

THE VOICE OF THE RAIN

Q1.How does the poet question the rain and how does he get his answer?

Q2. Why does the rain answer that it is the poem of the earth?

Q3. Which two voices does the poem 'The Voice of the rain' have?

Q4. Explain briefly the process of the formation of the rain , what it does and where it goes?

Q5. What would happen to the earth if the rain never comes down?

Q6. What does the rain do to its own self and what has the poet compared it with?

Q7. What are the similarities between the rain and a song?

Q8. What does the rain give to the earth and what does a song give to the people?

Extract Based Questions:

I. And forever , by day and night, I give back life to my

Own origin

And make pure and beautify it;

a) Where are these lines from and who is 'I' in the first line?

b) What does 'I' do to its own origin?

c) How is the rain formed ?

d) Explain 'make pure' and 'beautify it'.

2. For song, issuing from its birth-place ,after fulfillment,

Wandering

Reck'd or unreck'd, duly with love returns

a) Where are these lines from and who is the poet?

b) Why is the poet comparing the rain with a song?

c) What does the rain do to itself ?

d) What happens to a song?

CRITICAL THINKING QUESTIONS

1. The poem ' The Voice of the Rain' gives a hidden message that rain is essential for this earth. Write an article describing the importance of rain for the survival of the humanity.

2. Natural elements such as air and rain make no discrimination and bless everyone equally. Comment on class distinction and inequality which are totally human creations.

3. There is a parallel between rain and music. Elaborate the above point using your own ideas.

4. Consider yourself to be the 'Voice of the Rain'. Write a letter to the present generation encouraging them to be selfless and to keep others before self to help the humanity from collapsing under the pressure of selfish motives. Give some ways of doing the same.

CHILDHOOD

1. Why is the age eleven so important ?
2. What is the poet obsessed with ?
3. 'My mind was really mine.' Explain.
4. Describe the poet's feeling of childhood ?
5. What could not be found in geography textbooks ?
6. What is the poet's opinion about the hypocrisy of the adults ?
7. How according to the poem childhood is involved in the process of growing up ?
8. Has the poet got an answer to the question: "Where did my childhood go" ?
9. Is independent thinking a step towards adulthood?
10. What is the difference between childhood and adulthood ? Do you think the only difference is between, that of 'innocence' and 'hypocrisy'?

CRITICAL THINKING QUESTIONS

1. Have you been able to relate to the poem with your life ? If yes, how? If not, why?
Q2. The poet mentions three milestones in his transition from childhood. Which are they and what are the characteristics of these milestones?
Q3. "Childhood is an essential state in the process of growing up, but it cannot go forever." Discuss.
Q4. Refrain is a poetic device used to emphasize an idea. How has it been used in this poem and with what effect?

Q5.Write an informal letter to your childhood friend recalling your childhood days that you spent with him/her.W.L.-100

THE ADVENTURE

Q1.What were the thoughts of Professor Gaitonde as his train approached Bombay?

Q2. What indication do you get that tells that Professor Gaitonde was visiting a British Indian Bombay city?

Q3. What did the history books say about the East India Company and what was the reality? What did he see in Bombay?

Q4. When did history take a different turn according to Professor Gaitonde ?

Q5. What were the effects of the victory in the battle between Marathas and the East India Company?

Q6. What was the intention of Peshwas keeping the Mughal regime alive in Delhi?

Q7.' Gangadharpant began to appreciate the India he had seen'. What kind of India had he seen?

Q8. What did Gaitonde discover in 'Bhausahebanchi Bakhar'?

Q.9 What was the scenery at the Azad Maidan as witnessed by Gaitonde?

Q10. What did Rajendra Deshpande reveal to Professor Gaitonde about the collision theory?

Q11. How did Rajendra Deshpande relate the catastrophe theory to the battle of Panipat?

Q12.What was 'reality' according to Rajendra Deshpande?

Q13. How can there be a contact between many worlds according to Rajendra Deshpande?

Q14. How did Rajendra rationalise the experience of Gaitonde?

Q15. What books did Gangadharpant browse through in the library.What did he find?

Q16. What came as a huge surprise to Gangadharpant as he emerged from the station?

CRITICAL THINKING QUESTIONS

Q1. How is Rajendra Deshpande able to explain the history as experienced by Gaitonde?
Q2. Imagine yourself to be in some other world. You feel lost. Write the conversation you had with a person in that world.
Q3. Imagine yourself to be Gaitonde at Azad Maidan. You were badly manhandled by the crowd. You felt emotionally bruised and hurt . Write a letter to Khan Saheb in Lahore sharing your pain.
Q4. Imagine yourself to be the librarian at the Asiatic Society Library. You came across a man looking for some books in your library who continued to remain there for a very long time. Everything seemed very strange. Make an entry in your diary expressing your views about the same.

SILKROAD

1. Who was Lhamo?
2. What difficulties did Tsetan face while taking shortcuts?
3. What did the doctor in the Darchen Medical College look like?
4. What does Kora mean?
5. Comment on the appearance of Darchen Medical College.
6. How was the experience of the author at Hor different from the earlier visits to the place?
7. What made the author believe that his strategy of positive thinking went well?
8. Comment on the sensitive behaviour of hill folk.
9. How does the author recount his experience at the Darchen Medical College?
10. What disappointed the author in Darchen?

11. How do you think T-setan supported the author during his journey?

12. Why do you think the lesson has been named ''Silk Road" ?

13. What was the physical condition of the author in Darchen ?

14. Why does the narrator think that the snow was dangerous yet beautiful?

CRITICAL THINKING QUESTIONS

Q1. What is the growing impact of tourism on nature? Do exotic places in legends still retain their pristine beauty? Give reasons to support your answer.

Q2. Discuss why some people willingly undergo the difficult journeys?

Q3. Discuss how travel widens the horizon of our knowledge.

Q4. Browse the web about some of the most widely known travelogues and prepare a write-up.
Q5. Find out about the importance of Mount Kailash in different religions and write brief notes on them.

FATHER TO SON

(1) Read the extracts given below and answer the questions that follow:

(1). I do not understand ----------he was when small

1. Who is the speaker in these lines?

2. What does the speaker reveal? Does it strike odd? Why/ Why not?

3. What does the speaker intend to do?

(2) Yet have I killed ----------of understanding in the air

1. Who is 'I' in these lines? Whom is he talking about?

2. What does the speaker mean by 'seed'?

3. What is the poet's mood in these lines?

(3) Silence surrounds us---------- shaping from sorrow a new love

1. Why does the speaker say, "Silence surrounds us"?

2. What does the speaker wish for?

3. What would 'I' forgive?

4. How does the speaker intend to behave in case his wishes come true?

(4) We both must live ---------- something to forgive

1. What reality dawns on the speaker?

2. How do the father and son behave? How does the father feel?

3. Do you think a reconciliation is possible and how?

(2) Answer the following questions:

1. Show that the father and the son do not have the relationship of warmth and understanding.

2. How is the father's helplessness brought out in the poem?

3. How can you say that the father and the son are very near to each other yet very far?

4. Does the father understand his own son? Justify your answer based on your reading of the poem.

5. What does the poet mean by "have I killed the seed I spent'?

6. What does the speaker say about father-son relationship?

7. What do you think is responsible for the distance between father and son?

8. How can you infer that the father wishes his son to remain at home with him?

9. Why does the father feel that he and his son are like strangers to each other?

10. The father wants his son to be like the prodigal son. Why?

11. Why does the speaker feel that he has killed the seed?

12. Explain: "There is no sign of understanding in the air."

13. Explain: "This child is built to my design."

14. What does the speaker want to say through the expression 'Shaping from sorrow a new love.'

CRITICAL THINKING QUESTIONS

1. Is Generation Gap a universal problem? On what issues or matters do you have different views from your parents?
2. Lockdown brought the family members together and in disguise gave everybody an opportunity to spend time together and resolve the conflicts or cold indifferences.Write a diary entry expressing your confession of being responsible of cold indifferences between you and your parents and finding solutions to the problem.
3. Who do you sympathisize with the father or the son?
4. The poem reflects the realities of the modern times. The aged persons face problems and there is no end to it.How do you feel?
5. Is the father responsible for the present situation ? What are your views?

SNAPSHOTS
The Summer of the Beautiful White Horse

1. "I couldn't believe what I saw," says the narrator. What was so unbelievable? Why?

2. What two character traits of Mourad are hinted at by the narrator in the initial part of the story?

3. "This was the part that wouldn't permit me to believe what I saw." What 'part' does the narrator hint at?

4. What traits of the Garoghlanian family are highlighted in this story?

5. How did the narrator react on seeing the horse and Mourad?

6. What conflicting thoughts passed through the narrator's mind on seeing Mourad on a beautiful white horse early one morning?

7. What feelings did the sight of cousin Mourad and the horse arouse in the narrator?

8. "It was true, then. He had stolen the horse. There was no question about it. He had come to invite me to ride or not, as I chose." How did the narrator convince himself to enjoy a horse ride with cousin Mourad?

9. Give examples to show why cousin Mourad was considered one of the craziest members of the narrator's family?

10. Why does the narrator mention uncle Kosrove? Which characteristic features of the man are highlighted?

11. Give an example to illustrate how uncle Khosrove's impatience sometimes worked to his disadvantage?

12. "The distribution of the various kinds of spirit of our tribe had been from the beginning capricious and vagrant." Elucidate.

13. Give a brief account of Mourad's joy ride.

14. How did Aram, the narrator, fare in his solo ride?

15. "We'll either take him back or hide him until tomorrow morning." Which course of action did the speaker take and why?

16. How do you think, had Mourad developed an understanding with the horse and what was the result?

17. Contrast the two visitors to narrator's house who visited them one afternoon.

18. How did uncle Khosrove react to John Byro's complaint about the theft of his horse?

CRITICAL THINKING QUESTIONS

1. Imagine you are the narrator of the story ' The Summer of the Beautiful White Horse'. Describe to your friend how you got a beautiful white horse and also why you returned it to its rightful owner.

2. Do you think that the boys returned the horse to its true owner because they were afraid of punishment? Did the pangs of conscience force them to do it? Comment.

3. 'We are nothing but a set a values.' You are Rahul/ Ritika. Write an article on the given topic to be printed in the school magazine.

4. Sometimes as human beings we are faced with an ethical dilemma as we are tempted to do wrong things. Do you agree? Explain with reference to the lesson 'The Summer of the Beautiful White Horse'.

THE ADDRESS

Q1. What did the author's mother tell her about Mrs. Dorling?
Q2. How did the author recognize that the woman who was at the door was Mrs. Dorling?
Q3. What horrified the author on her second visit to Mrs. Dorling's house?
Q4. What was the reason behind Mrs. Dorling's refusal to recognize the author?
Q5. "The wars cause a lot of trauma." How is the statement true w.r.t. the story of 'The Address'?
Q6.How did the narrator decide to go back to the 'things'?
Q7.What did you learn about Mrs. Dorling in the story 'The Address'?
Q8. Write the character sketch of the author.
Q9.The author was in a way a little afraid of the 'stored stuff' at Mrs. Dorling's house after the war. Why?
Q10.Why did the narrator of the story want to forget the address?
Q11. What two reasons did the narrator give to explain that she was mistaken?
Q12. How did the narrator conclude that she was right?
Q13. Who had given the narrator the address? When and under what circumstances?
Q14. What was the outcome of the interview b/w Mrs. Dorling and the narrator?
Q15. What impression do you form of the narrator's mother on the basis of her conversation b/w the narrator and Mrs. Dorling?
Q16. Did the narrator feel convinced about the views of her mother about Mrs. Dorling? How do you know?
Q17. Why did the narrator wait for a long time before going to the address no. 46, Marconi Street?
Q18. In what respect was the second visit of the narrator to 46, Marconi Street different from the first visit? Did she really succeed in her mission? Give a reason for your answer.
Q19. The Address is a story of predicament that follows war. Comment.
Q20. The story is divided into pre-war and post-war times. What hardship do you think the girl underwent during these times?

CRITICAL THINKING QUESTIONS

1. Find an object in your room that reminds you of a family picnic. Write a paragraphdescribing the object and the memory attached with that.
2. Refugees suffer from separation, loss and fear. Your teacher has asked you toprepare a report on them describing the hardships they face. Write the report.
3. "An opportunist disguised as a friend can be every bit as dangerous as an outrightenemy." Comment with reference to the story.
4. "Memories are the timeless treasures of the heart. Nobody can snatch them fromyou." Write a diary page pouring your feelings as the narrator of the story.
5. "Selfishness creates greed and greed destroys the soul." Write an article commenting on the topic.

MOTHER'S DAY

Q1. What difference do you find b/w Mrs. Pearson and Mrs. Fitzgerald?

Q2. What advice does Mrs. Fitzgerald give Mrs. Pearson regarding being boss in her family?

Q3. How is Mrs. Pearson treated by the family?

Q4. What problem did Mrs. Pearson face? Who do you think is responsible for this state of affairs?

Q5. How does Mrs. Fitzgerald plan to deal with the family?

Q6. Why does Doris say ,"Mum what's the matter with you"?

Q7. What is Doris' reaction when Mrs. Pearson says she will work only 40 hrs a week?

Q8. How does Mrs. Pearson criticize Doris for going out with Charlie Spence?

Q9. What two things does Doris want her mother to do?

Q10. Who was Cyril? Why was he annoyed with his mom?

Q11. How do Doris and Cyril react to Mrs. Pearson's query about stout?

Q12. Who was Charlie Spence? What did Mrs. Pearson say about him?

Q13. What changes in the behaviour of Mrs. Pearson startle Doris and Cyril? What possible reasons do you suggest?

Q14. Who is George? What did Mrs. Pearson tell him to face?

Q15. What did Mrs. Pearson tell George about his visit to the bar?

Q16. Why is George Pearson angry about Fitzgerald calling him George?

Q17. Why does Mrs. Pearson find fault with George in dealing with neighbours?

Q18. Why did Mrs. Pearson threaten to slap George?

Q19. What advice does Mrs. Fitzgerald give to Mrs. Pearson after changing back personalities?

Q20. How does Pearson family –Doris, Cyril, George spend evening finally?

Q21. How does stern treatment reform the spoilt children?

Q22. What impression do you form of Mrs. Pearson?

Q23. Comment on the ending on the play?

Q24. Write a short note on Mother's Day?

CRITICAL THINKING QUESTIONS

1. How does the play resolve the issue? Do you agree with the resolution?
2. Husbands, sons, daughters should be taking notice of wives and mothers, not giving them orders and treating them like dirt. What do you think about it?
3. Our history is replete with the contribution of mothers to inculcate values in their children to face the challenges in life. Name a few of them.
4. Provide an ending to the story.
5. This play,written in the 1950s is a humorous and satirical depiction of the status of the mother in the family. What are the issues it raises?

BIRTH

Q1.Who was Dr Andrew?
Q2.Who was Joe Morgan? Why was he waiting for Dr Andrew?
Q3.Where did Joe lead Andrew? Why did he not go in with the doctor?
Q4.What did Andrew see when he entered Joe's house?
Q5."Don't fret mother. I will not run away". Why do you think Andrew said so?
Q6.What did Andrew realize while he drank tea in the kitchen?
Q7. Why were Andrew's thoughts muddled?
Q8. What had Andrew been thinking about? How would you like to describe the state of his thoughts?
Q9. What was Andrew's view of marriage? What made him feel confused?
Q10.Why did Andrew feel surprised while sitting by the kitchen fire?
Q11. What was Mrs. Morgan's special request?
Q12.Why did Andrew feel a shiver of horror?
Q13. What dilemma did the doctor face after the child was born?
Q14. What efforts did Andrew make to revive Susan Morgan?
Q15. Where had the midwife kept the child? Why ?
Q16. In what state did Andrew find the newborn child? What did he conclude?
Q17. What did Andrew do with the still born baby after reviving Susan?
Q18.What final efforts did Andrew make to save the baby?
Q19. How did Andrew react to the first glimpse of the success of his efforts to help the still born child come alive?
Q20. What was the result of Andrew's feverish efforts after the child's chest gave a short convulsive heave?
Q21. What was the state of the room after the reaction of the mother and child?
Q22. Why did Andrew say "I'll fetch my bag later nurse"?
Q23. How did the doctor feel after his successful effort?
Q24. How important was this work in the career of Dr Andrew at Balaenelly?

CRITICAL THINKING QUESTIONS

1. When a medical student is awarded a degree after completing his studies, he has to take an oath. Unfortunately, in the present times, doctors seem to have forgotten their oath. Do you agree? Elaborate your point.
2. If you work to respect the feelings, yearnings and desires of others, success is always yours. Explain on the basis of the lesson 'Birth' by A. J. Cronin.

3. ' I had no premonition that this night would influence my future in Blaenelly'. Making this the opening sentence, write a paragraph for the diary page of the doctor.

4. Bookish knowledge is theoretical. It is practice and observation which makes a man with theoretical knowledge a man perfect in his field. Write a talk to be given in the morning assembly expressing your feeling of gratitude for doctors.

THE TALE OF MELON CITY

Q1. What sort of king ruled over the state?

Q2. What did the king proclaim?

Q3. Why did the king ride down the thorough fair and what was the result?

Q4. Who was held responsible for the disgrace? How did he/they react to it? What do you learn about the king?

Q5. What did the chief of builders say in his defence?

Q6. What did the workmen say to defend themselves?

Q7. What argument did the architect give in his self defence? How did the king take it?

Q8. Why did the king need some counsel and from whom? Do you think the man was not capable of giving advice? Give reason?

Q9. Comment on criteria of selection of the wisest man and the quality of counsel he offered?

Q10. Why did the king succumb (to surrender)to public demand?

Q11. What was custom of choosing a ruler of the state?

Q12. Why did the minister feel relieved? Do you think their election was right?

Q13 what was the selection process of the new state reveal about ministers and the people

Q14. How did the accused try to shift the blame on others? How did he/they succeed?

Q15. What impression do you gather about the king?

Q16.The poem makes the process of fair trail and proper judgment. How far do you agree with this statement?

Q17. Comment on the title. Find out the instances of irony?

Q18. How according to you can peace and liberty be maintained in a state?

CRITICLAL THINKING QUESTIONS

Q1.The Tale Of A Melon City is full of irony. Give any two examples from the poem.
Q2.What do you think makes The Tale Of A Melon City interesting and edifying?
Q3.How,according to you,can peace and liberty be maintained in a state? Express your views on the decision taken by the king in - The Tale Of A Melon City.
Q4.The king's sense of justice is absurd in the poem The Tale Of A Melon City by Vikram Seth. Substantiate your answer in the light of the poem.
Q5. The Tale Of A Melon City is a satire on people in power. Express your views in a paragraph analysing the poem critically.

COMPETENCY BASED QUESTIONS

CLASS- XI

(1) You have just read the poem Childhood by Markus Natten. You decide to write your views about the poem in your diary, emphasising the conflict in ideas, beliefs and emotions you have undergone while reading it. You may begin like this.....

Thursday, Jan 10, 2024

7.45 pm

After a long time, I read a poem today. I enjoyed.

(2) You are Mrs. Annie Pearson, a woman activist. You had been asked to preside over a meeting where the audience mostly comprised of housewives who were trying to prove themselves by dismantling their established social identity. With reference to Mother's Day, draft the speech within 120-150 words. You may begin like this.....

Greetings to the lovely audience! Today I am going to talk about

(3) Wrong is wrong even if everyone is doing it. Right is right even if no one is doing it. On the basis of your understanding of the story, 'The Summer of the Beautiful White Horse 'and the quote given above, analyse Mourad's character within 120-150 words.

(4) Life is a process of exchange and transformation. People are alive because they undergo exchange of energy. How have the poets Ted Hughes (The Laburnum Top) and Walt Whitman (The Voice of the Rain) used sound to express the liveliness and beauty of nature?

(5) The story is called 'The Adventure'. Compare it with the adventure described in 'We're Not Afraid to Die....'

(6) What does the child think about the adulst in poem 'Childhood'?Compare and contrast with poem 'Father to son ' 'I would have ..... Him prodigal', says the father.

(7) He's an adventurer, but at heart he was more a meticulous academic than a daredevil.

Explain the truth of the statement based on your reading of the chapter 'Silk Road'.

(8) Suppose you are Khushwant Singh. Your grandmother dies just after your returning from abroad. Write a letter to your friend describing him the end of the great lady. Don't forget to include the strange behaviour of the sparrows at her death.

(9) The poet Shirley Toulson has paid a tribute to her mother. Similar instances can be seen in "The Portrait of a Lady". This made you think that writing about a loved one is much better than building their statues or drawing their portraits. Comment.

(10) Do you know of any incident when someone has been brought back to life from the brink of death through medical help? Discuss medical procedures such as organ transplant and organ regeneration that are used to save human life.

READING SKILLS

1. Read the following passage carefully.

(1) Soil is your garden's natural growing medium, so it's vital for the health and successful growth of your plants and crops that you keep it well maintained. Soil is basically rock that's been ground down by the effects of the weather over a long period of time and made fertile by decayed organic matter (derived from dead insects and leaves). There are hundreds of different soil types, but they can broadly be classified as sandy, loamy or clay, referring to their basic texture. It is the texture that affects the drainage. aeration and nutrient content of the soil and you may have to take steps to improve this in certain types of soil.

(2) Take a handful of soil and run a small amount between your forefinger and thumb. Although all soils contain varying proportions of sand, silt and clay, you'll readily be able to tell the difference between the main types.

(3) Sandy soil feels gritty when dry and even it's wet particles will not stick together. Loamy soil, on the other hand, can be moulded by hand when moist, but aren't at all sticky and gritty and are fairly loose when dry. Clay soil is sticky and smooth when wet,but becomes polished when rubbed and baked hard when dry.

(4) A loamy soil is a well-balanced amalgamation of sand, silt and clay, which combines excellent drainage with sufficient moisture retention to assure good growing conditions for most plants. It's fairly easy to look after, although loamy soils do benefit from regular applications of well-rotted organic matter to prevent getting tightly packed.

(5) The particle consistency of sandy soil doesn't hold water well, with the result that plant foods are often taken away by rain before they can do any good. Again, well rotted organic matter can be added to bind the soil particles together.

(6) Clay soil is most difficult to work with, usually becoming waterlogged, so they are virtually impossible to dig. Artificial drainage will probably be the first step in improving the texture of the soil and various additives will break down the structure to make use of its excellent food stocks.

(7) There are various methods of improving your soil's texture. Essentially this require regular applications of a well-rotted organic substance called humus, which is obtained from decayed plant

and animal matter (manure, compost, and seaweed; each provide ample sources).

(8) The presence of chalk in soil can also affect the growth of plants: some prefer slightly acid (chalk-free) soils, while others grow more successfully in alkaline, chalky soils. Most fruits and vegetables, however, grow better in neutral soil.

(9) Although benefiting the soil in some ways, compost, manure and fertilizers can actually add to its acidity, as organisms break them down. Over-acid soils can be treated with applications of lime either hydrated (slaked) lime, or ground limestone (chalk). Of the two, ground limestone is your best choice

(10) To apply lime, sprinkle it on the broken top soil and mix it lightly but don't dig in;leave it to be washed down by rain. Apply lime every other year if need be. An alkaline soil can be treated with manure, garden compost or peat, well dug in.

Based on your understanding of the passage, answer the questions given below.

(a) Why should we keep soil well maintained?

(i) Because it absorbs and retains water

(ii) Because it responds to the effects of weather

(iii) Because it raises water table

(iv) Because it is the garden's natural growing medium

(b) Complete the given statement.

By taking a handful of soil and running it between our forefinger and thumb, we can tell _____.

(c) Complete the following.

Opinion: Clay soils are the most difficult to work with.

Reason: _____

(d) Soil is divided into various types on the basis of:

(i) colour (ii) texture (iii) drainage (iv) aeration

(e) Fill in the blank.

The particle consistency of sandy soil doesn't hold _____well.

(f) Complete the given analogy.

_____: combination:: moulded: shaped

(g) Loamy soil is the best for plant growth because:

(i) it is a well-balanced mixture of sand, silt and clay

(ii) it has weak drainage and retention

(iii) its texture responds slowly to decayed organic matter

(iv) it gets tightly packed unless looked after well

(h) Soils must be tested before growing fruits and vegetables because:

(i) they need alkaline soil (ii) they prefer slightly acidic soil

(iii) they grow better in neutral soil (iv) they flourish in over-acidic soil

(i) State whether the given statement is TRUE or FALSE.

The presence of chalk in soil affects the growth of plants.

(j) Pick a word from paragraph 5 which corresponds to the meaning of 'firmness" as in the passage.

(2) Read the text carefully:

(1) Today, when we pick up a daily newspaper, we invariably find an increasing incidence of vandalism, frauds rape, child abuse, battered spouses, murders, hate crimes, genocide (now termed as ethnic cleansing)along with a multitude of other senseless violent acts as that have become disturbingly common. These are not the actions of people like themselves.

(2) The solution to be a great many problems, whether personal, national or global, lies in improving our feelings about ourselves both as individuals and members of society. When the significance of good self-esteem is well understood and it achieves the prominence it deserves, a transformation will begin, for when the people will realise that they deserve self-respect, their respect for others will automatically increase.

(3) Most of our behaviour has been shaped by our parents, caregivers and authority figures who played an important part in our early upbringing and were responsible for crystallizing our ideas about ourselves and the world. While everyone has self- esteem, only a small percentage of us have high self-esteem. High self-esteem denotes that we accept ourselves unconditionally exactly as we are, and we appreciate our value as a human being. When, on the other hand, we have low self-esteem, we believe that we have little intrinsic worth.

(4) We believe our personal value is in direct proportion to the value of our accomplishments. If we cannot accomplish certain results, we tend to feel low about ourselves. Some of us try too hard and become workaholics and over-achievers. With few genuine feelings of self-worth, we try to create some and prove that we are somebody by our successes and achievements. Because our desire for perfection is so great, we tend to set unrealistic goals and place unreasonable demands on ourselves. Failing, rather than encouraging us to have more realistic aspirations, only leads to a mere punishing round of self-blame and a resolve to drive ourselves harder next time. If we do finally achieve our goals, we are disappointed; despite everything we have done, we still feel empty inside.

(5) Vulnerable to the opinions of others, we desperately try to gain their recognition and approval sometimes through risky and dangerous behaviour. Thus, we are at the mercy of our emotions,

instead of controlling them, we permit them to control us. Since we allow circumstances to influence our feelings, we are inclined to be moody. The insecurity we feel as a result of devaluing ourselves makes us react with jealousy,envy and possessiveness. Fear makes us greedy and acquisitive, and feelings of self- hate alternate with those of futility, unhappiness and depression.

(6) Sound self-esteem is the basis for all self improvement. As human beings, our potential is limitless, our abilities inexhaustible, and the possibilities for creative and constructive changes are endless. But, we won't experience satisfactory progress towards our goals or make any lasting improvements unless we believe we deserve the good we want. Conditions in our lives will improve permanently only when we believe we are entitled to something better. So improving our self-esteem inwardly is the vital ingredient for improving our lives.

Based on your understanding of the passage, answer the questions given below.

(a) These days the newspapers are full of:

(i) development news (ii) political news

(iii) acts of violence and crimes (iv) educational and employment news

(b) State whether the given statement is TRUE or FALSE.

Our personal value is in direct proportion to the value of our accomplishments.

(c) Why is good self-esteem stressed upon?

(i) Because it is essential for solving many problems (ii) Because is builds up self-confidence

(iii) Because it increases one's reputation (iv) Because it helps one to respect others

(d) Complete the following.

Vulnerable to the opinion of others, we desperately try to_____.

(e) Why is high self-esteem considered a remarkable asset?

(i) Because it makes us worthless in our own eyes (ii) Because it helps us to believe in our worth

(iii) Because it forces us to be achievers (iv) Because it brings depression and disappointment

(f) Fill in the blank.

We are inclined to be_____because we allow circumstances to influence our feelings.

(g) Sound self-esteem ensures success as:

(i) one reacts emotionally to problems (ii) one becomes moody and insecure

(iii) one taps one's latent talents and creative faculties

(iv) one makes instant improvements

(h) Complete the given analogy.

fear: __:: self-hate: futility

(i) Complete the given statement.

We tend to set unrealistic goals and demands on ourselves because_____.

(j) The word 'potential in paragraph 6 means:

(i) possible (ii) ability of a person

(iii) a liquid with magic powers (iv) hidden power

(3) Read the following passage carefully.

(1) Fear of failure is an attitude problem. All of us postpone things. We procrastinate. We rationalize.We make excuses. We foolishly believe that to be creative and to have a positive attitude and to simply do things, we have to have all kinds of preconditions,

(2) You can find several excuses for waiting to be more creative. But scratch the surface of these smooth and logical rationalization , and if you are honest, you'll see the face of a little demon, the fear of failure, hiding there.

(3) Zig Ziglar reminds us that this is nothing but an attitude problem: "The future can be depressing or magnificent- it is not correlated to the present or the past,past failures or successes. It is only our attitude towards these failures or successes which determines our future." You can change yourself by changing your attitude without fear of error.

(4) Problems cause stress and stress reduces our effectiveness. So it is very logical that once we solve our problems, we should be able to increase our efficiency and effectiveness .Incidentally, we can't eliminate problems unless we opt for the final exit-the very thought of this itself is stressful!

(5) What causes our problems? Well, roughly speaking one-third of our problems are there because we are alive and kicking, another one-third of our problems are created by ourselves; and the remaining one-third of our problems exist because of greed and ego.

(6) When too many problems are causing you enormous stress and strain, do the following

Think...there must be a better way to solve these problems. It helps to remember the crow and jug story! Recall similar stories and incidents.

Ask, ask, ask...from yourself and from others, how to do things in better ways. May be certain things should not be done at all or should be clubbed with other activities! Don't forget that even stupid questions will get your intelligent and common sense answers.

Do it now! Start doing it. Don't forget that the first step towards solving a problem is to begin. The first step is the most difficult one, but taking it will kill procrastination- a disease or a problem in itself. Do not forget to prioritise your problems first. Those which are "C" category jobs should be delegated to others, but do not forget to check and recheck till these get done.

(7) There is always a silver lining in any gloomy situation, provided you starve the problem and feed the opportunities. For every problem, there could be several solutions and solutions point towards opportunities.

(8) Apply the MISER concept to solve problems. MISER... where M stands for Merge for Improve, S for Simplify, E for Eliminate and R for Reduce. MISER is an excel conceptual sieve that helps in reducing many problems to a very few ones.

Based on your understanding of the passage, answer the questions given below.

(a) Why do most people procrastinate?

(i) Because they are not creative

(ii) Because they adopt a wrong attitude

(iii) Because they are too lazy to do anything

(iv) Because they wait for better opportunity

(b) State whether the given statement is TRUE or FALSE.

One-third of our problems are created by ourselves.

(c) Why can't we eliminate problems from our life?

(i) Because we are alive and kicking

(ii) Because we are inactive

(iii) Because we are afraid of final exit

(iv) Because we tend to postpone actions

(d) Complete the given statement.

Our future can be determined by_____.

(e) According to the passage, in which of the following circumstances does our effectiveness get reduced?

(i) When our problems multiply

(ii) When the depressing time is painful

(iii) When there is stress due to some problems

(iv) When problems dishearten us

(f) Complete the given statement.

We can change ourselves by_____.

(g) Complete the given analogy.

starve: problems:: feed:___

(h) What is the best way to tackle a problem?

(i) To defer it for sometime

(ii) To seek help from a friend

(iii) To think of an easy solution

(iv) To begin at once

(i) Fill in the blank.

There is always a silver lining in any_____situation.

(j) The word 'procrastinate' in paragraph 1 means:

(i) obtain with difficulty

(ii) natural tendency to do something bad

(iii) delay or postpone an action

(iv) doing with ease

4. Read the passage given below:

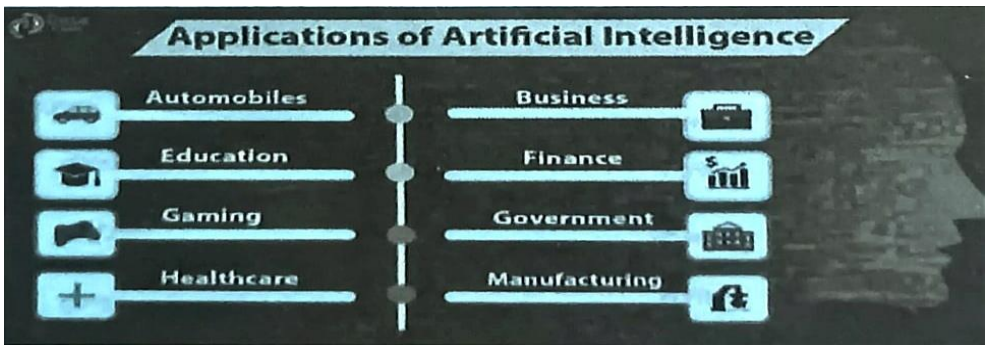
1. Artificial intelligence (AI) is the simulation of human intelligence processes by machines, especially computer systems. Al programming focuses on three cognitive skills: learning, reasoning and self-correction.

2. Learning processes focuses on acquiring data and creating rules for how to turn the data into actionable information; Reasoning processes focuses on choosing the right algorithm to reach a desired outcome; Self-correction processes refer to continually fine-tune algorithms and ensure they provide the most accurate results possible

3. Al processes large amounts of data much faster and makes predictions more accurately than humanly possible. The primary disadvantage of using Al is that it is expensive to process the large amounts of data that Al programming requires.

4. Al can be categorised as either weak or strong. Weak AI, also known as narrow Al, is an Al system that is designed and trained to complete a specific task. It only responds to its programming. Strong Al, also known as artificial general intelligence (AGI), is more like the human brain. It has cognitive abilities that help to perform unfamiliar tasks and commands. It can find the solution to a problem and works beyond a preprogramed algorithm. While narrow Al may outperform humans at whatever its specific task is like playing chess or solving equations, AGI would outperform humans at nearly every cognitive task.

5. Al is revolutionising the way we live and get things done and is advancing dramatically. It is already transforming our world socially, economically and politically. In most of the fields, it provides human beings a great helping hand to get tasks done quickly and perfectly. The following image gives us a brief about the vast expansion of artificial intelligence.



There's no doubt in the fact that technology has made our lives comfortable. From music recommendations, map directions, internet banking, Al and other technologies have taken over. Al truly has the potential to transform many industries, with a wide range of possibilities. These industries are all data driven. Since Artificial Intelligence is an efficient data processing system at its core, there's a lot of potential for optimisation everywhere. Let's hope that the concept of Al will help the human race in the long run.

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

Al refers to

(a) human intelligence (b) temporary intelligence

(c) mechanical intelligence (d) chemical intelligence

(ii) How does Al provide the best experience to us?

(a) By revolutionising our lives.

(b) By focusing on learning, reasoning and self-correction processes.

(c) By using weak and strong intelligence.

(d) By collecting and processing large amount of data.

(iii) How is Al applied to healthcare services ?

(a) Assist doctors. (b) Help the diagnosis to be more accurate.

(c) Perform robotic surgeries. (d) All of the above.

(iv) Which of the following is a feature related to AI?

(a) Find the quickest routes for a destination. (b) Manual gear stick.

(c) Using seat belts. (d) Power steering.

(v) In the field of education,_____is an example of using artificial intelligence.

(a) automated grading systems (b) interaction between parents and teacher

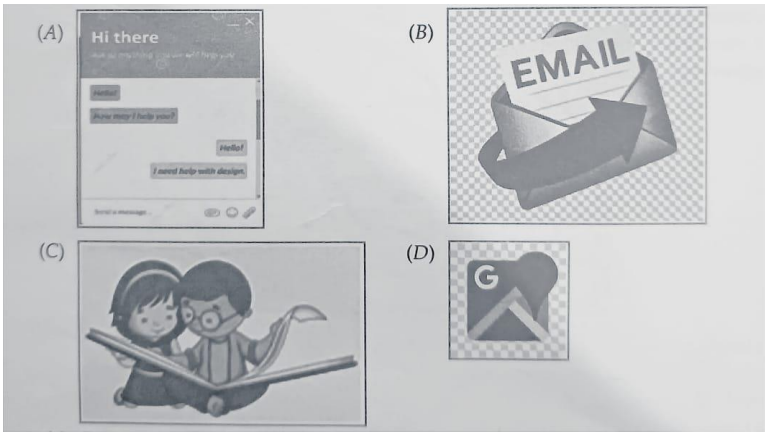
(c) excursions (d) classroom interactions

(vi) How does Al promote business growth?

(a) By processing large amount of quantitative data. (b) By creating promotional advertisements.

(c) By providing financial scheme to customers. (d) None of the above.

(vii) Which of the following illustrates/illustrate an example/examples of using Artificial intelligence?



(a) Options (A) and (B) (b) Option (A) and (D)

(c) Option (B) and (D) (d) None of the above

(viii) Siri and Alexa are the examples of _____.

(a) default software (b) artificial intelligence

(c) strong artificial intelligence (d) weak artificial intelligence

(ix) Choose the correct statement.

(a) AGI relies on human intervention. (b) AGI can perform variety of tasks.

(c) Weak Al doesn't need human interference. (d) Strong AI functions as per the inbuilt program.

(x) The word 'Revolutionising' (para 5) means the same as _____.

(a) revolting (b) preventing (c) transforming (d) exchanging

(xi) The synonym of the word 'simulation'(para 1) is _____.

(a) production (b) replication

(c) examination (d) function

(xii) Which of the following products are available with AI technology?

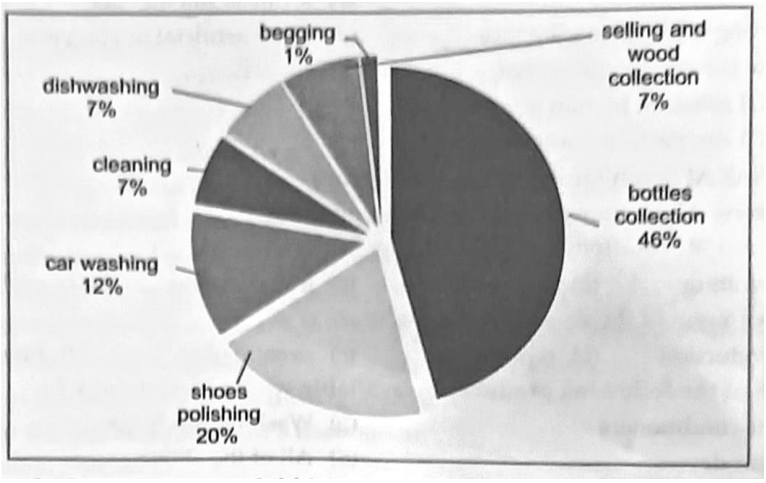
(a) Air-conditioners (b) Washing machines

(c) Hair dryers (d) All of the above

5. Read the passage given below:

1. When one comes across such slogans, the heart howls with anguish for children who are forced to forget their childhood and slog to earn their livelihood.

The child has been the subject of special laws and legal provisions because of its tender age, inadequately developed mind and fragile body. They need a shield against the moral and physical abuse by others. There are about 300 Central and State Statutes concerning children but still, we are unsuccessful in eradicating and protecting children of our country from such abuse.



2. In India, the law addressing child labour regulates the employment of children and does not allow children below the age of 14 to work except as a child artist and in a family business. Basic rights of many children are seen being snatched away commonly on streets, at restaurants, agricultural fields, construction sites or anywhere where labour is required. The wages paid to the child labourers are usually lower than those paid to adult workers. Children are thus not only exploited but are sometimes engaged in hazardous work also.

3. The Constitution of India, 1950 under Article 21(A) mandates free and compulsory education for all children in the age group of 6-14 yrs. Article 24 also specifically prohibits the employment of children below the age of fourteen years in dangerous factories which may cause them physical as well as long-term mental harm.

4. Every person, including the parent or guardian of children, has the fundamental duty under Article 51 of the Constitution - a part of the Directive Principles of State Policy - to provide opportunities for education to his or her child between the age of 6-14 yrs.

The State, under Article 45 of the Constitution, also must provide free and compulsory education for

all children until they complete the age of fourteen years.

5. Under child labour law in India, adolescents between the age of 14 and 18 are prohibited from working in any hazardous or dangerous occupations and processes. They can only work in certain government declared non-hazardous occupations or in a family business or as an artist. The employer also has a wide range of duties and measures which they need to keep in mind, like health, safety and well-being while employing children

6. Despite several legislative measures by the enactment of statutory provisions to diminish the employment of kids in hazardous employment, we have not been that successful in prohibiting child labour.

7. If awareness about the cons of child labour is spread across the nation and strict implementation of existing laws is done India can combat the issue of Child Labour. Every individual must understand how important it is for the children to grow and study, as they are the future of our developing nation.

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

(i) Choose the most appropriate slogan against child labour:

(a) Don't kill their innocence, kill their hunger. (b) Education is each child's right.

(c) Help a child learn not earn. (d) Do not let your greed haunt the mindset of children.

(ii) Which occupation has the maximum number of children involved ?

(a) Glass bangle industry (b) Mining (c) Garbage scrounging (d) All of the above

(iii) Children getting indulged in work at such young stage, how does it affect their growth?

(a) Their growth stops as they are overburdened with work.

(b) They don't get the exposure and opportunities they should get at this stage.

(c) They themselves are not keen to bring a positive change in their situation, so the growth gets affected.

(d) All of the above.

(iv) Why do people prefer to hire children as labour ?

(a) Children are docile. (b) Child labour is easily available.

(c) It is hassle-free. (d) Child-labour is cheaper as compared to adult-labour.

(v) "Centre and State Statues' refers to ___.

(a) the conditions applied by the centre and the state in case child labour is required

(b) the laws made by the centre and state governments separately to control this abuse

(c) the decisions taken by the judiciary against child abuse

(d) the laws made by NGOs at state and central level to eradicate this evil practice

(vi) Why has our country failed to curb child labour completely?

(a) The laws framed are not sufficient.

(b) The implementation of the laws is questionable and ineffective.

(c) The laws are not clear, hence don't convey real meaning.

(d) The laws don't apply to 6-14 years of children.

(vii) Why are children allowed to work as a child artist or be a part of the family business?

(a) Both the jobs are age-appropriate and there's no room for exploitation.

(b) Children should get some work experience.

(c) To make them respect hard work, this is for their brighter future.

(d) None of the above.

(viii) Which of the following is the right expression for 'adolescence'?

(a) Attaining adulthood. (b) Attaining childhood.

(c) Attaining puberty. (d) The last leg of being a minor.

(ix) The synonym for the word 'inadequately_____.

(a) inappropriately (b) insufficiently (c) illegally (d) vaguely

(x) The employers are legally bound to _____ while hiring children in the age bracket 14-18.

(a) legal implications (b) providing food and shelter

(c) ensuring safety measures (d) offering standardised wages

(xi) The word that has the same meaning as harmful is ____. (para 6)

(a) statutory (b) prohibiting (c) hazardous (d) diminish

(xii) India as a developing country boasts of _____.

(a) prevailing child-labour (b) NGOs fighting against the injustice called child-labour

(c) ineffective laws against child-labour (d) more than 50% of its population below the age of 25

PHYSICS
CLASS XI
UNIT 1-UNIT AND DIMENSIONS

MULTIPLE CHOICE BASED QUESTIONS

Q1. The dimensions of impulse is equal to
(a) Pressure
(b) linear momentum
(c) Force
(d) Angular momentum

Q2. The area of a square is 5.29cm^2. The area of 7 such squares taking into account the significant figures is?
(a) 37cm^2 (b) 37.0 cm^2 (c) 37.03 cm^2 (d) 37.030 cm^2

Q3. The dimensions of torque is
(a) [MLT^{-2}] (b) [ML^{2}T^{-2}] (c) [ML^{-1}T^{-2}] (d) [ML^{3}T^{-3}]

Q4. Which of the following pairs does not have same dimensions
(b) Impulse and Momentum
(c) Moment of inertia and moment of force
(d) Angular momentum and Planck's Constant
(e) Work & torque

Q5. The dimension of universal gravitational constant is
(a) [M^{-1}L^{3}T^{-2}] (b) [ML^{2}T^{-1}] (c) [M^{-2} L^3 T^{-2}] (d) [M^{-2} L^{2}T^{-1}]

Q6. The number of significant figures in 0.06900 is the
(a) 5 (b) 4 (c) 2 (d) 3

Q7. A body is dropped from the top of a tower falls 40m during the last 2 second of its fall. The height of tower (in metres) is (take g=10m/s^2)
(a) 60 (b) 45 (c) 80 (d) 50

Q8. A cube has a side of length 1.2×$^{10-2}$ m. Calculate its volume
(a) 1.7 x 10^{-6} m^3 (b)1.73 x 10^{-6} m^3 (c) 1.70 x 10^{-6} m^3 (d) 1.732 x 10^{-6} m^3

Q9. A body of mass m=3.513 kg is moving along the x-axis with a speed of 5.00ms−1. The magnitude of its momentum is

(a) 17.56 kg m/s (b) 17.6 kg m/s (c) 17.57 kg m/s (d) 17.565 kg m/s

Q10. Light year is the unit of

(a) time (b) distance (c) velocity (d) intensity of light

Q11. Parsec is the unit of

(a) Time (b) distance (c) frequency (d) angular momentum

ASSERTION AND REASON TYPE QUESTIONS:

Each of these questions contain two statements, Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes (a), (b), (c) and (d) given below.

(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.

(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion.

(c) Assertion is correct, reason is incorrect.

(d) Assertion is incorrect, reason is correct.

Q12**. Assertion: T**he number of significant figures depends on the least count of measuring instrument.

Reason: Significant figures define the accuracy of measuring instrument.

Q13. **Assertion:** If power of an engine depends on mass, angular speed, torque, and angular momentum, then the formula of power is not derived with the help of dimensional method.

Reason: In mechanics, if a particular quantity depends on more than three quantities, then we cannot derive the formula of the quantity by the dimensional method.

Q14**. Assertion:** When we change the unit of measurement of a quantity, its numerical value changes.

Reason: Smaller the unit of measurement smaller is its numerical value.

Q15. **Assertion**: The dimensional formula for product of bulk modulus and compressibility is same as strain.

Reason: Both have dimensions of modulus.

Q16. **Assertion**: A.U. is much bigger than Å.

Reason: A.U. stands for astronomical unit and A stands for Angstrom.

SHORT ANSWERS, LONG ANSWERS AND NUMERICALS

Q17. The Van der Walls equation for gas is (p+ a/ v^2) (v-b) =RT. Determine the dimensions of a and b. Hence, write the SI unit of a and b. Here P in pressure V is volume, T is temperature and R is gas constant.

Q18. A new system of unit is proposed, in which unit of mass is α kg, unit of length β m and unit of time ϒ s. How much will 5J measure in this new system?

Q19. Find the dimensions of a and b in the relation $p= b-x^2/at$, where P is Power, x is the distance and t is time.

Q20. Find the value of 60 J per min on a system that has 100g, 100cm and 1 min as the base units.

Q21. If the unit of force in 100N, unit of length in 10m and unit of time in 100s. What in the unit of mass in this system of units?

Q22. Write the limitations of dimensional analysis.

Q23. If unit of force, velocity and energy are 100 dyne, 10cm/s and 400 ergs, respectively. What will be the unit of mass, length and time.

Q24. It is assumed that the mass of largest stone (M) that can be moved by a flowing river depends upon the velocity 'v', density ‘p’ and the acceleration due to gravity ‘g’. Prove that $M \alpha v^6$.

Q25. If velocity of light c, Planck’s constant h and gravitational constant G taken as fundamental quantities, then express mass, length and time in terms of dimensions of these quantities.

Q26. Check the correctness of following

(i) $F= mv^2/r$ here m is mass , v is velocity, r is radius.
(ii) P = hdg here h is height, d is density, g is acc. Due to gravity.

Q27. CASE STUDY BASED QUESTION

A physical equation will be dimensionally correct if the dimensions of all the terms occurring on both sides of the equation are same the underline opposite proposition of this concept is that the physical quantities of same kinds can be added separated or compared to check correctness of a given equation we must find out dimensions of the quantities on both sides. After doing all calculations if the dimensions on both sides are same then the equation is dimensionally correct.

(i) Check the dimensional accuracy of the equation $s= ut + 1/2 at^2$.
(ii) Check whether the following equation is dimensionally correct $1/2mv^2 = mgh$.
(iii) Check by the method of dimensions whether the following equations are correct: $E= mc^2$ and $v= \sqrt{P/\rho}$ where E is energy, m is mass, c is speed of light, v is velocity, P is the pressure, and ρ is density.

Q28.CASE STUDY BASED QUESTIONS:-

The system of units which is at present internationally accepted for measurement is the *Systeme Internationale* d' Unites' which is French equivalent for international system of units. It's the modernised and extended form of the metric systems like cgs and mks systems. The eleventh general conference of Weights and Measures adopted in 1960 six base units – metre, kilogram, second, ampere, kelvin, and candela. In 1971, a seventh unit for the amount of substance, the mole was added. This system provides a logical and interconnected framework for all measurements in scientific, technical and commercial work.

(i) The correct value of $0^{o}C$ on the kelvin scale is
(a) 273.15K (b) 272.85K (c) 273K (d) 273.2K

(ii) Which of the following is true for the solid angle?
(a) Derived quantity (b) fundamental quantity (c) not a physical quantity (d) none of them.

(iii) The SI unit of Planck's constant is
(a) Js (b) Ns (c) m/s (d) N.

(iv) The SI unit of luminous intensity is.
(a) Joule (b) Newton (c) Candela (d) Kelvin.

Q29. If the units of force and length each are doubled, then how many times would the unit of energy be affected?

Q30. If 'slap' times speed equals power. What will be the dimensional equation for 'slap'?

Q31. If speed (V),acceleration (A) and force (F) are considered as fundamental units, then find the dimension of Young modulus.

UNIT 2: KINEMATICS

MULTIPLE CHOICE BASED QUESTIONS

Q1. When a ball is thrown obliquely from the ground level, then the x-component of the velocity
(a) decreases with time
(b) increases with time
(c) remains constant
(d) zero

Q2. At the top of the trajectory of a projectile, the directions of its velocity and acceleration are
(a) parallel to each other
(b) antiparallel to each other
(c) inclined to each other at an angle of 45°
(d) perpendicular to each other

Q3. If the velocity-time graph of an object is a straight line sloping downwards, the body has
(a) zero acceleration
(b) positive acceleration
(c) constant acceleration
(d) negative acceleration

Q4. When a body is dropped from a tower, then there is an increase in its
(a) mass
(b) velocity
(c) acceleration
(d) potential energy

Q5. If the displacement-time graph of an object is parallel to the time-axis, then it represents that the object is
(a) at rest
(b) in uniform motion
(c) in acceleration motion
(d) none of the above

Q6. If a car is executing a uniform circular motion, then its centripetal acceleration represents

(a) a scalar quantity (b) constant vector (c) not a constant vector (d) None of these

Q7. The distance travelled by an object is directly proportional to the time taken. Its acceleration
(a) increases
(b) decreases
(c) becomes zero
(d) remains constant

Q8. A man can throw a stone to a maximum distance of 80 m. The maximum height to which it will rise, is

(a) 30 m (b) 20m (c) 10m (d) 40m

Q9. A particle is moving with a constant speed along straight line path. A force is not required to
(a) change its direction
(b) increase its speed
(c) decrease its momentum
(d) keep it moving with uniform velocity

Q10. Two equal vectors have a resultant equal to either of the two. The angle between them is

a. 60°
b. 0°
c. 90°
d. 120°

ASSERTION AND REASON TYPE QUESTIONS:-

(a) If both assertion and reason are true and reason explains the assertion.
(b) If both the assertion and reason are true but reason does not explain the assertion.
(c) If assertion is true but reason is false.
(d) If assertion is false but reason is true.

11. **Assertion**. Two balls of different masses are thrown vertically upward with same speed. They will pass through their point of projection in the downward direction with the same speed. Reason. The maximum height and downward velocity attained at the point of projection are independent of the mass of the ball.

12. **Assertion** Vector addition of two vectors is always greater than their vector subtraction.
Reason At $\Theta = 90°$, addition and subtraction of vectors are unequal.

13. **Assertion**. In javelin throw, the athlete throws the projectile at an angle slightly more than 45°.
Reason. The maximum range does not depend upon angle of projection.

14. **Assertion**. The projectile has only vertical component of velocity at the highest point of its trajectory.
Reason. At the highest point only one component of velocity is present.

15. **Assertion** Sum of maximum height for angles a and 90°- a is independent of the angle of projection.
Reason For angles a and (90°-a), the horizontal range R is different.

16. **Assertion** An object can have constant speed but variable velocity.
Reason SI unit of speed is m/s.

17. **Assertion** An object may have varying speed without having varying velocity.
Reason If the velocity is zero at an instant, the acceleration is zero at that instant.

18. **Assertion** A body cannot be accelerated, when it is moving uniformly.
Reason When direction of motion of the body changes, then body does not have acceleration.

19. **Assertion** A body is momentarily at rest at the instant it reverses the direction.
Reason A body cannot have acceleration, if its velocity is zero at a given instant of time.

20. **Assertion** The range of a projectile is maximum at 45^0.
Reason At $\Theta = 45°$, the value of the value of sin Θ is maximum.

SHORT ANSWERS, LONG ANSWERS AND NUMERICALS

Q21. A person can throw a ball to a maximum range of hundred metre. How high above the ground he can throw the same ball?

Q22. Draw the following graphs (expected nature only) between distance and time of an object in case of
(i) For a body at rest
(ii) For a body moving with uniform velocity.
(iii) For a body moving with constant acceleration.

Q23.Two bodies, A (mass 1kg) and B (mass 3kg) ,are dropped from heights of 16 m and 25 m respectively. Find the ratio of the time taken by them to reach the ground.

Q24.A ball is thrown vertically upward. It has speed of 10m/s when it is reached one half of its maximum height. How high does the ball rise? (Taking g=10m/s 2)

Q25.A body is dropped form the top of a tower. It falls through 40 m during the last two seconds of its fall. The height of tower (g=10ms-2)

Q26The motion of a particle along a straight line is described by equation x=8+12t- t^ 3, where x is in metre and t in second. What is the retardation of the particle when its velocity becomes zero

Q27.A car moving along a straight highway with speed of 126kmh^−1 is brought to a stop within a distance of 200 m. What is the retardation of the car (assumed uniform), and how long does it take for the car to stop?

Q28.If two ball are projected at angle of 45 degree and 60 degree and the total heights reached are same, then find the ratio of their initial velocities.
Q29.What is the ratio of the distance travelled by a body falling freely from rest in first second and third second.

Q30.A stone is thrown vertically upwards and then it returns to the thrower. Is it a projectile ?

Q31.A body is projected horizontally from the top of a cliff with a velocity of 9.8 m/s. How much time elapses before horizontal and vertical velocity becomes equal in magnitude? (Take g=9.8 m/s2)

Q32A bullet is dropped from a certain height and at the same time, another bullet is fired horizontally from the same height. Which one will hit the ground earlier and why?

Q33.At what point in its path does a projectile thrown from the ground has its minimum and maximum speed?

Q34.A person sitting in a moving train throws a ball vertically upwards. How will the ball appear to move to an observer (i) sitting inside the train, (ii) standing outside the train? Give reason.

Q35.A force is inclined at 30 degrees to the horizontal. If its rectangular component in the horizontal direction be 50N, find the magnitude of the force and its vertical component.

Q36.Find the angle of projection at which horizontal range and maximum height are equal.

Q37.Show that there are two values of time for which a projectile is at the same height. Also show mathematically that the sum of these two times is equal to the time of flight.

Q38. Derive the three kinematic equations for uniformly accelerated motion graphically.

CASE STUDY BASED QUESTIONS:-

Q39. The motion in which the acceleration remain constant is known as to be uniformly accelerated motion. There are certain equations which are used to relate the displacement (x), time taken (t), initial velocity kinematics (w), final velocity (2) and acceleration (a) for such a motion and are known as equations for uniformly accelerated motion.

i) The displacement of a body in 8 s starting from rest with an acceleration of 20 cm s^{-2} is
(a) 64 m (b) 64 cm (c) 640 m (d) 0.064 m

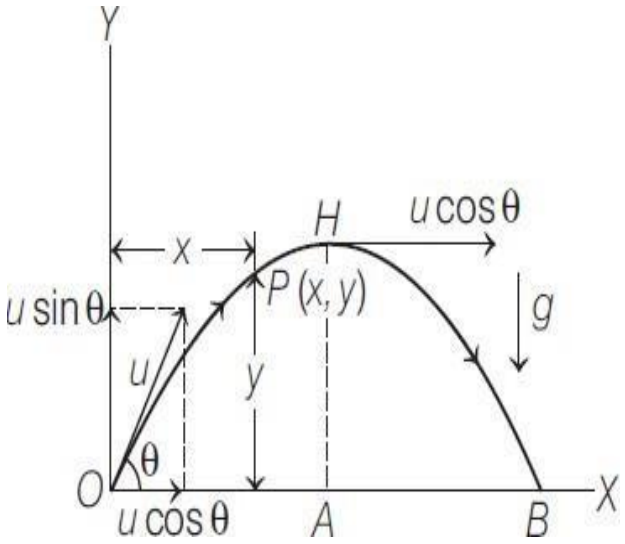
ii) A particle starts with a velocity of 2 m/s and moves in a straight line with a retardation of 0.1 ms^{-2}. The first time at which the particle is 15 m from the starting point is
(a) 10s (b) 30s (c) 20s (d) 40s

iii) If a body starts from rest and travels 120 cm in 6th second, then what is its acceleration?
(a) 0.20m/ s2 (b) 0.218m/ s2 (c) 0.027 m/ s2 (d) 0.03 m/ s2

iv) An object starts from rest and moves with uniform acceleration a. The final velocity of the particle in terms of the distance x covered by it is given as
(a) $(2ax)^{1/2}$ (b) 2ax (c) $(ax/2)^{1/2}$ (d) $(ax)^{1/2}$

v) A body travelling with uniform acceleration crosses two points A and B with velocities 20 m/s and 30 m/s respectively. The speed of the body at mid-point of A and B is
(a) 25 m/s (b) 24 m/s (c) 255 m/s (d) $10\sqrt{6}$ m/s

Q40. Projectile motion is a form of motion in which an object or particle is thrown with some initial velocity near the earth's surface and it moves along a curved path under the action of gravity alone. The path followed by a projectile is called its trajectory, which is shown below. When a projectile is projected obliquely, then its trajectory is as shown in the figure below.



Here velocity u is resolved into two components, we get (a) u cos Ɵ along OX and (b) u sin Ɵ
along OY.

The example of such type of motion is
(a) motion of car on a banked road (b) motion of boat in sea
(c) a javelin thrown by an athlete (d) motion of ball thrown vertically upward

The acceleration of the object in horizontal direction is
(a) constant (b) decreasing (c) increasing (d) zero

The vertical component of velocity at point H is
(a) maximum(b)zero (c) double to that at 0 (d) equal to horizontal component A cricket ball is thrown at a speed of 28 m/s in a direction 30° with the horizontal.

The time taken by the ball to return to the same level will be
(a) 2.0 s (b) 3.0 s (c) 4.0 s (d) 2.9 s

In above case, the distance from the thrower to the point where the ball returns to the same level will be
(a) 39 m (b) 69 m (c) 68 m (d) 72 m

UNIT-3 LAWS OF MOTION

MULTIPLE CHOICE BASED QUESTIONS

1. If maximum and minimum value of the resultant of two forces acting at a point are 7 N and 3 N respectively, the smaller force is equal to
   a) 4N (b) 5N (c)3N (d) 2N
2. No force is required for
   (a) an object moving in a straight line with constant velocity
   (b) an object move with constant acceleration
   (c) an object moving in circular motion
   (d) an object moving in elliptical path
3. Dimensions of impulse are same as that of
   (a) force (b) momentum (c) energy (d)acceleration

4. Momentum is closely related to
   (a) force (b)impulse (c)velocity (d)kinetic energy

5. A ball strikes .a bat with velocity v. The ball has mass m and after striking it retraces its path. What is the impulse imparted by the bat?
   a) 3mv b) mv c) zero d) 2mv

ASSERTION AND REASON TYPE QUESTIONS:-

Directions:

In the following question a statement of assertion A is followed by a statement of reason R. Mark the correct choice as:

a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false.
d) It both assertion and reason are false.

6. **Assertion:** Frictional forces are conservative forces
Reason: Potential energy can be associated with frictional forces

7. **Assertion:** It is difficult to move a cycle along the road with its break on
Reason: Sliding friction is greater than rolling friction

8. **Assertion:** Use of ball bearings between two moving parts of a machine is a common practice
Reason: Ball bearings reduce vibration and provide good stability.

9. **Assertion:** Impulsive force is large and acts for a short time
Reason: Finite change in momentum should be produced by force

10. **Assertion:** A body can be at rest even when it is under the action of any number of external forces.
Reason: Vector sum of all the External forces is zero.

SHORT ANSWERS, LONG ANSWERS AND NUMERICALS

11. A machine gun of mass 10 kg fires 20g bullets at the rate of 10 bullets per second with a speed of 500 meter per second. What force is required to hold the gun in position?

12. A cricket player lowers his hands while catching a ball. Explain with reason.

13. Show that Newton's second law of motion is the real law of motion.

14. Derive a relation between linear velocity and angular velocity.
Show that Newton's second law of motion is the real law of motion.

15. A 30 kg shell is flying at 48m/s when it explodes its one part of 18 kg stops, while the remaining part flies on. Find the velocity of the later.
16. When a moving bus suddenly stops, a person sitting in it falls forward. Explain.

17. What should be the coefficient of friction between the tyres and the road when a car travelling at 60 km per hour makes a level turn off radius 40 m?

18. Why do we slip on a rainy day?

19. What do you mean by banking of a curved road? Determine the angle of Banking so as to minimise the wear and tear of the tyres of a car negotiating a banked curve.

CASE STUDY BASED QUESTIONS:-

20. Conservation of Linear Momentum

Consider an isolated system of n interacting particles. The mutual forces between pairs of particles in the system cause changes in momenta of the individual particles. The mutual forces between any pair of particle are equal and opposite. By second law the Change in momentum for any pair of particles are equal and opposite. The momentum changes cancel in pairs and total momentum of the system remains constant. This leads to a fundamental principle of conservation of linear momentum. This law states that the total linear momentum of an isolated system of interacting particles is conserved. The recoil of a gun on firing, explosion of a bomb into different fragment due to internal forces, the working of rocket and jet planes can be explained on basis of momentum conservation

1) A gun fires a bullet of mass 50 gram with a velocity of 30 m/s. Because of this, the gun is pushed back with a velocity of 1 m/s. The mass of the gun is
a) 5.5 kg b)3.5 kg c)1.5 kg d)0.5 kg

2) A body of mass Of M moving with velocity V explodes into two equal parts. If one comes to rest and the other part moves with velocity v, what would be the value of v?
a) V b) $V/\sqrt{2}$ c) 4V d)2V

3) A bullet is fired from a rifle. If the rifle recoils freely , the kinetic energy of the rifle is
a) less than that of the bullet b) more than that of the bullet
c) same as that of the bullet d)equal to or less than that of the bullet

Q21. A particle is moving along a circular path with a constant speed of 10 m/s. What is the magnitude of the change in velocity of the particle when it moves through an angle of 60° around the centre of the circle?

Q22. A mass of 10 kg is suspended vertically by a rope from the roof. When a horizontal force is applied on the rope at some point, the rope deviated at an angle of 45^0 at the roof point. If the suspended mass is at equilibrium, what will be the magnitude of the force applied?

UNIT 4 WORK ENERGY AND POWER MULTIPLE CHOICE BASED QUESTIONS

Q1 A ball moves on a frictionless inclined table without slipping. The work done by the table surface on the ball is

(a) Positive (b) negative (c) zero (d) none of these.

Q2. The work done by an applied variable force $F= x + x^3$ from x=0 to x = 2m where x is displacement, is

(a) 6J (b) 8J (c) 10J (d) 12J

Q3. A body moves a distance of 10m under the action of force F= 10N. If the work done is 25J, the angle which the force makes with the direction of motion is

(a) 0^o (b) 30^o (c) 60^o (d) none of these.

Q4. The kinetic energy of body of mass 2 Kg and momentum of 2Ns is.

(a) 1J (b) 3J (c) 2J (d) 4J

Q5. If momentum is increased by 20%, then kinetic energy increases by

(a) 48% (b) 40% (c) 44% (d) 35%

Q6. An electric motor exerts a force of 40N on a cable and pulls it by a distance of 30m in one minute. The power supplied by the motor (in watt) is

(a) 10 (b) 2 (c) 200 (d) 20

Q7. A car of mass m is driven with an acceleration a along a straight level road against a constant external resistive force R. When the velocity of the car is v, the rate at which engine of the car is doing work, will be

(a) R, v (b) ma, v (c) (R+ ma) , v (d) (ma – r) , v

Q8. The coefficient of restitute, e, for a perfectly elastic collision is

(a) 0 (b) -1 (c) 1 (d) ∞

Q9. If a neutron collides with a stationary α particle with velocity v, what is the resultant velocity Of neutron.

(a) v/5 (b) 2v/5 (c) 3v/5 (d) 4v/5

Q10. A ball falls from rest from a height h on to a floor and rebounds to a height h/4. The coefficient of restitution between the ball and the floor

(a) 1/2 (b) 1/4 (c) $1/\sqrt{2}$ (d) 3/4.

ASSERTION AND REASON TYPE QUESTIONS

(a) If both assertion and reason are true and reason explains the assertion
(b) If both the assertion and reason are true but reason does not explain the assertion.
(c) If assertion is true but reason is false.
(d) If both assertion and reason is false.

Q11. **Assertion** When a body moves along a circular path, no work is done by the centripetal force.
Reason: The centripetal force is used in moving the body along the circular path and hence no work is done.

Q12. **Assertion**. Mass and energy are not conserved separately, but are conserved as a single entity called mass energy.
Reason: Mass and energy are interconvertible in accordance with Einstein's relation $E= mc^2$

Q13. **Assertion**. In an elastic collision of two billiard balls, the total kinetic energy is conserved during the short time of collision of the balls.
Reason: Energy spent against friction does not follow the law of conservation of energy.

Q14. **Assertion**. The momentum of a body increases by 50%, its kinetic energy will increase by 125%.
Reason: Kinetic energy is proportional to square of velocity.

Q15. **Assertion**. When a ball collides elastically with a floor, it rebounds with the same velocity as with it strikes.
Reason: Momentum of (earth+ ball) system remains constant.

Q16. **Assertion**. In an elastic collision between two bodies, the energy of each body is conserved.
Reason: The total energy of an isolated system is conserved.

Q17. **Assertion**. Work done in moving a body over a closed loop is zero for every force in nature.
Reason: Work done does not depend on nature of force.

Q18. **Assertion**. KE is conserved at every instant of elastic collision.
Reason: No deformation of matter occurs in elastic collision.

Q19. **Assertion**. A quick collision between two bodies is more violent than a slow collision, even when the initial and the final velocities are identical.
Reason: The rate of change of momentum is greater in the first case.

Q20. **Assertion**. In an elastic collision between two bodies, the relative speed of the bodies after collision is equal to the relative speed before the collision.
Reason: In an elastic collision, the linear momentum of the system is conserved.

SHORT ANSWERS, LONG ANSWERS AND NUMERICALS

Q21. A pendulum bob of mass 10^{-2} kg is raised to a height .05m. At the bottom of its swing, it picks up a mass of .003 kg. To what height will the combined mass rise? G = 10 $m/s^{2.}$

Q22. What is an elastic collision? Name the physical quantity which remains conserved in elastic and inelastic collision.

Q23. State and prove the principle of conservation of mechanical energy.

Q24. Define the absolute and gravitational unit of work in SI and CGS systems.

Q25. What are conservative and non-conservative forces? Give one example of each.

Q26. Define kinetic energy. Derive an expression for the kinetic energy of a body moving with a uniform velocity.

Q27. Define the term potential energy. Write an expression for gravitational potential energy.

Q28. State and prove work energy theorem for a variable force.

Q29. A locomotive of mass m starts moving so that its velocity varies according to the law $v = \alpha\sqrt{s}$ where α is a constant and s is the distance covered. Find the total work done by all the forces acting on the locomotive during the first t seconds after the beginning of motion.

Q30. A chain is held on a friction less table with 1/nth of its length hanging over the edge. If the chain has the length l and mass m, how much work is required to pull the hanging part back on the table?

Q31. Can K.E. of a body be negative? Explain with example?

Q32. Show that coefficient of restitution for one dimensional elastic collision is equal to one.

Q33. A ball whose kinetic energy is E, is projected at an angle of 45° to the horizontal. What will be the kinetic energy of the ball at the highest point of its flight?

Q34. A body of mass m accelerates uniformly from rest to velocity v_1 in time t_1. Find the expression for the instantaneous power delivered to the body as function of time.

Q35. Obtain mathematically and graphically the work done by a variable force.

Q36. Define elastic potential energy. Derive expression of elastic potential energy for spring.

Q37. Define elastic collision and discuss it for two bodies in one dimension. Calculate the velocities of bodies after collision. Discuss special cases also.

Q38. In a collinear collision, a particle with an initial speed u strikes a stationary particle of the same mass. If the final total kinetic energy is 50% greater than the original kinetic energy, calculate the magnitude of the relative velocity between the two particles, after collision.

CASE STUDY BASED QUESTIONS:-

Q39. Work energy theorem

The work energy theorem states that the change in kinetic energy of a body is equal to the work done by the net force on the body. It is an integral form of Newtons second law. In deriving W-E theorem, it is assumed that the force is effective only in changing the kinetic energy of the body. When force and displacement are in same direction, kinetic energy increases and work done is positive. When force and displacement are oppositely directed, KE decreases, the work done is negative. When a body is in uniform circular motion, KE does not change and the work done by the centripetal force is zero.

(i) A body of mass 10kg initially at rest acquires velocity of 10m/s. What is the work done.
(a) -500J (b) 500J (c) 50J (d) -50J

(ii) How much work must be done by a force on 50kg body in order to accelerate it from rest to 20m/s in 10s ?
(a) 1000J (b) 10000J (c) 2000J (d) 40000J

(iii) An unloaded car moving with velocity u on a frictionless road can be stopped in a distance s. If passenger add 40% to its weight and braking force remains same, the stopping distance at velocity u is now
(a) 1.4s (b) $\sqrt{1.4}$s (c) $(1.4)^2$ s (d) 1/1.4 s.

(iv) A gun of mass m fires a bullet of mass m with maximum speed v. Given that m<M. The kinetic energy of the gun will be
(a) ½ mv^2 (b) ½ Mv^2 (c) more than ½ (d) less than ½ mv^2

Q40.Conservative and non-conservative force

A force is conservative (i) if the work done by the force in displacing a body from one point to another is independent of the path followed by the particles and (ii) if the work done by the force in moving a particle around any closed path is zero. Gravitational force, electrostatic force, elastic force of spring are all conservative. If amount of work done depends on path the force is non conservative. Force of friction is conservative.

(i) A particle moves along a curve of unknown shape but magnitude of force F is constant and always acts along tangent to the curve. Then
(a) F may be conservative (b) F must be conservative.
(c)F may be non-conservative (d) F must be non-conservative.

(ii) Which of the following is not a conservative force?
(a) Gravitational force (b) Electrostatic force between two charges
(c)Frictional force (d) magnetic force between two dipoles.

(iii) Give two differences between conservative and non-conservative force.

UNIT 5- MOTION OF SYSTEM OF PARTICLES AND RIGID BODY

Q 1-10 are ASSERTION AND REASON TYPE QUESTIONS

(i) If both assertion and reason are true and reason explains the assertion
(ii) If both the assertion and reason are true but reason does not explain the assertion.
(iii) If assertion is true but reason is false.
(iv) If both assertion and reason are false.

Q1. **Assertion:** If polar ice melts day will be longer.
Reason: Moment of inertia decreases and thus angular velocity increases.

Q2. **Assertion:** The size and shape of the rigid body remains unaffected under the effect of external forces.
Reason: The distance between two particles remains constant in a rigid body.

Q3. **Assertion:** If a satellite is orbiting around a planet, then its angular momentum is conserved.
Reason: Linear momentum conservation leads to angular momentum conservation.

Q4. **Assertion:** Torque on a body can be zero even if there is a net force on it.
Reason: Torque and force on a body are always perpendicular.

Q5. **Assertion:** In case of pure rolling, the force of friction becomes zero.
Reason: The speed at the point of contact is zero.

Q6. **Assertion:** If there is no external torque on a body about its centre of mass, then the velocity of the centre of mass remains constant.
Reason: The linear momentum of an isolated system remains constant.

Q7. **Assertion:** The centre of mass of an electron and proton, when released moves faster towards proton.
Reason: Proton is heavier than electron.

Q8. **Assertion:** Angular speed of a planet around a sun increases, when it is closer to the sun.
Reason: Total angular momentum of the system remains constant.

Q9. **Assertion:** The earth is slowing down and as a result the moon is coming nearer to it.
Reason: The angular momentum of the earth moon system is not conserved.

Q10. **Assertion:** A judo fighter in order to throw his opponent on to the mat tries to initially bend his opponent and then rotate him around his hip.
Reason: As the mass of the opponent is brought closer to the fighter's hip, the force required to throw the opponent is reduced.

Q 11-20 are MCQs

Q11. The angular momentum of a system of particles is conserved
(a) when no external forces act upon the system
(b) when no external torque acts upon the system
(c) when no external impulse acts upon the system
(d) when axis of rotation remains same.

Q12. The reduced mass of two particles having masses m and 2m is,
(a) 2m (b) 3m (c) 2m/3 (d) m/2

Q13. Two wheels having radii in the ratio 1:3 are connected by a common belt. If the smaller wheel is accelerated from rest at a rate of 1.5 rad s^{-2} for 10s, find the velocity of bigger wheel in rad s^{-1}.
(a) 5 (b) 15 (c) 45 (d) none of these.

Q14. Under a constant torque, the angular momentum of a body changes from A to 4A in 4 sec. The torque on the body will be

(a) 3A/4 (b) A/4 (c) 4A/3 (d) 4A

Q15. Moment of inertia of an object does not depend upon

(a) Mass of an object (b) mass distribution (c) angular velocity (d) axis of rotation

Q16. What is the ratio of the moments of inertia of two rings of radii r and 2r about an axis perpendicular to their plane and passing through their centre

(a) 1: n^2 (b) 1:n (c) 1:2n (d) n^2 : 1

Q17. The motion of planets in the solar system is an example of conservation of

(a) Energy (b) Linear momentum (c) Angular momentum (d) Mass

Q18. If a person standing on a rotating disc stretches out his hands, the angular speed will

(a) Increase (b) decrease (c) remain same (d) none of these.

Q19. A diver in a swimming pool bends his head before diving. It

(a) Increases his linear velocity

(b) decreases his angular velocity

(c) Increases his MI

(d) Decreases his MI.

Q20. The separation between C and O atoms in CO is 1.2 Å. The distance of carbon atom from the centre of mass is in Å.

(a) 0.3 (b) 0.7 (c) 0.5 (d) 0.9

SHORT ANSWERS, LONG ANSWERS AND NUMERICALS

Q21. Define a rigid body. State the factors on which the centre of mass of a rigid body depends.

Q22. How torque is expressed as the vector product of two vectors? State the rule for determining the direction of torque.

Q23. Define angular momentum. Derive the relation between angular momentum and torque.

Q24. Prove that the time rate of change of the angular momentum of a particle is equal to the torque acting on it.

Q25. Define radius of gyration and mention two factors on which radius of gyration of a body depends.

Q26. Establish the relation between moment of inertia and torque on a rigid body.

Q27. An isolated particle of mass m is moving in a horizontal plane XY along x axis at a certain height above the ground. It suddenly explodes into fragments of masses m/4 and 3m/4. At instant later, the smaller fragment is at y = +15cm. What is the position of larger fragment at this instant?

Q28. A boat of 90Kg is floating in still water. A boy of mass 30kg walks from the stern to the bow. The length of the boat is 3m. Calculate the distance through which the boat will move.

Q29. A fly wheel of mass 25kg has a radius of 0.2m. What force should be applied tangentially to the rim of the flywheel so that it acquires an angular acceleration of 2 rad s^{-2}?

Q30. (a) Why there are two propellers in a helicopter?

(a) The speed of a whirl wind in a tornado is alarmingly high. Why?

(b) If earth contracts to half its radius, calculate the percentage change in the length of the day.

Q31. (a) If angular momentum is conserved in a system whose moment of inertia is decreased, will its rotational kinetic energy be conserved?

(a) A particle moves in a circular path with decreasing speed. What happens to its angular momentum?

Q32. (a) Using expressions for power and kinetic energy of rotational motion, derive the relation, Torque = Moment of inertia x angular acceleration.

(b) Explain if the ice on the polar caps of the earth melts, how will it affect the duration of the day?

Q33. (a) A child stands at the centre of turntable with his two arms out stretched. The turntable is set rotating with an angular speed of 40rpm. How much is the angular speed of the child if he folds his hands back and thereby reduce his moment of inertia to 2/3 times the initial value?
Assume that the turntable rotates without friction.

(a) Show that the child's new kinetic energy of rotation is more than the initial kinetic energy of rotation. How do you account for this increase in kinetic energy?

Q34. Find the torque of a force $7i - 3j - 5k$ about the origin which acts on a particle whose position vector is $i + j + k$.

Q35. The angular momentum of a body is 3.14 Js and its rate of revolution is 10 cps. Calculate the moment of inertia of the body about the axis of rotation.

Q36. Many rivers flow towards the equator. What effect does the sediment they carry to the seas have on the rotation of the earth?

Q37. When is a rigid body said to be in equilibrium? State the necessary conditions for a body to be in equilibrium.

Q38. An automobile engine develops 100kW when rotating at a speed of 1800 rev/min. what torque does it deliver?

CASE STUDY BASED QUESTIONS:-

Q39. **Centre of mass**

Newtons laws of motion are applicable to point objects. But a rigid body is a many particle system. To simplify the motion of such a system, we define mathematically a specific point, called centre of mass of the system, whose motion under the effect of external forces can describe the motion of the entire system. The centre of mass of a system of particles is a point where the whole mass of a body is to be concentrated for describing its translatory motion. It is that single point which moves in the same way in which a single particle having the total mass of the system and acted upon by the same external forces would move. The position vector of the centre of mass is the weighted average of the position vectors of all the particles of the system, the contribution of each particle being proportional to its mass. The equations of motion for the centre of mass can be written as

$Ma_{cm} = F_1 + F_2 + \ldots = F_{ext}$: $P = P_1 + P_2 + \ldots = Mv_{cm}$.

These equations show that the centre of mass of the system moves as if entire mass of the system is concentrated at this point and the total external force acts on this point. The internal forces between various particles cancel out in pairs in accordance with Newtons third law.

(i) The centre of mass of a solid cone along the line from the centre of the base to the vertex is at

(a) One fourth of the height (c) one fifth of the height

(b) One third of the height (d) none of the above.

(ii) Two bodies A and B initially, at rest move towards each other under mutual force of attraction. At the instant when the speed of A is v and that of B is 2v, the speed of the centre of mass of the body is

(a) 3v (b) 2v (c) 1.5v (d) zero

(iii) Four particles of mass 2kg, 3kg, 4kg and 8kg are situated at the corners of a square of side length 2m, the centre of mass may be given as

(a) (30/18, 28/18) (b) (20√2/18, 24√2/18) (c) (14/17,24/17) (d) (34/18, 34/18)

OR

Three masses 2,4 and 4 kg are placed at the three points (1,0,0) , (1,1,0) and (0,1,0) respectively. The position vector of its centre of mass is

(a) 3i/5+4j/5 (b) 3i + j (c) 2i/5 + 4i/5 (d) i/5 + 3j/5

Q40. **Moment of Inertia**

The mass of a body resist a change in its state of linear motion, it is measure of inertia in linear motion. Similarly, the moment of inertia of a body about an axis of rotation resists a change in its rotational motion. The greater the moment of inertia of a body, the greater the torque required to change its state of rotation. It's a measure of rotational inertia of a body. The moment of inertia of rigid body about a fixed axis is defined as the sum of the products of the masses of the particles constituting the body and the squares of their respective distances from the axis of rotation.

$I = M_1R_1^2 + M_2R_2^2 + \ldots.+M_n R_n^2$. Thus the moment of inertia of a rigid body depends on the mass of the body, its shape and size, distribution of mass about the axis of rotation, and the position and orientation of the axis of rotation.

(i) Analogue of mass in rotational motion is

(a) Moment of inertia (b) angular momentum (c) gyration (d) none of these

(ii) Moment of inertia of a thin circular disc of mass M and radius R about any diameter is

(b) $MR^2/4$ (b) MR^2 (c) $MR^2/2$ (d) $2\ MR^2$

(iii) Moment of inertia depends upon

(b) Axis of rotation (b) torque applied (c) angular speed (d) angular momentum

(iv) Moment of inertia of a ring of mass M and radius R about an axis passing through the centre and perpendicular to the plane is I. What is the moment of inertia about its diameter?

(c) I (b) I/2 (c) I/√2 (d) $I + MR^2$

UNIT 6 GRAVITATION

MULTIPLE CHOICE BASED QUESTIONS

Q1. If gravitational constant decreasing in time, what will remain unchanged in case of a satellite orbiting around earth?

(a) Time period (b) orbiting radius (c) areal velocity (d) angular velocity

Q2. Two balls each of radius R, equal mass and density are placed in contact, then the force of gravitation between them is proportional to

(a) $1/R^2$ (b) R (c) R^4 (d) 1/R

Q3. If the density of earth is doubled keeping its radius constant, the acceleration due to gravity g is

(a) 20 m/s^2 (b) 10 m/s^2 (c) 5 m/s^2 (d) 2.5 m/s^2

Q4. If the radius of earth decreases by 1% and its mass remains same, then the acceleration due to gravity

(a) Increases by 1% (b) decreases by 1% (c) increases by 2% (d) decreases by 2%

Q5. At what altitude (h) above the earths surface would the acceleration due to gravity be one-fourth of its value at the earth's surface?

(a) h = R (b) h = 4R (c) h = 2R (d) h = 16R

Q6. The escape velocity on a planet is v. If the radius of the planet contracts to $1/4^{th}$ of present value without any change in its mass, the escape velocity will be

(a) halved (b) doubled (c) quadrupled (d) one-fourth

Q7. The value of escape velocity on a certain planet is 2 km/s. Then the value of orbital speed for a satellite orbiting close to its surface is

(a) 12km/s (b) 1 km/s (c) $\sqrt{2}$ km/s (d) $2\sqrt{2}$ km/s

Q8. What is not conserved in the case of celestial bodies revolving around sun?

(a) Kinetic energy (b) mass (c) angular momentum (d) linear momentum

Q9. The mass of moon is 1% of mass of earth. The ratio of gravitational pull of earth on moon and that of moon on earth will be

(a) 1:1 (b) 1:10 (c) 1:100 (d) 2:1

Q10. If radius of earth is reduced, then

(a) Time duration is reduced (c) time period of Earth decreases
(b) Earth rotates slower (d) duration of day increases

ASSERTION AND REASON TYPE QUESTIONS

(e) If both assertion and reason are true and reason explains the assertion
(f) If both the assertion and reason are true but reason does not explain the assertion.
(g) If assertion is true but reason is false.
(h) If both assertion and reason are false.

Q11. **ASSERTION**. Linear momentum of a planet does not remain conserved.
REASON. Gravitational force acts on it.

Q12. **ASSERTION**. The comets do not obey Kepler's laws of planetary motion.
REASON. The comets do not have elliptical orbits.

Q13. **ASSERTION**. The square of the period of revolution of a planet is proportional to the cube of its distance from the sun.
REASON. Sun gravitational field is inversely proportional to the square of its distance from the planet.

Q14. **ASSERTION**. The earth without its atmosphere would be inhospitably cold.
REASON. All heat would escape in the absence of atmosphere.

Q15. **ASSERTION.** The time period of pendulum on a satellite orbiting the earth is infinity.
REASON. Time period of a pendulum is inversely proportional to $\sqrt{g}$.

Q16. **ASSERTION**. The square of the period of revolution of a planet is proportional to the cube of its distance from the sun.
REASON. Sun gravitational field is inversely proportional to the square of its distance from the planet.

Q17. **ASSERTION**. A planet moves faster, when its closer to the sun in its orbit and vice versa.
REASON. Orbital velocity in orbit of planet is constant.

Q18. **ASSERTION**. The ratio of inertial mass to gravitational mass is equal to one.
REASON. The inertial mass and gravitational mass of a body are equivalent.

Q19. **ASSERTION**. More the mass of object more will be the escape velocity.
REASON. Escape velocity depends on the mass of the object.

Q20. **ASSERTION**. Value of acceleration due to gravity on earth is same at every point.
REASON. Value of acceleration due to gravity is independent of R.

SHORT ANSWERS, LONG ANSWERS AND NUMERICALS

Q21. Three mass points each of mass m are placed at the vertices of an equilateral triangle of side l. what is the gravitational field and potential due to three masses at the centroid of the triangle?

Q22. If the diameter of earth becomes half its present value but its average density remains unchanged then how would be the weight of an object on the surface of the earth affected? Justify your answer.

Q23. The mass and diameter of a planet are twice those of the earth. What will be the time period of that pendulum on this planet, which is a second's pendulum on the earth?

Q24. A satellite is orbiting the earth with speed v_o. To make the satellite escape, what should be the minimum percentage increase in its velocity?

Q25. The time period of the satellite of the earth is 5 hours. If the separation between the earth and the satellite is increased 4 times the previous value, then what will be the new time period of the satellite.

Q26. Suppose the gravitational force varies inversely as the nth power of the distance. Then, find the expression for the time period of a planet in a circular orbit of radius r around the sun.

Q27. Two heavy spheres each of mass 100kg and radius 0.1m are placed 1.0m apart on a horizontal table. What is the gravitational field and potential at the mid-point of the line joining the centres of the spheres?

Q28. Find the potential energy of a system of four particles, each of mass m placed at the vertices of a square of side l. Also obtain the potential at the centre of the square.

Q29. How much below the surface of the earth does the acceleration due to gravity becomes 1% of its value at the earth's surface. Radius of the earth=6400km.

Q30. At what height above the earth's surface, the value of g is half of its value on earth's surface? Given its radius is 6400 km.

Q31. If the radii of two planets be r and R and their mean densities then prove that the ratio of accelerations due to gravity on the planets will be rd:RD

Q32. Determine the escape velocity of a body from the moon. Take the moon to be a uniform sphere of radius 1.76 x 10^6 m and mass 7.36 x 10^{22} kg. G = 6.67 x 10^{-11} in SI unit.

Q33. (a) Derive expression for the acceleration due to gravity g at a depth d from the centre of the earth. What happens to g at the centre of the earth?

(a) At what height above the earth's surface, is the value of g same as in a mine 80km deep?

Q34. (a) Define escape velocity.

(b) Obtain an expression for the escape speed of a body from the surface of the earth.

(c) A tennis ball and a cricket ball are to be projected out of the gravitational field of the earth. Do we need different velocities to achieve so.

Q35. Define orbital velocity and time period of a satellite. Derive expression for these.

Q36. State Kepler's law of planetary motion. Deduce Kepler's 3rd law.

Q37. Define gravitational potential energy. Derive expression for gravitational potential and gravitational potential energy.

Q38. (a) what does the negative sign show in gravitational potential energy.

(b) Why a body weighs more at the poles than at the equator.

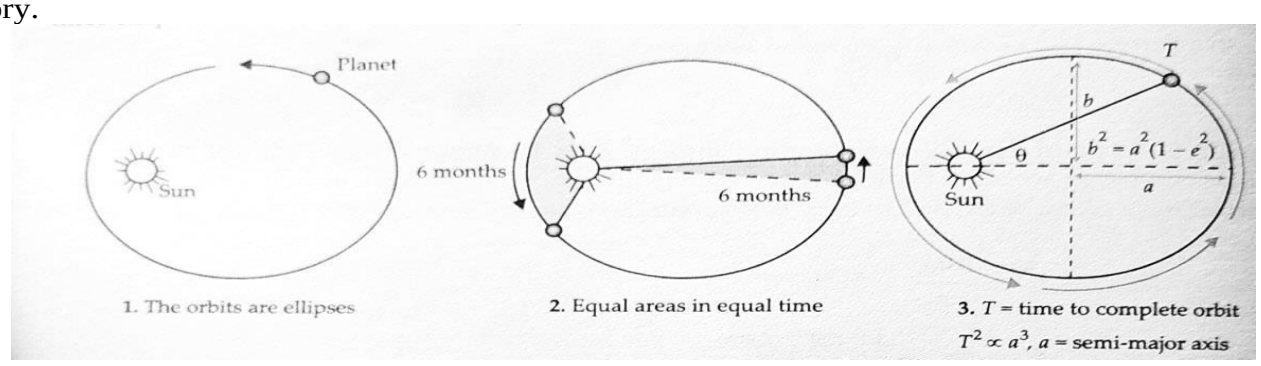
(c) Where will a body weighs more -1km above the surface of the earth or 1 km below the surface of Earth?

(d) If the distance between the earth and the sun were half its present value, calculate the number of days in year would have been.

CASE STUDY BASED QUESTIONS:-

Q39 **Kepler's law of planetary motion**

Tyco Brahe a Danish astronomer spent his entire lifetime recording observations of the planets with the naked eye. After Brahe's death, his painstaking observations were analysed by his assistant Johannes Kepler, a German mathematician and astronomer, Kepler found that Brahes data fit three simple rules or laws that describe planetary motion in a heliocentric or sun- centered theory.



These laws are stated as follows:

1. Law of orbits. All planets move in elliptical orbits with the sun at one of the foci.
2. Law of areas. The radius vector drawn from the sun to the planet sweeps out equal intervals in equal intervals of time.
3. Law of periods. The square of the period of revolution (T) of a planet is proportional to the cube the semi major axis (a) of the ellipse traced out by the planet.

$$T^2 = (4\pi^2/GM_s)\, a^2$$

Where M_s is the mass of the sun.

(i) A satellite is orbiting around the earth with radius slightly increases by Δr, the change in its time orbital radius R and time period T. The quantity which period is
(a) T/R (b) T^2/R (c) T^2/R^2 (d) T^2/R^3

(ii) Satellite is revolving around earth. If its height is increased to four times the height of geostationary satellite, what will become its time period?
(a) 8days (b) 4days (c) 2days (d) 16 days.

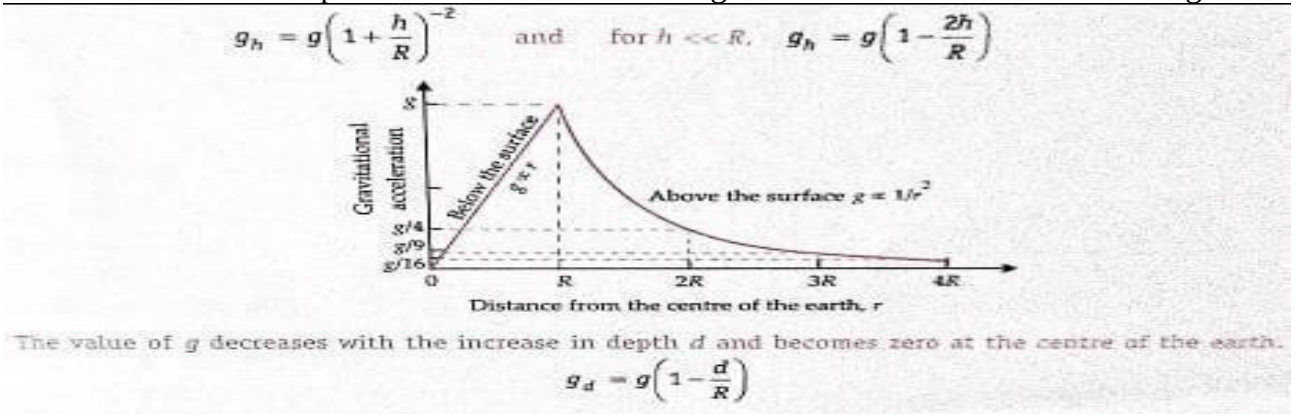
(iii) The period of a planet around sun is 27times that of earth. The ratio of radius of planets orbit to the radius of earth's orbit is
(a) 4 (b) 9 (c) 64 (d) 27

(iv) The maximum and minimum distances of a comet from the sun are $8x10^{12}$ m and $1.6x10^{12}$ m. If its velocity when nearest to the Sun is 60m/s, what will be its velocity in m/s when it is farthest?
(a) 12 (b) 6 (c) 112 (d) 60

CASE STUDY BASED QUESTIONS:-

Q40. **Factors affecting acceleration due to gravity**

The acceleration produced in the motion of a body due to force of gravity is called acceleration due to gravity. At the surface of the earth, $g = GM/R^2$. The value of g depends on the altitude, depth, latitude and also on the shape of the earth. The value of g decreases with the increase in height h.



(i) At what height h above earth, the value of g becomes g/2? (R = radius of earth)
(a) 3R (b) √2R (c) (√2 – 1) R (d) R/√2

(ii) The acceleration due to gravity at a depth d is gd and height h above the surface of earth is g_h. If d = 2h , then the ratio then the ratio g_d/g_h is equal to
(a) 1 (b) ½ (c) 2/1 (d) ¼.

(iii) A body weighed 250N on the surface. Assuming the earth to be a sphere of uniform mass density, how much would it weigh half way down to the centre of the earth?
(a) 240N (b) 210N (c) 195N (d) 125N.

(iv) If the earth stops moving around its polar axis, then what will be the effect on the weight of a body placed at the south pole?
(a) Remain same (b) increase (c) decrease but not zero (d) Decrease to zero.

Q41. Two satellites A and B have masses m and 2m respectively.A is in a circular orbit of radius r and B is in a circular orbit of radius 2r around the earth. Find the ratio of the kinetic energy T_A / T_B.

UNIT-7 MECHANICAL PROPERTIES OF SOLIDS AND

FLUIDS MULTIPLE CHOICE BASED QUESTIONS

1. A number of small drops of mercury coalesce adiabatically to form a single drop. The temperature of drop
(a) Increases
(b) Is infinite
(c) Remains unchanged
(d) May decrease or increase depending upon size

2. Plants get water through the roots because of
(a) Capillarity
(b) Viscosity
(c) Gravity
(d) Elasticity
(a) Capillarity

3. Choose the wrong statement from the following.
(a) Small droplets of a liquid are spherical due to surface tension
(b) Oil rises through the wick due to capillarity
(c) In drinking the cold drinks through a straw, we use the phenomenon of capillarity
(d) Gum is used to stick two surfaces. In this process we use the property of Adhesion
(c) In drinking the cold drinks through a straw, we use the phenomenon of capillarity

4. The height of a liquid in a fine capillary tube
(a) Increases with an increase in the density of a liquid
(b) Decreases with a decrease in the diameter of the tube
(c) Decreases with an increase in the surface tension
(d) Increases as the effective value of acceleration due to gravity is decreased
(d) Increases as the effective value of acceleration due to gravity is decreased

5. At critical temperature, the surface tension of a liquid
(a) Is zero
(b) Is infinity
(c) Is the same as that at any other temperature
(d) Can not be determined

6. A capillary tube when immersed vertically in a liquid records a rise of 3 cm. if the tube is immersed in the liquid at an angle of 60° with the vertical, then length of the liquid column along the tube will be
(a) 2 cm
(b) 3 cm
(c) 6 cm
(d) 9 cm

7. When the angle of contact between a solid and a liquid is 90°, then
(a) Cohesive force > Adhesive force
(b) Cohesive force < Adhesive force
(c) Cohesive force = Adhesive force
(d) Cohesive force >> Adhesive force

8. Water rises up to a height of 5 cm in a capillary tube of radius 2 mm. what is the radius of the radius of the capillary tube if the water rises up to a height of 10 cm in another capillary?
(a) 4 mm
(b) 1 mm
(c) 3 mm
(d) 1 cm

9. If the surface of a liquid is plane, then the angle of contact of the liquid with the walls of container is

(a) Acute angle
(b) Obtuse angle
(c) 90°
(d) 0°

ASSERTION AND REASON TYPE QUESTIONS

Directions:

(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(c) If assertion is true but reason is false.
(d) If the assertion and reason both are false.

10. **Assertion :** Steel is more elastic than rubber.
Reason : Under given deforming force, steel is deformed less than rubber.

11. **Assertion :** Glassy solids have sharp melting point.
Reason : The bonds between the atoms of glassy solids get broken at the same temperature.

12. **Assertion :** It is easier to spray water in which some soap is dissolved.
Reason : Soap is easier to spread.

13. **Assertion :** The angle of contact of a liquid decrease with increase in temperature.
Reason : With increase in temperature, the surface tension of liquid increase.

14. **Assertion :** When height of a tube is less than liquid rise in the capillary tube, the liquid does not overflow.
Reason : Product of radius of meniscus and height of liquid in capillary tube always remains constant.

15. **Assertion :** A needle placed carefully on the surface of water may float, whereas a ball of the same material will always sink.
Reason : The buoyancy of an object depends both on the material and shape of the object.

16. **Assertion :** A large force is required to draw apart normally two glass plates enclosing a thin water film.
Reason : Water works as glue and sticks two glass plates.

17. **Assertion :** Bulk modulus of elasticity (K) represents incompressibility of the material.
Reason : Bulk modulus of elasticity is proportional to change in pressure.

18. **Assertion :** A hollow shaft is found to be stronger than a solid shaft made of same material.
Reason : The torque required to produce a given twist in hollow cylinder is greater than that required to twist a solid cylinder of same size and material.

19. **Assertion :** The stretching of a coil is determined by its shear modulus.
Reason : Shear modulus change only shape of a body keeping its dimensions unchanged

SHORT ANSWERS, LONG ANSWERS AND NUMERICALS

20. A drop of oil placed on the surface of water spreads out, but a drop of water placed on oil contracts. Why?

21. Water rises in a capillary tube but mercury falls in the same tube. Why?

22. The diameter of ball A is half that of ball B. What will be their ratio of their terminal velocities in water?

23. If the rate of flow of liquid through a horizontal pipe of length l and radius R is Q. What is the

24. Water is coming out of a hole made in the wall of tank filled with fresh water. If the size of the hole is increased, will the velocity of efflux change?

25. Find the work done in blowing a soap bubble of surface tension 0.06 N/m from 2cm radius to 5cm radius.

26. Why is it painful to walk barefooted on a road covered with pebbles having sharp edges?

27. What should be the pressure inside a small air bubble of 0.1mm0.1radius situated just below the water surface? Surface tension ofwater=7.2×10−2N/m=7.2×10−2and atmospheric pressure=1.013×105N/m2

28. If the radius of a soap bubble is r and surface tension of the soap solution is T. Keeping the temperature constant, what is the extra energy needed to double the radius of soap bubble?

29. Find the work done in breaking a water drop of radius 1 mm into 1000 drops. Given the surface tension of water is 72 × 10-3 N/m.

30. If eight rain drops each of radius 1mm are falling through air at a terminal velocity of 5 cm/s5 If they coalesce to form a bigger drop, what is the terminal velocity of bigger drop?

31. Water flows through a horizontal pipe of which the cross–section is not constant. The pressure is 1cm of mercury where the velocity is 0.35m/s0.35.

32. Define terminal velocity and derive an expression for it.

33. What is equation of continuity? Water flows through a horizontal pipe of radius, 1cm at a speed of 2m/s?What should be the diameter of the nozzle if water is to come out at a speed of 10m/s?

34. What is Bernoulli's theorem? Show that the sum of pressure, potential and kinetic energy in the streamline flow is constant.

35. In deriving Bernoulli's equation, we equated the work done on the fluid in the tube to its change in the potential and kinetic energy.

a) What is the largest average velocity of blood flow in an artery of diameter 2.0×10−3m if the flow must remain laminar?

b) Do the dissipative forces become more important as the fluid velocity increases? Discuss qualitatively.

36. State the principle on which Hydraulic lift work and explain its working.

37. A steel wire of length 4.7 m and cross-sectional area 3.0 × 10–5 m 2 stretches by the same amount as a copper wire of length 3.5 m and cross-sectional area of 4.0 × 10–5 m 26.under a given load. What is the ratio of the Young's modulus of steel to that of copper?

38. A piece of copper having a rectangular cross-section of 15.2 mm × 19.1 mm is pulled in tension with 44,500 N force, producing only elastic deformation. Calculate the resulting strain?

39. A steel cable with a radius of 1.5 cm supports a chairlift at a ski area. If the maximum stress is not to exceed 108N m–2 , what is the maximum load the cable can support?

40 CASE STUDY BASED QUESTION:-

The property due to which the free surface of liquid tends to have minimum surface area and behaves like a stretched membrane is called surface tension. It is a force per unit length acting in the plane of interface between the liquid and the bounding surface *i.e.*, S = F/L, where F = force acting on either side of imaginary line on surface and L = length of imaginary line. Surface tension decreases with rise in temperature. Highly soluble impurities increases surface tension and sparingly soluble impurities decreases surface tension.

1. The excess pressure inside a soap bubble is three times than excess pressure inside a second soap bubble, then the ratio of their surface area is

(a) 9 : 1 (b) 1 : 3 (c) 1 : 9 (d) 3 : 1

2. Which of the following statements is not true about surface tension?

(a) A small liquid drop takes spherical shape due to surface tension.
(b) Surface tension is a vector quantity.
(c) Surface tension of liquid is a molecular phenomenon.
(d) Surface tension of liquid depends on length but not on the area.

3. Which of the following statement is not true about angle of contact?

(a) The value of angle of contact for pure water and glass is zero.
(b) Angle of contact increases with increase in temperature of liquid.
(c) If the angle of contact of a liquid and a solid surface is less than 90°, then the liquid spreads on the surface of solid.
(d) Angle of contact depend upon the inclination of the solid surface to the liquid surface.

4. Which of the following statements is correct?

(a) Viscosity is a vector quantity.
(b) Surface tension is a vector quantity.
(c) Reynolds number is a dimensionless quantity.
(d) Angle of contact is a vector quantity.

5. A liquid does not wet the solid surface if the angle of contact is

(a) 0° (b) equal to 45°
(c) equal to 90° (d) greater than 90°

UNIT 8 THERMODYNAMICS

MULTIPLE CHOICE BASED QUESTIONS

Q1. The volume of a gas expands by 0.25m3 at a constant pressure of 103N/m2. The work done is equal to

(a) 2.5 ergs (b) 250 J (c) 250 W (d) 250 N

Q2. In a cyclic process, work done by the system is

(a) zero
(b) Equal to heat given to the system
(c) More than the heat given to system
(d) Independent of heat given to the system

Q3. First law of thermodynamics corresponds to

(a) conservation of energy
(b) heat flow from hotter to cooler body
(c) law of conservation of angular momentum
(d) Newton's law of cooling

Q4. The heat of 100 J is added to a gaseous system whose internal energy is 40 J, then the amount of external work done will be:

(a) 70 J
(b) 140 J
(c) 40 J
(d) None of these

Q5. During the adiabatic compression of a gas, its temperature

(a) Falls (b) remains constant (c) rises (d) becomes zero

Assertions and Reasons

In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If both assertion and reason are false.

6. Assertion: Heat energy is completely transformed into work during the isothermal expansion of a gas.
Reason: During an isothermal process, the change in internal energy of a gas due to decrease in pressure is nullified by the change due to increase in volume.

7. Assertion: Air quickly leaking out of a balloon becomes cooler.
Reason: The leaking air undergoes adiabatic expansion.

8. Assertion: In adiabatic compression, the internal energy and temperature of the system get decreased.
Reason: The adiabatic compression is a slow process.

9. Assertion: Cp can be less than Cv.
Reason: Cp-Cv = R is valid only for ideal gases.

10. Assertion: In an adiabatic process, change in internal energy the gas of a gas is equal to work done on or by in the process.
Reason: Temperature of gas remains constant in an adiabatic process.

SHORT ANSWERS, LONG ANSWERS AND NUMERICALS

Q11. The temperature of a gas rises during an adiabatic compression, although no heat is given to the gas from outside. Why?

Q12. Why does air pressure in a car type increase during driving?

Q13. If an inflated type bursts, the air escaping out is cooled, why?

Q14. 400J of work is done on a gas to reduce its volume by compression adiabatically. What is the change in internal energy of the gas?

Q15. A gas expands in such a manner that its pressure and volume can be related with the conditionPV^2 = constant. Will the gas cool or get heated on expansion?

Q16.Define isothermal and adiabatic process and write the formula of work done by 1 mole of an ideal gas during these two processes.

Q17.Derive the relation CP - CV = R where CP = specific heat at constant pressure; CV = specific heat at constant volume and R = Universal Gas constant.

Q18.Write the limitations of 1st law of thermodynamics.

Q19.State all the laws of thermodynamics and explain briefly.

CASE STUDY BASED QUESTION:-

Q20. First law of Thermodynamics

Heat and work are two modes of energy transfer to a system. Heat is the energy transfer arising due to temperature difference between the system and the surroundings. Work is energy transfer brought about by other means, such as moving the piston of a cylinder containing the gas, by raising or lowering some weight connected to it. The first law of thermodynamics is the general law of conservation of energy applied to any system in which energy transfer from a system to the surroundings occurs through heat and work. According to the first law of thermodynamics, if some heat is supplied to a system which is capable of doing work, then the quantity of heat ΔQ absorbed by the system will be equal to the sum of the increase in its internal energy ΔU and the external work ΔW done by the system on the surroundings. As $\Delta W = P \Delta V$, so

$\Delta Q = \Delta U +$

$\Delta W \quad \Delta Q = \Delta U$

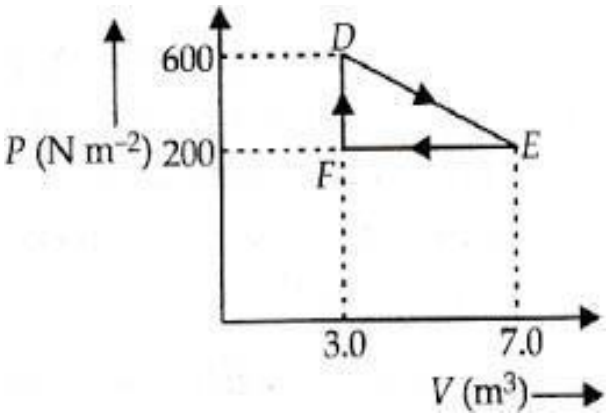
$+ P \Delta V$

QUESTIONS

1. In a cyclic process, work done by the system is
(a) zero
(b) more than the heat given to the system
(c) equal to heat given to the system
(d) independent of heat given to the system

2. The increase in internal energy of a system is equal to the work done on the system. Which process does the system undergo?
(a) isochoric (b) adiabatic (c) isobaric (d) isothermal.

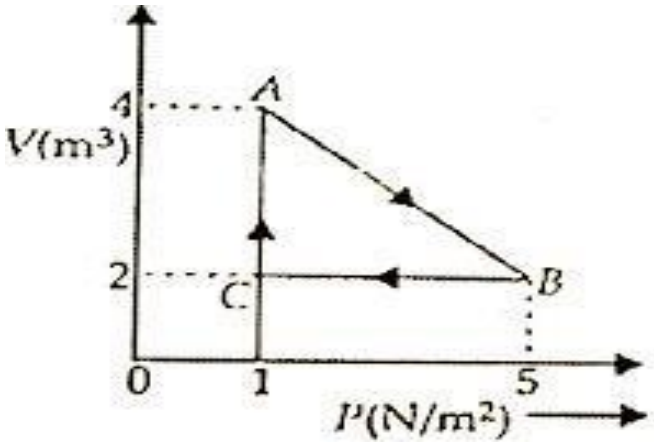
3. A thermodynamic process is carried out from an original state D to an intermediate state E by the linear process shown in the figure. The work done by the gas from D to E to F is



(a) 100 J (b) 800 J (c) 300 J (d) 250 J

4. When 20 J of work was done on a gas, 40 J of heat energy was released. If the initial internal energy of the gas was 70 J. Then what is the final internal energy of the system?
(a) 50 J (b) -150 J (c) 90 J (d) 110 J

5. An ideal gas is taken through a cycle A→B→C→A as shown in the figure. If the net heat supplied in the cycle is 5 J, then work done by the gas in the process C→A is



(a) 2 J (b) 3 J (c) 4 J (d) ∞

UNIT-9 BEHAVIOUR OF PERFECT GASES AND KINETIC THEORY OF GASES

MULTIPLE CHOICE BASED QUESTIONS

1) The temperature is changed from 27°C to 327°C. Find the ratio of K.E. of molecules at two temperatures.

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

2) The r.m.s. velocity at a temperature is 2 times the r.m.s. velocity at 300 K. What is this temperature?

(a) 900K (b) 2400 K (c)600K (d) 1200 K

3) Gas exerts pressure on the walls of the container

(a) gas has weight
(b) gas molecules have momentum
(c) gas molecules collide with each other
(d) gas molecules collide with the walls of the container

4) The degree of freedom in case of mono-atomic gas?

(a) 1 (b) 3 (c) 5 (d) none of these

5) The mean kinetic energy of one mole of gas per degree of freedom (on the basis of kinetic theory of gases) is

(a) 1/2kT (b) 3/2kT (c) 3/2RT (d) 1/2RT

Assertions and Reasons

6. **Assertion:** For an ideal gas, at constant temperature, the product of the pressure and volume is constant.
Reason
The mean square velocity of the molecules is inversely proportional to mass.

7. **Assertion:** The root mean square and most probable speeds of the molecules in a gas are the same.
Reason: The maxwell distribution for the speed of molecules in a gas is symmetrical.

8. **Assertion:**The ratio Cv/Cp for a monatomic gas is less than for a diatomic gas.
Reason
The molecules of a monatomic gas have more degrees of freedom than those of a diatomic gas.

9. **Assertion :** The ratio Cp/Cv is more for helium gas than for hydrogen gas.
Reason : Atomic mass of helium is more than that of hydrogen.

10. **Assertion.** Air pressure in a car tyre increases during driving.
Reason. Absolute zero temperature is not zero energy temperature

SHORT ANSWERS, LONG ANSWERS AND NUMERICALS

Q11.The volume of a given mass of a gas at 27 degree C, 1 atm is 100cc. What will be its volume at 327 degree C?

Q12.Derive the relationship between pressure and kinetic theory of gas.

Q13. Estimate the average thermal energy of a Helium atom at room temperature 20^0 C.

Q14. 4 molecules of gas have speeds of 1,2,3,4 cm/s respectively. Find average speed , root mean square speed.

Q15. A tank of volume 0.3m3 contains 2 moles of Helium gas at 200C. Assuming the helium behave as an ideal gas; 1 Find the total internal energy of the system.

Q16. The ratio of vapour densities of two gases at the same temperature is 8:9. Compare the rms velocities of their molecules.

Q17. An air bubble of volume 1.0 cm *3 rises from the bottom of a lake 40m deep at a temperature of 12 degree C. To what volume does it grow when it reaches the surface, which is at a temperature of 35 degree C?

Q18. Write all the assumptions of kinetic theory of gas.

Q19.Calculate the degree of freedom of monatomic diatomic and triatomic gases

CASE STUDY BASED QUESTIONS OF KINETIC THEORY

20. Gases at low pressure and high temperatures (much above that at which they liquefy or solidify) approximately satisfy a simple relation given by:

$$PV = nRT$$

Here P is the pressure, V is the volume, R is the gas constant, T is absolute temperature and n is the number of moles of the gas. This equation is called as ideal gas equation. We introduce another constant called as Boltzmann constant represented by kB . It is given as ratio of gas constant and Avogadro's number

$$kB = R/(N A)$$

R is gas constant and NA is Avogadro's constant. Value of Boltzmann constant is 1.38×10-22 J K-1.

If N the number of molecules of the gas in a simple, then for that sample, the gas equation could be written as: PV = NkBT

Another useful form of ideal gas equation is

$$P = \rho RT/M0$$

Where ρ is the mass density of the gas.

No real gas is truly ideal. It means that the ideal gas equation is not followed fully; a real gas will exhibit deviations from ideal behaviour.

Q1. A gas in a container A is in thermal equilibrium with another gas of the same mass in container B . If we denote the corresponding pressure and volume by the suffixes A and B, then which of the following statements is most likely to be true

(a)PA = PB, VA ≠ VB (b)PA ≠ PB, VA = VB
(c) PA/ VA = PB/ VB (d)PA VA = PB VB

Q2. The relation PV = nRT can describe behaviour of a real gas at

(a) High temperature and high density (b)High temperature and low density
(c) Low temperature and low density (d)Low temperature and high density

Q3. The equation of a gas for 5 g of oxygen at a pressure P and temperature T, when occupyinga volume V, will be

(a)PV = 5 RT/32 (b)PV = 5RT/16
(c)PV = 5RT/2 (d)PV = 5 RT

Q4. A given sample of an ideal gas occupies a volume V at pressure P and absolute temperature T.The mass of each molecule of the gas is m. Which of the following gives the density of the gas?

(a)P/(Ktv) (b)mkT
(c) P/(kT) (d)PM/(kT)

Q5. 1 mole of H2 gas is contained in a box of volume V = 1.00 m3 at T = 300 K. The gas is heated to a temperature T = 3000 K and the gas gets converted to a gas of hydrogen atoms. The final pressure (considering all gases to be ideal) would be

(a)Same as the pressure initially (b)2 times the pressure initially
(c) 10 times the pressure initially (d)20 times the pressure initially

UNIT 10: OSCILLATIONS AND WAVES

MULTIPLE CHOICE BASED QUESTIONS

1. When the maximum KE of a simple pendulum is K, then what is its displacement(in terms of amplitude a When its KE is K/2?

(a) a / √2 (b) a /2 (c) a /√3 (d) a/3

2. The potential energy of a particle executing S.H.M. is 2.5J, when its displacement is half of amplitude. The total energy of the particle be:-

(a) 5 J (b) 10 J (c)15 J (d) 20 J

3. If a particle is oscillating on the same horizontal plane in the ground

(a) It has only kinetic energy but no potential energy

(b) It has only potential energy but no kinetic energy

(c) It has both kinetic and potential energies

(d) It has neither kinetic nor potential energies

4. A particle executes S.H.M., its time period is 16s. If it passes through the centre of oscillation then its velocity is 2 m/s at time 2 sec. The amplitude will be:

(a) 7.2 m (b) 4 cm (c) 6 cm (d) 0.72 cm

5. The maximum value of the time period of a simple pendulum on the earth is

(a) 180.5min (b) 100min (c) 90.min (d) 84.5min

6. The Phase difference between the instantaneous velocity and acceleration of particle executing SHM is

(a) π (b) 0.707π (c) 0 (d) 0.5π

7. A particle executing simple harmonic motion of amplitude 5 cm has maximum speed of 31.4 cm/s. The frequency of its oscillation is :

(a) 4 Hz (b) 3Hz (c) 2 Hz (d) 1HZ

8. If density of oxygen is 16 times that of hydrogen, what will be their corresponding ratio of velocity of sound?

(a) 4 : 1 (b) 16 : 1 (c) 1 : 16 (d) 1 : 4

9. Light can travel in vacuum but not sound, because

(a) Speed of sound is very slow than light

(b) Light waves are electromagnetic in nature

(c) Sound waves are electromagnetic in nature

(d) Light waves are not electromagnetic in nature

10. If sound waves travel from air to water, which of the following remains unchanged?

(a) Velocity (b) Wavelength (c) Frequency (d) Intensity

Assertions and Reasons

In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(a) If both assertion and reason are true and reason is the correct explanation of assertion.

(b) If both assertion and reason are true but reason is not the correct explanation of assertion.

(c) If the assertion is true but the reason is false.

(d) If both assertion and reason are false.

11. **Assertion (A):** In simple harmonic motion, the motion is to and fro and periodic **Reason (R):** Velocity of the particle V=ω(A2−x2)^½, where x is displacement as measured from extreme position.

12. **Assertion:** In simple harmonic motion, the velocity is maximum when, the acceleration is minimum.

Reason: Displacement and velocity of SHM differ in phase by π/2

13. **Assertion:** The time-period of pendulum, on a satellite orbiting the earth is infinity

Reason: Time-period of a pendulum is inversely proportional to √g

14. **Assertion:** When a pendulum is made to oscillate on the surface of the Moon, its time period increases.

Reason: The Moon is much smaller as compared to Earth.

15. **Assertion:** The graph of potential energy and kinetic energy of a particle in SHM with respect to position is a parabola.

Reason: Potential energy and Kinetic energy do not vary linearly with position.

16.Assertion: Sound waves cannot propagate through a vacuum but light waves can.

Reason: Sound waves cannot be polarised but light waves can be polarised.

17. Assertion: sound waves cannot propagate fastest in solid.

Reason: sound waves can propagate slightly in vacuum.

18. Assertion: Speed of wave = Wavelength/Time period

Reason: Wavelength is the distance between two nearest particles in phase.

19. Assertion: In a stationary wave, no transfer of energy takes place.

Reason: There is no onward motion of the disturbance from one particle to the adjoining particle in a stationary wave.

20. Assertion: In a stationary wave there is no transfer of energy.

Reason: The ratio of average kinetic energy to average potential energy is independent of the position.

SHORT ANSWERS, LONG ANSWERS AND NUMERICALS

21 The girl sitting on a swing stands up. What will be the effect on periodic time of swing?

22 Can a simple pendulum experiment be done inside a satellite?

23 What is meant by simple harmonic motion ? Give any two examples. Write its differential form.

24 Show that in S.H.M., the acceleration is directly proportional to its displacement at the given instant.

25 Show that the total energy of a body executing SHM is independent of time?

26 What is the difference between wave velocity and particle velocity

27 Two astronauts on the surface of the moon cannot talk to each other. Why?

28 Draw graphical representation of simple harmonic motion, showing

(1) the displacement time curve

(2) velocity time curve

(3) acceleration time curve

29 A particle executing S.H.M. of amplitude 4 cm and T=4 sec. Find the time taken by it to move from positive extreme position(+a) to half of its amplitude.

30 An 8 kg body performs S.H.M. of amplitude 30 cm. The restoring force is 60N, when the displacement is 30cm. Find: - a) Time period b) the acceleration c) potential and kinetic energy when the displacement is 12cm?

31 The kinetic energy of a particle executing S.H.M. is 16 *J* when it is in its mean position. If the amplitude of oscillations is 25 *cm* and the mass of the particle is 5.12 *kg*. Calculate the time period of its oscillation.

32 A body is executing simple harmonic motion according to equation $y = 14 \sin (100 \pi t + \pi/6)$ cm. Find its

(i) amplitude (ii) frequency (iii) angular frequency (iv) maximum speed (v) maximum acceleration

33 Distinguish between stationary wave and progressive wave.

34 Explain why the speed of sound in air

(a) is independent of pressure,

(b) increases with temperature,

(c) Increases with humidity .

35 A hospital uses an ultrasonic scanner to locate tumours in a tissue. What is the wavelength of sound in the tissue in which the speed of sound is 1.7km/s? The operating frequency of the scanner is 4.2 MHz.

36 Determine the time period of a simple pendulum of length = l when mass of bob = m Kg?

37 Write Newton's formula for the speed of sound in a gas. Why and what correction was applied by Laplace in this formula. Deduce modified formula for speed of sound

38 What is a plane progressive harmonic wave? Establish displacement relation for a harmonic wave travelling along the positive direction of X axis .

CASE STUDY BASED QUESTION

39.Simple Harmonic Motion

Simple harmonic motion is the simplest form of oscillation. A particular type of periodic motion in which a particle moves to and fro repeatedly about a mean position under the influence of a restoring force is termed as simple harmonic motion (S.H.M).

A body is undergoing simple harmonic motion if it has an acceleration which is directed towards a fixed point and proportional to the displacement of the body from that point.

Acceleration $a \propto -x \Rightarrow a = -kx$ or $\frac{d^2x}{dt^2} = -kx$,

1. Which of the following is not a characteristic of simple harmonic motion?

(a) The motion is periodic.

(b) The motion is along a straight line about the mean position.

(c) The oscillations are responsible for the energy conversion.

(d) The acceleration of the particle is directed towards the extreme position.

2. The equation of motion of a simple harmonic motion is

(a) $\frac{d^2x}{dt^2} = -\omega^2 x$ (b) $\frac{d^2x}{dt^2} = -\omega^2 t$

(c) $\frac{d^2x}{dt^2} = -\omega x$ (d) $\frac{d^2x}{dt^2} = -\omega t$

3. Which of the following expressions does not represent simple harmonic motion?

(a) x = Acoswt + Bsinwt (b) x = Acos(wt + a)

(c) x = Bsin(wt + b) (d) x = Sin Wt cos 2 wt

4. The time period of simple harmonic motion depends upon

(a) amplitude (b) energy

(c) phase constant (d) mass

5. Which of the following motions is not simple harmonic?

(a) Vertical oscillations of a spring (b) Motion of a simple pendulum

(c) Motion of planet around the Sun (d) Oscillation of liquid in a U-tube

Motion In A Plane

Q1) Answer questions number (i) - (v) on the basis of your understanding of the following paragraph and the related studied concepts:

Projectile is the name given to a body thrown with some initial velocity at some angle with horizontal direction and then allowed to move in two dimensions under the influence gravity alone. The path followed by a projectile is called its trajectory. A projectile is projected from a point O on the ground with an initial velocity u at an elevation angle & from the horizontal direction. It just crosses two walls A and B of same height 'h' situated symmetrically at times t-t1=2: and t2 = 6 s respectively. The horizontal distance between the two walls is d = 120m

You may presume g = 10 ms^{-2}

(i) The total time of flight of the projectile is

(a) 8 s (b) 10 s (c) 4s (d) 12s

(ii) The value of angle of projection θ of the projectile is:
(a) $\tan^{-1}(3/4)$ (b) $\tan^{-1}(4/5)$ (c) $\tan^{-1}(4/3)$ (d) $\tan^{-1}(5/4)$

(iii) The projection velocity 'u' of the projectile is:
(a) 30 m/s (b) 40 m/s (c) 50 m/s (d) 20/3 m/s

(iv) The height 'h' of either of two walls is:
(a) 15 m (b) 120 m (c) 30 m (d) 60 m

(v) The horizontal range of the projectile is:
(a) 240 m (b) 160 m (c) 300 m (d) 400 m

Q2) For what value of m the two vectors A=4i+mj-2k and B=2i+3j+k are perpendicular to each other?

Q3) Show that vectors A=2i- 3j -k and B= -6î + 9j + 3k are parallel to each other.

Q4) A ball is thrown with a velocity of $7\sqrt{2}$ m/s at an angle of 45°with the horizontal. It just clears the two vertical poles of height 0.9 m each find the separation between the poles.

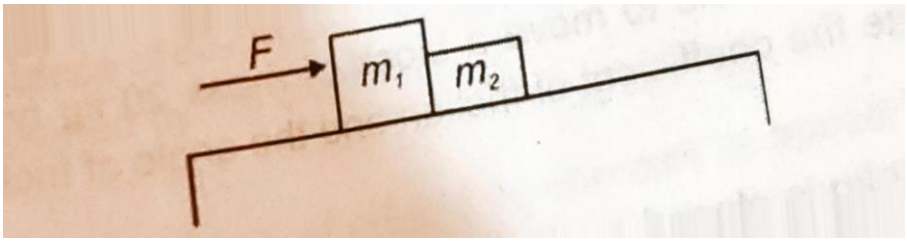
Q5) An aeroplane moving horizontally at 20 m per second drops a bag. What is the displacement of the bag after 5 seconds? given g= 10 m/s²

Q6) A celiling of long hall is 25 metre high what is the maximum horizontal distance that a ball thrown with the speed of 4 m/s can go without hitting the ceiling of the hall.

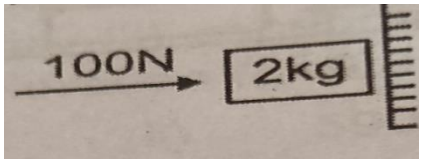
Laws of motion

Q7) A block of mass m is placed on another block of mass M and lying on a smooth horizontal surface. The coefficient of static friction between m and M is what is the maximum force that can be applied to m so that the block remains at rest relative to each other.

Q8) 2 block of mass m1=2kg and m2= 1kg Are in contact on a smooth horizontal surface as shown in figure. A horizontal force of F=3N is applied on the block of mass m1 find the contact force between the block.



Q9) A blog of March 2 KG is pressed against a rigid vertical wall by horizontal force of 100 Newton .if the coefficient of static and kinetic friction are each equals to 0.3, then find the magnitude and direction of frictional force on the block.



Q10) A force of 200 N is required to push a car of mass 500 kg slowly at a constant speed on a level road. If force of 500N is applied, then what shall be the acceleration of the car?
Q11) A 1200kg automobile rounds are level force of radius 200m on an unbanked road with a velocity of 72 km per hour. What is the minimum coefficient of friction between the tires and the road in order that automobile may not skit? Take g= $10m/s^2$

Work Power and Energy

Q12) A position dependent force is equals to $7 – 2x + 3x^2$ Newton acts on small body of mass 2 kg and displays from x = zero to x=5 m the work done in joules is.

Q13) A spring of force constant it 100 N/m has an extension of 5cm the work done in extending it from 5 cm to 15 cm is.

Q14) If the K.E. of A bodies increased by 300%, its momentum will increase by?
Q15) 2 bodies having same mass 40 kg are moving in opposite directions, one with the velocity of 10 m/s and other with 7 m/s. If they collide and move as one body, the velocity of the combination is?

Q16) A light body and heavy body have same momentum which is having more K.E

System Of particles and rotational motion

Q17) The masses are placed on the x axis: 300 g at the origin, 500 g at x=40 cm, and 400g at x=70 cm. The distance of the centre of mass from the origin is:
Q18) The moment of the force, F=4î + 5j -6k at (2, 0,-3) , about the point (2, -2, -2), is given by

Q19) The centre of mass of a system of particles does not depend upon:
1. Position of particles
2. Relative distance between particles
3. Masses of particles
4. Force acting on the particle

Q20) For a body, with angular velocity = î-2j+3k and radius vector r = î + j +k its velocity will be

GRAVITATION

Q21) Case Study Based

Earth satellites are the objects which revolve around the earth in circular or elliptical orbits. Mass of a satellite is very similar to the motion of a planet around the sun. A satellite is launched using multistage rocket, whose function is to take the satellite to a suitable height above the earth's atmosphere and then to project it with a high speed in horizontal direction so that it is established in its orbit. The minimum speed required to put a satellite into a given orbit around the earth is called its orbital speed. Orbital speed of a satellite revolving in a circular orbit at a height *h* above the earth's surface is given by:

$$V_{orb} = \sqrt{\frac{GM}{(R+h)}} = R\sqrt{\frac{g}{(R+h)}}$$

Time taken by a satellite to complete one revolution around the earth in its stable orbit

is called time period *T* and it is given as:

$$T = 2\pi\sqrt{\frac{(R+h)^3}{HM}} = \frac{2\pi}{R}\sqrt{\frac{(R+h)^3}{g}}.$$

(a) How does the orbital speed of a satellite depend on its mass?
(b) How does the orbital speed of a satellite change on increasing its orbital radius?
(c) Are Kepler's laws of planetary motion applicable to motion of satellite around the earth?
(d) Is a satellite a freely falling body?
(e) Find the revolution period of a satellite orbiting the earth just near its surface?

Q22) A body is projected vertically upwards from the surface of earth with a velocity equals to half of escape speed. what is the maximum height attained by the body.

Q23) Two bodies of m and 4m are placed at a distance r. The gravitational field is zero at a point on the line joining the 2 masses. what will be the gravitational potential at this point?

Solids and Fluids

Q24) On mild steel wire length 2L and cross sectional area A Is stretched well within elastic limit horizontally between 2 pillars. a man m is suspended from the midpoint of the wire strain in the wire is.

Q25) An ideal fluid flow through a pipe of circular cross section made of 2 sections with diameter 2.5 cm and 3.75 cm. the ratio of the velocities in the 2 pipe is

Q26) If 2 liquid job same masses but density is p1 and p2 respectively are mixed then density of the mixture is given by
Q27) Calculate excess pressure in an year bubble of radius 6 mm. Surface tension of liquid is 0.58 N/m
Q28) Calculate the velocity with which a liquid emerges from a small hole in the side of a tank of large cross sectional area if the hole is 0.2 m below the surface liquid(g=10 m/s^2)

Thermodynamics and thermal properties

Q29) As the temperature increases, the time period of a pendulum
(a) increases as its effective length increases even though its centre of man (CM) still reaming at the centre of the bob.
(b) decreases as its effective length increases even though its CM still remains at the centre of the bob.
(c) increases as its effective length increases due to shifting of CM below the centre of the bob.
(d) decreases as its effective length remains same but the CM shifts above the centre of the bob.

Q30) Case-Study Based question
Heat can be transferred from one place to another by three different methods. These are conduction, convection and radiation. Solids are usually heated by the process of conduction. Liquid and gases are heated by the process of convection. The process of

radiation requires no medium. Conduction and convection are slow processes while radiation is a very fast process.

Answer the following questions (do any four):

(i) Which of the following processes depends on gravity?
(a) conduction (b) convection (c) radiation (d) none of these

(ii) Woolen clothes keep the body warm, because wool
(a) is a bad conductor
(b) increases the temperature
(c) decreases the temperature
(d) generates heat energy

(iii) On a cold morning, a metal surface will feel colder to touch than a wooden surface because
(a) metal has high specific heat
(b) metal has high thermal conductivity
(c) metal has low specific heat
(d) metal has low thermal conducting

(iv) Earth receives heat from the sun by method of
(a) conduction
(b) convection
(c) radiation
(d) all of these

(v) A slab consists of two portions of different materials of same thickness and having the thermal conductivities K_1 and K_2. The equivalent thermal conductivity of the slab is
(a)K_1+K_2
(b)$(K_1K_2)/(K_1+K_2)$
(c)$(2K_1K_2)/(K_1+K_2)$
(d) $\sqrt{(K_1 + K_2)}$

Q31) If all the dimension of accumulator bar are double then what will be the effect of heat current between opposite faces of the bar?

Q32) A piece of flannel keeps the eyes cold but a person warm because flannel

Oscillation and waves

Q33) In simple harmonic motion the ratio of acceleration of the particle to its displacement at any time is measure of

Q34) The period of symbol pendulum is doubled when?

Q35) If metal Bob of a simple pendulum is replaced by a wooden Bob of same mass then its time period will?

Q36) A uniform spring force of constant K is cut into 2 pieces the length of which are in the ratio 1:2. The ratio of the force constant of the shorter and longer pieces is

Q37) The maximum wireless city of a particle executing simple harmonic motion with an amplitude 7mm is 4.4m/s . Determine its period of oscillation

Q38) a body of mass m suspended from spring execute shm calculate ratio of K.E and P.E Of body when it is at a displacement half of its amplitude

Q39) A stretched string of 1m length and mass 5×10^{-4} kg is having tension of 20N if it is plucked at 25cm from one and then it will vibrate with frequency.

Q40) Two uniform string A and B made of steel are made to vibrate under the same tension. If the first over tune of a equals to the second over tune of b and if the radius

of a is twice that of b the ratio of length of string is

Q41) Find the position of the particle when its kinetic energy is equal to potential energy.

Q42) What will be the periodic time when the particle is at 4 cm from the mean position, the magnitude of its velocity is equal to that of its acceleration. The particle executes SHM with an amplitude of 5 cm.

Assertion and Reason Type Questions

In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.

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

(ii) A is true but R is false.

(iii) A is false but R is true.

(iv) Both A and R are false.

Q1. Assertion (A): The empirical mass of ethene is half of its molecular mass.

Reason (R): The empirical formula represents the simplest whole-number ratio of various atoms present in a compound.

Q2. Assertion (A): One atomic mass unit is defined as one-twelfth of the mass of one carbon-12 atom.

Reason (R): Carbon-12 isotope is the most abundant isotope of carbon and has been chosen as the standard.

Q3. Assertion (A): Significant figures for 0.200 are 3 whereas for 200 it is 1.

Reason (R): Zero at the end or right of a number is significant provided they are not on the right side of the decimal point.

Q4. Assertion (A): Combustion of 16 g of methane gives 18 g of water.

Reason (R): In the combustion of methane, water is one of the products.

Case Based Questions:

Read the passage and answer the following question:

The uncertainty in the experimental or the calculated values is indicated by mentioning the number of significant figures. Significant figures are meaningful digits which are known with certainty plus one which is estimated or uncertain. The uncertainty is indicated by writing the certain digits and the last uncertain digit. there are certain rules for determining the Number of significant figures. These are Stated below:

- All non-zero digits are significant. For Example in 285 cm, there are three Significant figures and in 0.25 mL, there are two significant figures.
- Zeros preceding to first non-zero digit are not significant. such zero indicates the position of decimal point. thus, 0.03 has one significant figure and 0.0052 has two significant figures.
- Zeros between two non-zero digits are significant. thus, 2.005 has four Significant figures.
- Zeros at the end or right of a number are significant, provided they are on the right side of the decimal point. For example, 0.200 g has three significant figures. But, if otherwise, the terminal zeros are not significant if there is no decimal point.

Precision refers to the closeness of various measurements for the same quantity. However, accuracy is the agreement of a particular valueto the true value of the result.

Q1. What are significant figures?

Q2. Write the number of significant figures in the following:

(i) 1000.0 (ii) 100

Q3. How precision and accuracy arediffers with each other?

Q4. Express the following in term of scientific notation

(a) 0.0001 (b) 10695

Multiple Type Questions

Q1.Which has maximum number of atoms?
(a) 24 g of C (12) (b) 56 g of Fe (56) (c) 27 g of Al (27) (d) 108 g of Ag (108)

Q2Number of water molecules present in a drop of water (volume 0.0018 ml) at room temperature is
(a) 6.023×10^{19} (b) 1.084×10^{18} (c) 4.84×10^{17} (d) 6.023×10^{23}

Q3The modem atomic weight scale is based upon
(a) ^{12}C (b) ^{12}O (c) ^{1}H (d) ^{13}C

Q4 How many moles of carbon in 36 g of carbon

(a) 2moles (b) 3moles (c) 1moles (d) 0.5moles

Q5.The formula which represent exact number of different atom in compound called:

(a) Empirical formula (b) Molecular formula (c) Structural formula (d) all of these

Q6. Which of the following pairs of gases contains the same number of molecules?

(a) 16 g of O_2 and 14 g of N_2 (b) 6 g of O_2 and 22 g of CO_2

(c) 28 g of N_2 and 22 g of CO_2 (d) 32 g of CO_2 and 32g of N_2

Q7. A measured temperature on Fahrenheit scale is 200F. What will this reading be on the Celsius Scale?

(a) 40 ℃ (b) 94 ℃ (c) 93.3 ℃ (d) 30 ℃

Q8. The mass of an atom of carbon is ————.

(a) 1g (b) 1.99×10^{-23} g (c) 1/12 g (d) 1.99×10^{23} g

Q9The smallest particle that can take part in chemical reactions is ————.

(a) Atom (b) molecule (c) Both (a) and (b) (d) none of these

Q10. Formation of SO_2 and SO_3 illustrates the law of ————.

(a) Law of conservation of mass (b) Law of Reciprocal proportion

(c) Law of Constant Proportion (d) Law of Multiple Proportion

Q11.Which of the following depends on temperature.

(a) mole fraction(b) molality (c) molarity (d) mas percentage

Q12.What is the mass percentage of hydrogen in water

(a) 11.1% (b) 31.3% (c) 45% (d) 88.89%

CH: 2-STRUCTURE OF ATOM

Assertion and Reason Type Questions

In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.
(i) Both A and R are true and R is the correct explanation of A.
(ii) A is true but R is false.
(iii) A is false but R is true.
(iv) Both A and R are false.

Q1.Assertion : Black body is an ideal body that emits and absorbs radiations of all frequencies.
Reason : The frequency of radiation emitted by a body goes from a lower frequency to higher frequency with an increase in temperature.

Q2.Assertion : The radius of the first orbit of hydrogen atom is 0.529Å.
Reason : Radius of each circular orbit (rn) – 0.529Å (n^2/Z), where n = 1, 2, 3 and Z = atomic number.

Q3.Assertion : Number of photon emitted is depend on intensity of light.

Reason : There is no time lag between incident of light and ejection of electron from metal surface.

Q4.Assertion : Isotopes having similar chemical properties

Reason : Chemical properties of elements depend upon no of electron.

Case Based Questions:

Read the passage and answer the following question:

A number of atoms of some elements have the same atomic number but different mass numbers. For example, hydrogen atom, it has three atomic species, namely Protium, Deuterium and Tritium. The atomic number of each one is 1, but the mass number is 1, 2 and 3, respectively. On the basis of these examples, isotopes are defined as the atoms of the same element, having the same atomic number but different mass numbers. Therefore, we can say that there are three isotopes of hydrogen atom, namely protium, deuterium and tritium.

Many elements consist of a mixture of isotopes. Each isotope of an element is a pure substance. The chemical properties of isotopes are similar but their physical properties are different.

The mass of an atom of any natural element is taken as the average mass of all the naturally occurring atoms of that element. If an element has no isotopes, then the mass of its atom would be the same as the sum of protons and neutrons in it. But if an element occurs in isotopic forms, then we have to know the percentage of each isotopic form and then the average mass is calculated.

Chemical properties of all the isotopes of an element are the same. Some isotopes have special properties which find them useful in various fields. Such as, an isotope of uranium is used as a fuel in nuclear reactors, isotope of cobalt is used in the treatment of cancer, iodine is used in the treatment of goiter.

Q1.Name the isotopes used in the treatment of goiter.

Q2.Write the formula to calculate the average atomic mass of isotopes of an element.

Q3.Name the isotopes of hydrogen which is radioactive in nature?

Q4.An element with mass number 81 contains 31.7% more neutrons as compared to protons. Assign the symbol to the element.

Multiple Type Questions:

Q1. According to Aufbau principle a new electron enters the orbitals when:

(a) (n + l) is minimum(b) (n + l) is maximum(c) (n + m) is minimum(d) (n + m) is maximum

Q2.Which of the following is not permissible?

(a) n= 4, l = 3, m= 0 (b) n= 4, l = 2, m= 1 (c) n= 4, l = 4, m= 1 (d) n= 4, l = 0, m= 0

Q3. The number of nodal planes in P_x orbital is:

(a) One (b) Two (c) Three (d) Four

Q4 Azimuthal quantum number determines the
(a) size (b) spin (c) orientation (d) angular momentum of orbitals

Q5. The electronic configuration of Cu^{2+} ion is
(a) [Ar] $4s^1$ $3d^8$ (b) [Ar] $4s^2$ $3d^{10}$ $4p^1$ (c) [Ar] $4s^1$ $3d^{10}$ (d) [Ar] $3d^9$

Q6.The line spectrum of hydrogen obtained in the visible region of light corresponds to
(a) Lyman series(b) Balmer series(c) Paschen series(d) Brackett series

Q7. The quantum numbers + 1/2 and – 1/2 for the electron spin represent
(a) rotation of the electron in clockwise and anticlockwise direction respectively
(b) rotation of the electron in anticlockwise and clockwise direction respectively
(c) magnetic moment of the electron pointing up and down respectively
(d) two quantum mechanical spin states which have no classified analogue

Q8The last entering electron in an element has quantum number n = 3, l = 2, m = + 2 and s = + 1 /2. The atomic number of the element will be
(a) 13 (b) 21 (c) 29 (d) 39

Q9. Bohr atomic model can explain
(a) the spectrum of hydrogen atom only (b) the spectrum of hydrogen molecule
(c) spectrum of an atom or ion containing one electron only(d) the solar spectrum

Q10.Magnetic quantum number specifies
(a) orbital size (b) orbital shape (c) orbital orientation (d) nuclear stability

Q11.The electronic configuration of an element is $1s^2$ $2s^2$ $2p^6$ $3s^2$ $3p^6$ $3d^5$ $4s^1$. It represents
(a) excited state (b) cationic states (c) ground state (d) anionic state

Q12. The total number of orbitals in a shell having principal quantum n is
(a) 2n (b) n^2 (c) $2n^2$ (d) (n + 1)

CH: 3 -CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

Assertion -Reasoning Questions
Directions: Use the following keys to choose the appropriate answer.
a) Assertion and Reason are correct and Reason is the correct explanation of Assertion.
b) both Assertion and Reason are correct but Reason is not correct explanation of Assertion.
c) Assertion is correct and Reason is incorrect
d) Assertion is incorrect and Reason is correct
Assertion reasoning questions

Q1. Assertion: Nitrogen and oxygen are the main components of the atmosphere but these two do not react to form oxides of Nitrogen.
Reason: The reaction between nitrogen and oxygen requires high temperature.

Q2.Assertion: Pb^{4+} compounds are stronger oxidising agents than Sn^{4+} compounds .
Reason: The higher oxidation states for the group 14 elements are more stable for the heavier members of the group due to the inert pair effect.

Q3.Assertion :The first ionization energy of Be is greater than that of B .
Reason :2p orbital is lower in energy than 2s

Q4.Assertion: Atom has a less negative electron affinity then Cl atom.
Reason :Additional electrons are repelled more effectively by 3p electrons in Cl atom then by 2p electrons in f atom.

Case Based Questions:

Read the passage and answer the following question:

The removal of an electron from an atom results in the formation of cation where as gain of electron leads to the anion. In general the ionic radii of elements exhibit the same trend as the atomic radii. A cation is smaller than its atom because it has fewer electrons while its nuclear charge remains the same.The size of an anion will be larger than that of the parent atom because the addition of one or more electrons would result in increased repulsion among the electrons and the decrease in effective nuclear charge.
Q1. Out of Mg and Mg^{2+} which one is larger in size?
Q2. Out of Mg^{2+} and Al^{3+} which one is larger in size ?
Q3 What are isoelectronic species? Explain with example.
Q4. How does the atomic radii varies among isoelectronic species?

Multiple Type Questions:

Q1.The statement that is not correct for periodic classification of elements is:
(a)the properties of the elements are the periodic function of atomic number
(b) non metallic elements are lesser in numbers and metallic elements
(c)first ionization energy of elements along a period do not very in a regular manner with increase in atomic number
(d)for transition elements that d subshells are filled with electrons monotonically with increase in the atomic number.

Q2. Which among the following is most reactive ?
(a)Cl_2 (b) Br_2 (c) I_2 (d) ICl

Q3 .Which one has the highest boiling point ?
(a)He (b)Ne (c) Kr (d)Xe

Q4.Which of the following represents the correct order of increasing first ionization enthalpy for Ca,Ba,S,Se&Ar
(a)Ca< S< Ba< Se <Ar (b)S <Se <Ca < Ba< Ar
(c)Ba< Ca <Se S <Ar (d)Ca <Ba <S <Se <Ar

Q5. Identify the least stable iron amongst the following
(a)Li +. (b) Be - (c)B - (d)C-

Q6. The element with the highest first ionization potential is
(a) Boron (b) carbon (c) nitrogen. (d) oxygen

Q7. The electronegativity of the following elements increase in the order of
(a) C N Si P (b) N Si C P. (c) Si C P N. (d) P Si N C

Q8. The incorrect statement about the following .
(a) the I ionization potential of Al is less than that of first ionization potential of Mg
(b)II ionization potential of Mg is greater than second ionization potential of Na
(c) the I ionization potential of Na is less than that of first ionization potential of Mg
(d)the III ionization potential of Mg is greater than third ionization potential of Na

Q9 Which of the following has maximum number of unpaired electrons?
(a)Mg^{2+} (b)Ti^{3+} (c)V^{3+} (d)Fe^{2+}

Q10. Which has most stable + 2 oxidation state ?
(a) Sn (b)Pb (c) Fe (d)Ag

Q11. The element with atomic number 57 belongs to
(a) s- block (b)p- block (c)d- block (d)f -block

Q12. The period number in the long form of periodic table is equal to
a) magnetic quantum number of any element of the period
b) atomic number of any element of the period
c) maximum principal quantum number of any element of the period
d)maximum Azimuthal quantum number of any element of the period.

CH: 4-CHEMICAL BONDING AND MOLECULAR STRUCTURE

Assertion and Reason Type Questions: In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.

(i) Both A and R are true and R is the correct explanation of A.
(ii) A is true but R is false.
(iii) A is false but R is true.
(iv) Both A and R are false.

Q1Assertion: Both methane and ammonia are SP^3hybridized.

Reason: Methane is tetrahedral and ammonia is pyramidal

Q2.Assertion: Water exit in liquid state.

Reason: Water molecules associated together with hydrogen bonding

Q3. Assertion: Helium does not exist in He_2 molecule.

Reason: Bond order of helium is zero.

Q4.Assertion: NaCl is a good conductor of heat and electricity in molten and liquid form.

Reason:NaCl does not furnish ions in molten state.

Case Based Questions:

Read the passage and answer the following question:

The arrangement of electron pairs and the atoms around the central atom can be : linear, Trigonal planar, tetrahedral, trigonal-Bipyramidal and octahedral . Valence bond theory was introduced by Heitler and London (1927) and developed Further by Pauling and others. A discussion Of the valence bond theory is based on the knowledge of atomic orbital's, electronic Configurations of elements partial merging of atomic orbital's is called overlapping of atomic orbital's which results in the pairing of electrons. The extent of overlap decides the strength of a covalent bond .according to orbital overlap concept, the formation of a covalent bond between two atoms results by pairing of electrons present in the valence shell having opposite spins. When orbital's of two atoms come close to form bond, their overlap may be positive, negative or zero depending upon the sign and direction of orientation of amplitude of orbital wave function in space. Positive and negative sign on boundary surface diagrams in the show the sign (phase) of orbital wave function and are not related to charge. Orbital's forming bond should have same

sign(phase) and orientation in space. This is called positive overlap. The criterion of overlap, as the main factor for the formation of covalent bonds applies uniformly to the homonuclear/ heteronuclear diatomic molecules and polyatomic molecules.

Q1.How many sigma and pie bond in ethane?

Q2.Why water has bent shape and ammonia is tetrahedral while both have SP^3 hybridized?

Q3.Predict the shape of molecules in the following: $SiCl_4$, AsF_5,

Q4.Why is the shape of XeF_2 is linear?

Multiple Type Questions:

Q1.Which molecule/ion out of the following does not contain unpaired electrons?
(a) N^+_2 (b) 0_2 (c) O_2^{2-} (d) B_2

Q2.In $N0^-_3$ ion, the number of bond pairs and lone pairs of electrons on nitrogen atom are
(a) 2, 2 (b) 3, 1 (c) 1,3 (d) 4, 0

Q3.Hydrogen bonds are formed in many compounds e.g., H_20, HF, NH_3. The boiling point of such compounds depends to a large extent on the strength of hydrogen bond and the number of hydrogen bonds: The correct decreasing order of the boiling points of above compounds is
(a) $HF>H_20>NH_3$ (b) $H_20>HF>NH_3$ (c) $NH_3>HF>H_20$ (d) $NH_3>H_20>HF$

Q4.The types of hybrid orbitals of nitrogen in $N0_2$, $N0_3$ and NH_4 respectively are expected to be
(a) sp, sp^3 and sp^2 (b) sp, sp^2 and sp^3 (c) sp^2, **sp** and sp^3 (d) sp^2, sp^3 and sp

Q5.Polarity in a molecule and hence the dipole moment depends primarily on electronegativity of the constituent atoms and shape of a molecule. Which of the following has the highest dipole moment?
(a) $C0_2$ (b) HI (c) H_20 (d) $S0_2$

Q6.In which of the following molecule/ion all the bonds are not equal?
(a) XeF_4 (b) BF^-_4 (c) C_2H_4 (d) SiF_4

Q7.In which of the following substances will hydrogen bond be strongest?
(a) HCl (b) H_20 (c) HI (d) H_2S

Q8.Which of the following angle corresponds to sp^2 hybridisation?
(a) 90° (b) 120° (c) 180° (d) 109°

Q9.If the electronic configuration of an element is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^2\ 4s^2$, the four electrons involved in chemical bond formation will be .
(a) $3p^6$ (b) $3p^6, 4s^2$ (c) $3p^6, 3d^2$ (d) $3d^1,4s^2$

Q10. Which of the following options represents the correct bond order?
(a) $o_2>o_2>o^+_2$ (b) $o^-_2<o_2<o_2$ (c) $o_2>o_2<o_2$ (d) $o^-_2<o_2>o^+_2$

Q11.The electronic configuration of the outermost shell of the most electronegative element is
(a) $2s^22p^5$ (b) $3s^23p^5$ (c) $4s^24p^5$ (d) $5s^25p^s$

Q12. Amongst the following elements, whose electronic configurations are given below, the one having the highest ionization enthalpy is
(a) $[Ne]3s^23p^1$ (b) $[Ne]3s^23p^3$ (c) $[Ne]3s^23p^2$ (d) $[Ar]3d^{10}4s^24p^3$

CH: 5-THERMODYNAMICS

Assertion -Reasoning Questions

Directions: Use the following keys to choose the appropriate answer.
(a) Assertion and Reason are correct and Reason is the correct explanation of Assertion.

(b) both Assertion and Reason are correct but Reason is not correct explanation of Assertion.
(c) Assertion is correct and Reason is incorrect
(d) Assertion is incorrect and Reason is correct

Q1 Assertion: The enthalpy of formation of gaseous oxygen molecule and 298k under a pressure of atm is zero .
Reason: The entropy of formation of gaseous oxygen molecules under the same condition is zero.

Q2. Assertion: Decrease in free energy causes spontaneous reaction .
Reason :Spontaneous reactions are in variable exothermic reactions.

Q3. Assertion : Temperature of a gas does not change when it undergoes and adiabatic expansion.
Reason :During an adiabatic process the container should be perfect conductor

Q4.Assertion:ΔH&ΔE are almost the same for the reaction, N2(g)+ O2(g) →2 NO(g)
Reason: all reactants and products are gases

Case Based Questions:

Read the passage and answer the following question:
We know that the heat absorbed constant volume is equal to change in internal energy that is ΔU=qv. But most of chemical reactions are carried out not at constant volume but in flasks or test tubes under constant atmospheric pressure. We need to define another state function which may be suitable under these conditions. Enthalpy is generally a measure of internal energy at constant pressure and not at constant volume. Enthalpy is a more inclusive parameter to express energy changes associated with the system under consideration and the state function which has its value independent of the path taken by the system .
Q1. What is the enthalpy change for an exothermic process?
Q2.Write the expression for the enthalpy change of gases system?
Q3 .What is an extensive property?
Q4. What will be the value of enthalpy change if the process is carried out at constant volume?

Multiple Type Questions:

Q1. A well stopper thermos flask contains some ice cubes, this is an example of :
(a) closed system (b)open system (c)isolated system. (d) non thermodynamic system

Q2. Given that
i) $C(s) + O_2(g) \rightarrow CO_2$; $\Delta H° = -xkJ$
ii) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$; $\Delta H° = -ykJ$
The enthalpy of formation of carbon monoxide will be
(a) y-2x (b) (2x-y)/2 (c) (y-2x)/2. (d) 2x-y

Q3. The word standard in molar enthalpy change implies :
(a) temperature 298k (b) pressure 1atm
(c)temperature 298k and pressure 1atm (d)Any temperature and pressure

Q4.The value ofΔH&ΔS for the reaction
$C(graphite) + CO_2(g) \text{-------} CO_2(g)$

are 170 kJ and 170 JK ^- 1 respectively. The reaction will be spontaneous at
(a) 910K (b)1110K (c) 510 K (d) 710K

Q5. The enthalpy change in a reaction does not depend upon
(a) the state of reactants and products (b) the nature of reactants and products
(c) different intermediate steps in the reaction (d) initial and final enthalpy of the reaction

Q6. Heat exchange in a chemical reaction at constant temperature and pressure is called.....
(a)internal energy (b) enthalpy (c) entropy (d)free energy

Q7. When a liquid boils there is
(a)an increase in entropy (b)a decrease in entropy
(c)an increase in heat of vaporization (d)an increase in free energy

Q8. Bond dissociation enthalpy of H_2,Cl_2 and HCl are 434, 242 and 431kJ/mol respectively. Enthalpy of formation of HCL is:
(a)-93 kJ/mol (b)245 kJ/mol (c) 93 kJ/mol (d) - 245 kJ/mol

Q9. The internal energy change when a system goes from by state A to B is 40 kJ/ mole .If the system goes from A to B by a reversible path and returns to state A by an irreversible path what would be the net change in internal energy?
(a) >40J. (b) <40kJ. (c) zero. (d) 40kJ

Q10 The enthalpy change for a reaction does not depend upon
(a)use of different reactants for same product
(b)nature of intermediate reaction steps
(c) the differences in initial and final temperatures of involved substances
(d)the physical states of reactants and products

Q11. If liquid A and B forms an ideal solution
(a) the entropy of mixing is zero
(b)the free energy of mixing is zero
(c) the free energy as well as entropy of mixing are each zero
(d) the enthalpy of mixing is zero

Q12.If 298K the bond energies of C-H,C-C, C=C & H-H bonds are respectively 414, 347, 615 & 435kJ/mol, the value of enthalpy change for the reaction:
(a)-250kJ. (b) +125kJ. (c) -125kJ. (d) +250kJ

CH: 6 EQUILIBRIUM

Assertion and Reason Type Questions

In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.
(i) Both A and R are true and R is the correct explanation of A.
(ii) A is true but R is false.
(iii) A is false but R is true.
(iv) Both A and R are false.

Q1. Assertion: Buffer system of carbonic acid and sodium bicarbonate is used for the precipitation of hydroxides of third group elements.
Reason: It maintains the pH to a constant value, about 7.4.

Q2. Assertion: K_p can be less than, greater than or equal to K_c.
Reason: Relation between K_p and K_c depends on the change in number of moles of gaseous reactants and products (Δn).

Q3. Assertion: The substance which gives lone pair of electron is known as Lewis base.
Reason: Water is act as Lewis acid

Q4. Assertion: For every chemical reaction at equilibrium, standard Gibbs energy of the reaction is zero.
Reason: At constant temperature and pressure, chemical reactions are spontaneous in the direction of the decreasing Gibbs energy.

Case Based Questions:

Reactants and products coexist at equilibrium, so that the conversion of reactant to products is always less than 100%. Equilibrium reaction may involve the decomposition of a covalent (nonpolar) reactant or ionization of ionic compound into their ions in polar solvents. Ostwald dilution law is the application of the law of mass action to the weak electrolytes in solution.
A binary electrolyte AB which dissociates into A^+ and B^- ions i.e.

$$AB \rightleftharpoons A^+ + B^-$$

for every weak electrolyte, Since $\alpha << 1$ $(1 - \alpha) = 1$

$$K = C\,\alpha^2 \Rightarrow \alpha = \sqrt{\frac{K}{C}} \Rightarrow \alpha = \sqrt{KV}\,.$$

Q1.State and derive dissociation constant for weak acid.
Q2.Derive the relation between K_a and K_b
Q3. A monobasic weak acid solution has a molarity of 0.005 M and pH of 5. What is its percentage ionization in this solution?
Q4. Definen degree of dissociation.

Multiple Type Questions:

Q1.Ostwald's dilution law is applicable to:

(a) Strong electrolytes only (b) Weak electrolyte only

(c) Non-electrolytes (d) Strong and weak electrolytes

Q2.The pH of a solution of hydrochloric acid is 4. The molarity of the solution is:

(a) 4.0 (b) 0.4 (c) 0.0001 (d) 0.04

Q3.Which of the following pairs constitutes a buffer?

(a) NaOH and HCl (b) HNO_3 and NH_4NO_3 (c) HCl and KCl (d) HNO_2 and $NaNO_2$

Q4.Le Chatelier's principle is applicable to:

(a) only homogeneous chemical reversible reactions

(b) only heterogeneous chemical reversible reactions

(c) only physical equilibria

(d) all systems, chemical or physical in equilibrium.

Q5.Which of the following is the weakest base?

(a) NaOH (b) $Ca(OH)_2$ (c) NH_4OH (d) KOH

Q6.When NH_4Cl is added to NH_4OH solution the dissociation of ammonium hydroxide is reduced. It is due to:

(a) common ion effect (b) hydrolysis (c) oxidation (d) reduction

Q7.For the reversible reaction

N_2 (g) + $3H_2$(g) ⇋ $2NH_3$ + Heat

The equilibrium shifts in forward direction

(a) by increasing the concentration of NH_3(g)

(b) by decreasing the pressure

(c) by decreasing the concentration of N_2 and H_2

(d) by increasing pressure and decreasing temperature

Q8.A base according to Bronsted concept is a substance which can:

(a) lose pair of electron (b) donate protons (c) gain a pair of electrons (d) accept protons

Q9.we know that the relationship between K_c and K_p is $K_p = K_c(RT)^{\Delta n}$ What would be the value of Δn for the reaction $NH_4Cl(s)$ ⇆ $NH_3(g)$ + HCl(g)?
(a) 1 (b) 0.5 (c) 1.5 (d) 2

Q10,PCl_5, PCl_3 and Cl_2 are at equilibrium at 500 K in a closed container and their concentrations are 0.8 x 10"^{3} $molL^{-1}$, 1.2 x 10^{-3} mol L^{1} and 1.2 x 10^{-3} mol L^{-1} The value of K_c for the reaction $PCl_5(g)$ ⇌$PCl_3(g)$ + $Cl_2(g)$ will be
(a) 8 x 10^3 $molL^{-1}$ (b) 1.8 x 10^{-3} $molL^{-1}$ (c) 1.8 x 10"^{3} $molL^{-1}$ (d) 0.55 x 10^4 $molL^{-1}$

Q11.The pH of neutral water at 25°C is 7.0. As the temperature increases, ionization of water increases, however, the concentration of H^+ ions and OH^- ions are equal. What will be the pH of pure water at 60°C?
(a) Equal to 7.0 (b) Greater than 7.0 (c) Less than 7.0 (d) Equal to zero

Q12.What will be the correct order of vapour pressure of water, acetone and ether at 30°C? Given that among these compounds, water has maximum boiling point and ether has minimum boiling point.
(a) Water < Ether < Acetone (b) Water < Acetone < Ether
(c) Ether < Acetone < Water (d) Acetone < Ether < Water

CH: 7 REDOX REACTIONS

Assertion -Reasoning Questions

Directions: Use the following keys to choose the appropriate answer.
(a) Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) both Assertion and Reason are correct but Reason is not correct explanation of Assertion.
(c) Assertion is correct and Reason is incorrect
(d) Assertion is incorrect and Reason is correct

Q1. Assertion : Among halogens fluorine is the best oxidant .
Reason : Fluorine is the most electronegative atom.

Q2. Assertion: Fe reacts with HCl to produce H_2 gas .
Reason: Fe is better oxidising agent than H_2.

Q3. Assertion: When Zinc rod is dipped in copper nitrate solution blue colour of solutions start fading.
Reason: In this reaction zinc gets reduced and Cu^{2+} ions get oxidized

Q4 Assertion: In this reaction between potassium permanganate and potassium iodide ,permanganate ions acts as oxidizing agent.

Reason: Oxidation state of Manganese changes from +2 to +7 during the reaction.

Case Based Questions:

Read the passage and answer the following question:
In order to keep a track of electron shifts in chemical reaction involving formation of covalent compounds ,a more practical method of using oxidation number has been developed. In this method it is always assumed that there is a complete transfer of electron from a less electronegative atom to a more electronegative atom. Oxidation number provides a more comprehensive view of valence of atoms. Oxidation number denotes the oxidation state of an element in a compound ascertained according to a set of rules formulated on the basis that electron pairing covalent bond belongs entirely do more electronegative element.

Q1. What is oxidation number state of oxygen in peroxide linkage?

Q2 describe an oxidizing agent in terms of oxidation number

Q3. What is the oxidation number of sulphur in CuSO4 and chromium in Cr_2O_3

Q4. Justify that
$CuO(s) + H_2(g) \rightarrow Cu(s) + H_2O(g)$

Multiple Type Questions:

Q1. The oxidation number of an element in a compound is evaluated on the basis of certain rules which of the following rule is not correct in this respect?
(a) Number of hydrogen is always +1
(b) algebraic sum of all the oxidation numbers in a compound is zero .
(c)An element in the free or the uncombined state bears oxidation number zero
(d) in all the compounds the oxidation number of fluorine is -1

Q2. In which of the following compounds and element exhibits two different oxidation states?
(a)NH_2OH. (b)NH_4NO_3 (c) N_2H_4 (d)N_3H

Q3. Which of the following elements does not show disproportionation tendency ?
(a) Cl. (b) Br. (c) F. (d) I

Q4. Identify disproportionation reaction

(a) $CH_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O$
(b) $CH_4 + 4\ Cl_2 \rightarrow CCl_4 + 4\ HCl$
(c) $2F_2 + 2\ OH\text{------}2F^- + OF_2 + H_2O$
(d) $2NO_2 + 2OH\text{------} NO_2^- + NO_3^- + H_2O$

Q5. The largest oxidation number exhibited by an element depends on its outer electronic configuration .With which of the following outer electronic configurations the element will exit exhibit largest oxidation number.
(a)$3d^1\ 4s^2$. (b)$3d^3\ 4s^2$ (c)$3d^5\ 4s^1$. (d)$3d^5\ 4s^2$

Q6. From the following statements regarding H_2O_2 choose the incorrect statement.
(a) it can act only as an oxidizing agent.
(b)it decomposes on exposure to light.

(c)it has to be stored in plastic or wax lined glass bottles in dark.
(d) it has to be kept away from dust

Q7. The reaction,
3 ClO-(aq)------ClO^3 -(aq) + 2 Cl - (aq) is an example of
(a) Oxidation reaction (b) reduction reaction
(c) disproportionation reaction (d) decomposition reaction

Q8. The oxidation number of sulphur in S_8 respectively are
(a) 0,+1 and -2. (b) +2,+1 and -2 (c)0,+1 and +2 (d)-2,+ 1 and -2

Q9. The oxidation number of phosphorus in$Ba(H_2PO_2)_2$ is
(a)+3. (b)+2. (c)+1. (d)-1

Q10 From the given species , which of the following is a strongest reducing agent ?
(a) Na (b) Li (c)Ca (d) K

Q11. In the redox reaction:MnO_4- + 8H+ +5Br- →Mn^{2+} +4H $_2$O +5/2Br_2
Which one is reducing agent?
(a) H+. (b) MnO_4-. (c)Br_2. (d) Mn^{2+}
Q12 In which of the following oxidation number of chlorine is + 5?
(a)Cl-. (b) ClO-. (c) ClO_2-. (d)ClO_3-

CH: 8-ORGANIC CHEMISTRY: SOME BASIC PRINCIPLES AND TECHQNIUES

Assertion and Reason Type Questions

In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.
(i) Both A and R are true and R is the correct explanation of A.
(ii) A is true but R is false.
(iii) A is false but R is true.
(iv) Both A and R are false.

Q1.**Assertion:** The general formula for a dihydric alcohol is $C_nH_{2n}(OH)_2$
Reason: Ethylene glycol is a dihydric alcohol

Q2.**Assertion:** Chain isomerism is observed in compounds containing four or more than four carbon atoms
Reason: Only alkanes show chain isomerism

Q3.**Assertion:** But-1-ene and 2-methylprop-1-ene are position isomers.
Reason: Position isomers have same molecular formula but differ in position of functional group or C = C.

Q4 **Assertion:** Aniline is better nucleophile than anilium ion.
Reason: Anilium ion have +ve charge.

Case Based Questions:

Read the passage and answer the following question:
The existing large number of organic compounds and their ever-increasing numbers has made it necessary to classify them on the basis of their structures. Organic compounds are broadly classified as open-chain compounds which are also called aliphatic

compounds. Aliphatic compounds further classified as homocyclic and heterocyclic compounds. Aromatic compounds are special types of compounds. Alicyclic compounds, aromatic compounds may also have heteroatom in the ring. Such compounds are called heterocyclic aromatic compounds. Organic compounds can also be classified on the basis of functional groups, into families or homologous series. The members of a homologous series can be represented by general molecular formula and the successive members differ from each other in molecular formula by a $-CH_2$ unit.

Q1. What is aliphatic compound explain with example

Q2. What is homologous series? Write any two characteristics of homologous series.

Q3.What is functional group?

Q4. What is aromatic compound explain with example.

Multiple Type Questions:

Q1.The addition of carbonyl compound to HCN is an example of

(a) Nucleophilic substitution(b) Electrophilic addition(c) Nucleophilic addition(d) Electrophilic substitution

Q2.Nucleophilicity order is correctly represented by

(a) $CH_3^- < NH_2^- < HO^- < F^-$ (b) $CH_3^- > NH_2^- > HO^- > F^-$

(c) $NH_2^- > F^- > HO^- > CH_3^-$ (d) $CH_3^- \simeq NH_2^- > HO^- \simeq F^-$

Q3.The IUPAC name of CH_3CHO is:

(a) Acetaldehyde(b) Methylaldehyde(c) Formyl chloride(d) Ethanal

Q4.The structure of 4-Methylpent-2-en-1-ol is:

(a) $CH_3CH_2CH=CHCH_2OH$ (b) $(CH_3)_2C=CHCH_2CH_2OH$

(c) $(CH_3)_2CHCH=CHCH_2OH$ (d) $CH_3CH(OH)CH-CH=C(CH_3)_2$

Q5.In which of the following, functional group isomerism is not possible?

(a) Alcohols (b) Aldehydes (c) Alkyl halides (d) Cyanides

Q6.Electrophiles are electron seeking species. Which of the following groups contains only electrophiles?

(a) BF_3, NH_3, H_2O (b) $AlCl_3, SO_3, \dot{N}O_2^+$

(c) $NO_2^+, CH_3^+, CH_3-C=O$ (d) $C_2H_5^-, \dot{C}_2H_5, C_2H_5^+$

Q7.Electrophilic addition reactions proceed in two steps. The first step involves the addition of an electrophile. Name the type of intermediate formed in the first step of the following addition reaction.

$H_3C\text{-}HC = CH_2 + H^+ \rightarrow$?

(a) 2°Carbanion (b) 1° Carbocation (c) 2° Carbocation (d) 1°Carbanion

Q8.Which of the following the correct IUPAC name?

(a) 3-Ethyl-4,4-dimethylheptane (b) 4,4-Dimethyl-3-ethylheptane

(c) 5-Ethyl-4,4-dimethylheptane (d) 4,4-Bis(methyl)-3-ethylheptane

Q9.Nucleophile is a species that should have

(a) a pair of electrons to gain (b) positive charge

(c) negative charge (d) electron deficient species

Q10.Hyperconjugation involves delocalization of .

(a) electrons of carbon-hydrogen σ bond of an alkyl group directly attached to an atom of unsaturated system.

(b) electrons of carbon-hydrogen σ bond of aryl group directly attached to the positively charged carbon atom.

(c) π-electrons of carbon-carbon bond.

(d) lone pair of electrons.

Q11.Correct order of stability of carbocation;

(a) $1^0>2^0>3^0$(b) $1^0>3^0>2^0$(c) $3^0>2^0>1^0$(d) $2^0>1^0>3^0$

Q12.Correct order of stability of carbanion;

(a) $1^0>2^0>3^0$ (b) $1^0>3^0>2^0$ (c) $3^0>2^0>1^0$ (d) $2^0>1^0>3^0$

CH: 9-HYDROCARBON

Assertion and Reason Type Questions

In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct option out of the choices given below each question.

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

(ii) A is true but R is false.

(iii) A is false but R is true.

(iv) Both A and R are false.

Q1.Assertion : Boiling point of alkanes increases with increase in molecular weight.
Reason : van der Waal's forces increase with increase in molecular weight.

Q2.Assertion : Benzene on heating with conc. H_2SO_4 gives benzene sulphonic acid which when heated with superheated steam under pressure gives benzene.
Reason :Sulphonation is a reversible process.

Q3.Assertion : Sodium acetate on Kolbe's electrolysis gives methane.
Reason : Methyl free radical is formed at anode.

Q4. Assertion : Methane cannot be obtained by Wurtz reaction.
Reason :Wurtz reaction leads to the formation of symmetrical alkane having an even number of carbon atoms

Case Based Questions:

Read the passage and answer the following question:

The rotation of carbon-carbon single bond (s-bond), due to cylindrical symmetry of s-MOs (molecular orbitals) long internuclear axis, in alkanes results into different spatial arrangements of atoms in space, that are inter convertible. These arrangements are called conformations.

However, weak repulsive interaction are present between the adjacent bonds in alkanes so the rotation of C—C single bond is not completely free and is hindered by a small energy barriers of 1-20 kJ mol^{-1}. The repulsive interaction between the adjacent bond is due to electron cloud. The two types of conformations are very common, i.e., staggered and eclipsed.

The conformation in which the hydrogen atoms attached to the two carbon atoms are as far apart as possible is called the staggered conformation. The conformations in which the hydrogen atoms attached to the two carbon atoms are as closed as possible is called eclipsed conformation. Any intermediate conformation between the above two is called skew or gauche conformation.

Q1. What is rotamers?.

Q2.Why the different conformations of ethane are cannot be separated and isolated?

Q3. What is torsional strain?

Q4 Differentiate eclipsed and staggered confermations

Multiple Type Questions:

Q1. Arrange the following ia decreasing order of their boiling points.
A- n-ButaneB- 2-MethylbutaneC- n-PentaneD- 2,2-Dimethylpropane

(a) A > B > C > D (b) B > C > D > A (c) D>C>B>A (d) C >B>D > A

Q2.Arrange the halogens F_2, Cl_2, Br_2 and I_2 in order of their increasing reactivity with alkanes.

(a) $I_2 < Br_2 < Cl_2 < F_2$ (b) $Br_2 < Cl_2 < F_2 < I_2$ (c) $F_2 < Cl_2 < Br_2 < I_2$ (d) $Br_2 < I_2 < Cl_2 < F_2$

Q3.When acetylene is treated with HBr, the product is ———-

(a) Methyl bromide(b) Ethylene bromide(c) Ethyl bromide(d) Ethylidene bromide

Q4. When acetylene is treated with HBr, the product is ———-

(a) Methyl bromide(b) Ethylene bromide(c) Ethyl bromide(d) Ethylidene bromide

Q5.The dihedral angle in the staggered conformation of C2H6 is

(a) 120^0 (b) 60^0 (c) 0^0 (d) 90^0

Q6. Bond length of (I) ethane, (II) ethene, (III) acetylene and (IV) benzene follows the order:

(a) I > II > III > IV (b) I > II > IV> III (c) I > IV > II > III (d) III > IV > II > I

Q7.Which of the following participate in the sulphonation of benzene?

(a) SO_2 (b) SO_3H^+ (c) SO_3 (d) SO_3H^-

Q8 Which one of the following is not an isomer of 3-Methylbut-1-yne?

(a) Pent-1-yne (b) Buta-1,3-diene (c) Pent-2-yne (d) Penta-1,3-diene

Q9. Which of the following can be used as the halide component of a Friedel craft reaction?

(a) Chlorobenzene (b) Bromobenzene (c) Chloroethene (d) Isopropyl chloride

Q10. Which of the compounds show dipole moment?

(a) 1,4-dichlorobenzene (b) 1,2-dichlorobenzene

(c) trans-1,2-dichloroethane (d) trans-but-2-ene

Q11Which of the following compounds will exhibit cis-trans isomerism?

(a) Butanol(b) 2- Butyne(c) 2-Butenol(d) 2-Butene

Q12.What happens when a mixture of acetylene and hydrogen is passed over heated Lindlar's catalyst?

(a) Ethylene and water are formed(b) Ethane and water are formed

(c) Ethylene is formed(d) Acetylene and ethane are formed

Chapter -1

SETS

Multiple Choice Questions (MCQs)

1) The set (A ∩B') ∪ (B ∩ C) is equal to
   (a) A' ∪ B ∩ C (b) A' ∪ B (c) A' ∪ C' (d) A' ∩ B

2) The set S = set of all points inside the square, T = the set of points inside the triangle and C= the set of points inside the circle. If the triangle and circle intersect each other and are contained in a square. Then
   (a) S ∩ T ∩ C = φ (b) S ∪ T ∪ C = C
   (c) S ∪ T ∪ C = S (d) S ∪ T = S ∩ C

3) The elements of set A, satisfy the property $\frac{n}{2n+1'}$ n ∈ $N, n < 5$ for their elements. The elements which does not belong to the set is
   (a) $\frac{3}{5}$ (b) $\frac{4}{9}$ (c) $\frac{1}{3}$ (d) $\frac{5}{11}$

4) The cardinal number of the set of letters of the word 'MATHMATICS' is
   (a) 8 (b) 9 (c) 10 (d) 11

5) All the elements of the set { x : x ∈ z, /x/ ≤ 3 } can be listed as
   (a){ 0,2,3, } (b) {-3, -2, -1, 0,1, 2, 3} (c) { -3, -2, -1, 0} (d) {0,1,2}

6) If x = { 8^n - 7n -1/n ∈ N } $and\ Y$ = { 49n -49/ n ∈N }.
   (a) x c Y (b) y c x (c) X = y (d) X ∩ Y = φ

7) If s = {x/ x is a positive multiple of 3less than 100} and P = {x / x is a prime number less than 20}. Then n (S) + n(P) is
   (a) 34 (b) 31 (c) 33 (d) 41

8) Given set aN = { ax : x ∈N, a is a constant natural number}, then describe the set 4N ∩ 6N is
   (a) 12N (b) N (c) 2N (d) 24N

9) Two finite sets m and n elements. The total number of subsets of the first set is 112 more than the total number of subsets of the second set. The value of m and n are respectively.
   (a) 4, 7 (b) 7, 4 (c) 4,4 (d) 7,7

Assertion Reason Questions

Each of these questions contains two statements Assertion (A) and Reason (R). Each of these questions have four alternative choices, any one of which is the correct answer. You have to select one of the options (a), (b), (c) and (d) given below.

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

10) Assertion : The intersection of two disjoint sets is an empty set.
    Reason : Disjoint sets are sets that have no elements in common. Therefore, the intersection of such sets will have no elements and be an empty set.

11) Assertion : The set of irrational numbers is infinite.
    Reason: The set of irrational numbers includes numbers such as $\sqrt{2}$, $\sqrt{3}$, π,

etc. , which cannot be expressed as fractions and have non-repeating decimal expansions.

12) Assertion : The union of two sets always results in a larger set.
Reason: The union of sets A and B includes all the elements present in both sets, resulting in a set that has at least the same number of elements as the individual sets or more.

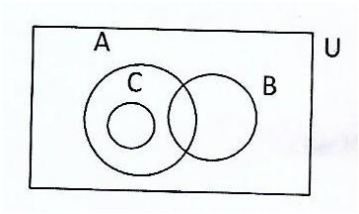
Long Answer Questions

13) Let Set A = { a,b,c,d } , set B = { b,d,e,f,g } and Set C = { a,c,e,f,h,i }, verify that $A \cap (B - C) = (A \cap B) - A \cap C)$.

14) From 50 students taking examinations in Mathematic, Physics and Chemistry, each of the student has passed in at least one of the subject, 37 passed Mathematics, 24 Physics and 43 Chemistry. At most 19 passed Mathematics and Physics, at most 29 Mathematics and Chemistry and at most 20 Physics and Chemistry. What is the largest possible number that could have passed all three examinations ?

15) A surevy shows that 63% of the Americans like cheese whereas 76% like apples. If x% of the Americans like both cheese and apples, find the value of x.

16) In the given Venn diagram, if $n (\cup) = 100$, $N(A) = 60$, $n(B) =48$, $n (A \cap B) =22$ and $n (A \cap C) =30$



(i) Mark the number of elements in each region.
(ii) Find the value of $n(A \cup B)$
(iii) $n (B' \cap C')$

17) Suppose S_1 , S_2 .....S_{30} are thirty sets with 5 elements each and S_1 , S_2 .....S_n are n sets with three elements each. Let $U^{3=}_{i=1} S_i = U^{n}_{j=1} S_j' = S$. Assume that each element of S belongs to exactly 10 of the $S'i_s$ s and exactly 9 of the S'_j s. Find n. [where U - Union of sets]

18) Let A = { 1,2, {3,4}, 5}, State as 'True' or 'False' for the following statements.
(i) {3,4} c A (ii) { 1,2,5 } c *A* (iii) { φ} c A (iv) $1 \in A$ (v) $\{3,4\} \in$

19) If U = { 1,2,3,4,5,6,7,8,9 }, A = { 2,4,6,8, } and B = {2,3,5,7 }, Verify that
(i) $(A \cup B)' = A' \cap B'$
(ii) $(A \cap B)' = A' \cup B'$

Case Study Based Question

20) In a city of 56,000 people, following is the number of fans of players rohit (R), Virat (V) and Dhoni (D) :

Players	Number of Fans
R	23,000
V	25,000
D	18,000

R and V	12,000
R and D	10,000
V and D	8,000
R,V and D	3,000

Based on the above information, answer the following :

(i) How many people are fans of at least 2 players ?
(a) 23,000 (b) 24,000 (c) 25,000 (d) 27,000

(ii) How many people are fans of exactly 1 player ?
(a) 18,000 (b) 19,000 (c) 21,000 (d) 15,000

(iii) How many people are fans of exactly 2 player ?
(a) 21,000 (b) 23,000 (c) 18,000 (d) 24,000

(iv) How many people follow R and V but not D ?
(a) 17,000 (b) 19,000 (c) 21,000 (d) 23,000

(v) How many people are not fans of any of these 3 players ?
(a) 17,000 (b) 18,000 (c) 20,000 (d) None

Chapter -2
Relations and Functions

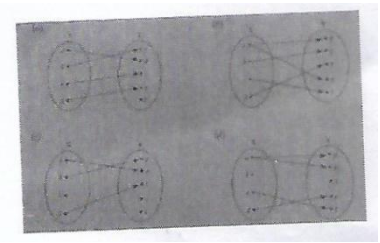
Multiple Choice Questions (MCQs)

(1) If (2x, y -x) = (y +3, 0), then the value of y is
(a) -3 (b) 3 (c) x (d) -x

(2) Range of the function f(x) = $\frac{x}{x+2}$ is
(a) R (b) R - {2} (c) R- {1} (d) R-{-2}

(3) The range of the function f{x} = / x - 3/ is
(a) R-{3} (b) Q -{3} (c) R^+ U {0} (d) Q^+ U {0}

(4) Which of the following arrow diagrams represents a function from X toY ?



(5) Let n (A) = m and n(B) =n , the find the number of non-empty relations from A to B.
(a) m^n (b) n^m -1 (c) mn-1 (d) 2^{mn}-1

(6) Find the domain of the real valued function f(x) = $\frac{1}{3x-2}$
(a) Q - $\left\{\frac{2}{3}\right\}$ (b) R- $\left\{\frac{2}{3}\right\}$ (c) R - {2} (d) N

(7) Given set A + { 1,2,3 ....., 10 } . Relation R is defined in set A as R = {(a,b) ∈ *A* xa:a= 2b}, Then range of the relation R is
(a) { 2,4,6,8,10} (b) {1,3,5,7,9 }
(c) { (2,1), (4,2), (6,3), (8,4), (10,5) } (d) { 1,2,3,4,5 }

(8) The domain of the function f(x) = $\frac{x^3 - x + 3}{x^2 - 1}$ is

(a) Q - {-1,1 } (b) R - {-1} (c) R-{-1,1} (d) R-{1}

Assertion Reason Based Questions

Each of these questions contains two statements Assertion (A) and Reason (R). Each of these questions have four alternative choices, any one of which is the correct answer. You have to select one of the options (a), (b) and (d) given below.

(9) Assertion (A) if a = {1,2,3 }, B = {2,4}, then the number of relation from A to B is equal to 26.
Reason (R) The total number of relation from set A to set B is equal to {2n(A).n(B)}.

(10) Assertion : Every function is a relation.
Reason : A function is a special type of relation where each input value is related to exactly one output value.

(11) Assertion: A function f:**R-R** is defined by $f(x) = 2^x$ and its range is R.
Reason : f(x + y) = f(x) f(y) holds true for the function $f(x) = 2^x$.

(12) Assertion : The function f:**X -R** defined by $f(x) = x^3 + 1$, where **X** = {-1,0,3,9,7 } expressed as ordered pairs is f = {(-1,0), (0,1), (3,28), (9,730), (7, 344)}
Reason : Range of the function f is { -1,0,3,9,7 }.

Long Answer Questions.

(13) Find the domain and range of the function $f(x) = \frac{x^2 - x + 1}{x^2 + x + 1}$

(14) Solve the following :
9i) [3x - 4] = 5 (ii) $[x]^2 - 5[x] + 6 = 0$

(15) If f (x) = y = $\frac{ax-b}{cx-a}$, then prove that f(y) = x.

(16) Determine a quadratic function 'f' defined by $f(x) = ax^2 + bx + c$ if f(0) =6 , f(2) =6, f(2) =11 and f(-3) = 6.

(17) If f(x) = 2x + 5 and $g(x) = x^2 - 1$ are two real valued functions, find the following functions : (i) f + g (ii) $\frac{g}{f}$ (iii) $3g + 2f^2$.

(18) If A = { 1,2,3}, B = { 4,5 } and C = { 5,6}, then verify that
(i) A x { B U C} = { A x B } U { A x C }
(ii) A x { B -C } = { A x B } - { A x C}

(19) If $f(x) = \frac{a^x}{a^x + \sqrt{a}}$, then show hat f(x) + f(1 -x) = 1

Chapter -3
TRIGNOMETRY

Multiple Choice Questions (MCQs)

(1) Angled formed by the minute hand of a clock in 20 minutes is
(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{3\pi}{4}$ d) $\frac{2\pi}{3}$

(2) If $f(x) = \cos^2 x + \sec^2 x$ then
(a) f(x) <1 (b) f(x) =1 (c) 2 < f(x) <1 (d) $f(x) \geq 2$

(3) If $\tan\theta = \frac{1}{2}$ and $\tan\emptyset = \frac{1}{3}$, then the value of $\theta + \emptyset$ is

(a) $\frac{\pi}{6}$ (b) π (c) 0 (d) $\frac{\pi}{4}$

(4) If $\sin\theta + \text{cosec}\,\theta = 2$, then $\sin^2\theta + \text{cosec}^2\theta$ is equal

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

(5) If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, then tan { 2A + B) is equal to

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

(6) $-47^0\ 30''$ can be represented at

(a) $\frac{\pi^c}{180}$ (b) $-\frac{19\pi^c}{72}$ (c) $\frac{19\pi^c}{72}$ (d) $\frac{-\pi^c}{180}$

(7) Tangent function is negative in

(a) 1st and 2nd quadrant (b) 2nd and 4th quadrant

(c) 3rd and 4th quadrant (d) 4th and 1st quadrant

(8) find the value of $\sin 75^0$

(a) $\frac{\sqrt{2}-\sqrt{6}}{4}$ (b) $\frac{\sqrt{3}+\sqrt{6}}{8}$ (c) $\frac{\sqrt{2}+\sqrt{6}}{4}$ (d) $\frac{\sqrt{2}+\sqrt{6}}{8}$

(9) Assertion (A), Periods of sine function, cosine function, cosecant function, secant function is 2π.

Reason (R) : Period of tangent function and cotangent function is π.

(10) Assertion : The value of $\frac{1-\tan^2 15^0}{1+\tan^2 15^0}$ is $\frac{\sqrt{3}}{2}$

Reason : $\cos 2\theta = \frac{1-tan^2\theta}{1+tan^2\theta}$

(11) Assertion : if a wheel makes 360 revolution in one minute, then it turns by $12\pi^c$ radians in one second.

Reason : Value of $\text{cosec}\ 660^0$ is $-\frac{1}{\sqrt{3}}$

Long answer Questions

(12) Find the degree measure of the angle subtended at the centre of a circle of diameter 200cm by an arc of length 22cm (Use $\pi = \frac{22}{7}$)

(13) Simplify the following :

(i) $\frac{\sin(180^0 + \theta)\cos(360^0 - \theta)(\tan(270^0 - \theta)}{\sec^2(90^0 + \theta)\tan(-\theta)\sin(270^0 + \theta)}$

(ii) $\frac{\sin 3x + \sin 5x + \sin 7x + \sin 9x}{\cos 3x + \cos 5x + \cos 7x + \cos 9x}$

(iii) $\frac{\sin 4.\sin 2A + \sin 3A \sin 6A}{\sin A.\cos 2A + \sin 3A.\cos 6A}$

(14) Prove that $\sin 5A = 5\sin A - 20\sin^3 A + 16\sin^5 A$

(15) Find the value of the following :

(i) $\cos 570^0 \sin 510^0 + \sin(-330^0)\cos(-390^0)$

(ii) $\frac{\sin 225^0 - \cos 120^0}{}$

$\sin 225^0 + \cos 120^0$

(iii) $\sin \alpha + \sin (\alpha + \frac{2\pi}{3}) + \sin (\alpha + \frac{4\pi}{3})$

(iv) $\cos 20^0 \cdot \cos 40^0 . \cos 60^0 . \cos 80^0$

(16) Prove that $\sqrt{2 + \sqrt{2 + 2\cos 4x}} = 2 \cos x, \ 0 < x < \frac{\pi}{4}$

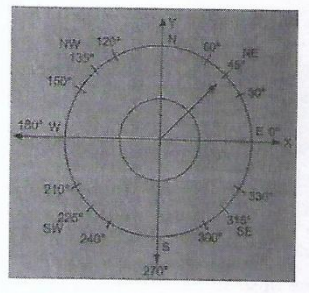
(17) If $\sin \alpha = k \sin \beta$ prove that $\tan (\frac{\alpha - \beta}{2}) = \frac{k-1}{k+1} \tan \frac{\alpha + \beta}{2}$

(18) If $\tan x = \frac{b}{a}$, then find the value of $\sqrt{\frac{a+b}{a-b}} + \sqrt{\frac{a-b}{a+b}}$

(19) Prove that $\frac{\sec 8\theta - 1}{\sec 4\theta - 1} = \frac{\tan 8\theta}{\tan 2\theta}$

Case study Based Questions

(20) The figure given below shows the compass. The East direction is along the X-axis (0^0 angle) and North direction is along the positive Y-axis (90^0 angles). Initially the pointer is pointed towards the North -East direction Pointer is deflected in a magnetic field by some angle. On the basis of above answer the following.



(i) If pointer move in anticlockwise direction by an angle of 90^0, then what is the value of sine of angle made by pointer from East direction.

(a) 1 (b) $\frac{1}{\sqrt{2}}$ (c) $-\frac{1}{\sqrt{2}}$ (d) $\frac{1}{2}$

(ii) If pointer moves an angle of 165^0 from its initial position in anticlockwise direction, then the value of cosine of angle made by pointer from East direction is

(a) $\sqrt{3}$ (b) $-\sqrt{3}$ (c) $\frac{\sqrt{3}}{2}$ (d) $-\frac{\sqrt{3}}{2}$

(iii) If pointer is pointing 45^0 in SE direction, then the value of tangent of angle made by pointer from East direction is

(a) +1 (b) -1 (c) $+\sqrt{3}$ (d) $-\sqrt{3}$

(iv) If the sine and cosine of angle made by pointer with East direction is $-\frac{1}{\sqrt{2}}$ then the pointer pointed towards

(a) South West (b) South East (c) North East (d) North East

(v) How much angle will pointer move in anticlockwise direction if tangent of angle made by pointer with x-axis is -1 ?

(a) 90^0 or 180^0 (b) 180^0 or 270^0 (c) 90^0 or 270^0 (d)90^0 or 300^0

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Chapter -6

Permutation & Combination

Q.1 If $20C_r = 20C_{r+4}$ then rC_3 is equal to :
(a) 54 (b) 56 (c) 58 (d) None of these

Q.2 If $mC_1 = nC_2$ then :
(a) 2m =n (b) 2m = n (n+1) (c) 2m =n(n-1) (d) 2n = m(m-1)

Q.3 The total number of ways of answering 5 objective type questions, each question having 4 choice is :
(a) 5^4 (b) 4^5 (c) 51, 41 (d) $^5P_4$

Q.4 In how many ways 5 rings of different types can be worn in 4 fingers ?
(a) 5^4 (b) $^5C_4$ (c) 4^5 (d) None of these

Q.5 The number of ways in which 3 prizes can be distributed to 4 children, so that no children gets all the three prizes, are :
9a) 64 (b) 62 (c) 60 (d) None of these

Q.6 If P {n, 5} = 20 P { n, 3 } , then value of n is :
(a) 8 (b) 4 (c) 5 (d) 6

Q.7 If $nP_4 = 360$, then value of n is :
(a) 4 (b) 5 (c) 6 (d) 7

Q.8 If $nP_r = 840$ and $nC_r = 35$, then value of r is :
(a) 5 (b) 6 (c) 4 (d) 3

Q.9 The number of ways in which 2 black and 3 red balls can be selected from a bag containing 5 black and 6 red ball is :
(a) 170 (b) 190 (c) 180 (d) 200

Q.10 The number of parallelogram that can be formed from a set of four parallel lines intersecting another set of three parallel lines are ?
(a) 6 (b) 9 (c) 12 (d) 18

Q.11 **Assertion :** If the letters W,I,F,E are arranged in a row in all possible ways and the word WIFE occurs in 24^{th} position.
Reason : The number of ways of arranging four distinct objects taken all at a time in C (4, 4).

Q.12 **Assertion :** Product of five consecutive natural numbers is divisible by 4.
Reason : Product of n consecutive natural numbers is divisible by (n+1) ,

Q.13 **Assertion :** The number distributing 10 identical balls in 4 distinct boxes such that no box is empty in $9C_3$,
Reason : The number of ways of choosing any 3 places from 9 different places is $9C_3$.

Q.14 Prove that 33! is divisible by 2^{15}. What is the largest integer n such that 33! is divisible by $2^{n.}$

Q.15 How many words can be made from the word "DAUGHTER" , so that :
(a) All vowels are together (b) Vowels never come together.

Q.16 How many arrangements can be made from the letters of word "MATHEMATICS " ? In how many of them vowels are together ?

Q.17 If all the letters of word "AGAIN" is arranged in dictionary ? What is 50^{th} word?

Q.18 If all the letters of word "AGAIN" in arranged in dictionary. Find Rank of the word "RANDOM".

Q.19 How many diagonals are there in a polygon of n sides ?

Q.20 Out of 18 points in a plane, no three are in the same line except five points which are collinear. Find the number of lines that can be formed joining the point.

Chapter -4
Complex Numbers

Q.1 If $Z_1 = 6 + 3i$ and $z_2 = 2 - i$, then $\frac{Z_1}{Z_2}$ is equal to :

(a) $\frac{1}{5}(9 + 12i)$ (b) $(9 + 12i)$ (c) $3 + 2i$ (d) $\frac{1}{5}(12 + 9i)$

Q.2 If $Z = i^{-39}$ then simplest form of Z is :

(a) $1 + oi$ (b) $0 + i$ (c) $0 + 0i$ (d) $1 + i$

Q.3 If $\frac{1}{(1-i)^n} = 2^n$, then n is equal to :

(a) 1 (b) 0 (c) -1 (d) None of these

Q.4 The value of i^{-1097} is :

(a) 1 (b) -1 (c) -i (d) i

Q.5 If $x + 4iy = ix + y + 3$, then the vale of y is :

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

Q.6 Simplified the value of $1 + i^{10} + i^{20} + i^{30}$ is :

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

Q.7 The modulus of complex number $4 + 3i^7$ is :

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

Q.8 The least positive integer n such that $\left[\frac{2i}{1+i}\right]^n$ is a positive integer, is :

(a) 16 (b) 6 (c) 4 (d) 2

Q.9 If $x + iy = (1 + i)(1 + 2i)(1 + 3i)$, then the value of $x^2 + y^2$ is :

(a) 0 (b) 1 (c) 100 (d) None of these

Q.10 The value of $(1+i)^4 + (1-i)^4$ is :

(a) 8 (b) 4 (c) -8 (d) -4

Q.11 **Assertion :** Simplest form of i^{-35} is -1.

Reason : Additive inverse of 1-i is -1 +i.

Q.12 **Assertion** : Multiplicative inverse of 2 -3i is 2 + 3i.

Reason : If z =3 +4i then z = 3-4i.

Q.13 **Assertion :** If $3x^2 + 4x + 2 = 0$ then equation has imaginary roots.

Reason : In a quadratic equation ax+2+ +bx +c =0 if $D = b^2 - 4ac$ is less than zero then the equation will have imaginary root.

Q.14 If $|z + 1| = z + 2(1 + i)$, find z .

Q.15 If $\left[\frac{1+i}{1-i}\right]^3 = \left[\frac{1-i}{1+i}\right]^3 = x + iy$, find x, y .

Q.16 Find real values of x, y if $(x + iy)(2-3i) = 4 + i$.

Q.17 Express : $\frac{(1-i)^3}{1-i^3}$ in standard form.

Q.18 Simplify : $\frac{i^{592} + i^{590} + i^{586} + i^{584}}{i^{582} + i^{580} + i^{578} + i^{574}}$

Q.19 If $\frac{(1+i)^2}{2-i} = x + iy$, find x + y.

Q.20 Solve the equation $|z| = z + 1 + 2i$.

Linear Inequality
Chapter -5

Q.1 If x is real numbers and $|x| < 5$ then :

(a) $x \geq 5$ (b) $-5 < x < 5$ (c) $x \leq -5$ (d) $-5 \leq x \leq 5$

Q.2 If $|x + 2| \leq 9$, then the solution is :

(a) (-7, 11) (b) (-11, 7)

(c) $(-\infty, -7) \cup (11, \infty)$ (d) None of these

Q.3 x and b are the real numbers, if b> 0 and |x| >b then :

(a) $x \in (-b, \infty)$ (b) $x \in (-\infty, b)$

(c) $x \in (-b, b)$ (d) $x \in (-\infty, -b) \cup (b, \infty)$

Q.4 The solution of inequality $2 \leq 3x - 4 \leq 5$ is :

(a) [-2,3] (b) [3, 4] (c) -2, 3) (d) [3, 4]

Q.5 If $\frac{x+3}{x-2} > \frac{1}{2}$ then x lies in the interval :

(a) (-8, ∞) (b) (8, ∞) (c) $(\infty, -8)$ (d) $(\infty, 8)$

Q.6 The solution set of linear inequations $-15 < \frac{3}{5}(x - 2) \leq 0$ is :

(a) (-23, 2) (b) (-20, 4) (-23, 2) (d) None of these

Q.7 The solution set of linear inequality $\frac{x+3}{x+4} \geq 1$ is :

(a) $(-\infty, -4)$ (b) $(-\infty, 4)$ (c) $(-4, \infty,)$ (d) $(4, \infty)$

Q.8 If $\frac{|x-2|}{x-2} \geq 0$, then :

(a) $x \in (2, \infty)$ (b) $x \in (2, \infty)$ (c) $x \in (-\infty, 2)$ (d) $x \in (-\infty, 2)$

Q.9 If x, y and b are real numbers and x < y, b < 0, then :

(a) $\frac{x}{b} < \frac{y}{b}$ (b) $\frac{x}{b} \leq \frac{y}{b}$ (c) $\frac{x}{b} > \frac{y}{b}$ (d) $\frac{x}{b} \geq \frac{y}{b}$

Q.10 The solution of inequality $\frac{1}{x-4} < 0$ is :

(a) $(-\infty, 4)$ (b) $(-\infty, 4)$ (c) $(0, 4)$ (d) can not be found

Q.11 **Assertion :** The inequality ax + by < 0 is strict inequality.

Reason : The inequality ax + b $\geq$ 0 is slack inequality.

Q.12 **Assertion :** If a<b, c < 0 then $\frac{a}{c} < \frac{b}{c}$,

Reason : If both sides are divided by the same negative quantity then the inequality is reversed.

Q.13 **Assertion :** If 3x + 8 > 2 then x $\in$ { -1, 0, 1, 2 .....} when x is integer.

Reason : The solution set of inequality 4x + 3 < 5x + 7; x $\in$ R is [4, ∞]

Q.14 Solve the system of inequations. :

$\frac{x}{2x+1)} \geq \frac{1}{4}$, $\frac{6x}{(4x-1)} < \frac{1}{2}$.

Q.15 Solve : $|x - 1| \leq 5$, $|x| \geq 2$.

Q.16 Solve : $\frac{|x| - 1}{|x| - 2} \geq 0$, x ϵ R, x $\neq \pm 2$

Q.17 Solve the inequation $\left|\frac{2}{x-4}\right| > 1$, x - 4.

Q.18 Solve : $1 \leq |x - 2| \leq 3$.

Q.19 Solve : $|x - 1| + |x - 2| \geq 4$.

Q.20 Solve : $\frac{|x - 1|}{x + 2} = 1$.

Chapter -7 (Binomial Theorem)

1. The largest coefficient in the expansion of $(1 + x)^{30}$ is .....
2. The largest coefficient in the expansion of $(1 + x)^{10}$ is .....
3. The coefficient of the middle term in the expansion of $(1 + 3x)^4$ is :

   (a) 5! (b) 6 (c) 216 (d) 8!
4. If n is even in the expansion of $(a + b)^n$, the middle terms is :

   (a) n^{th} term (b) $(\frac{n}{2})^{th}$ term (c) $[(\frac{n}{2}) - 2]^{th}$ term (d) $[(\frac{n}{2}) + 1]^{th}$
5. The fourth term in the expansion of $(x - 2y)^{12}$ is :
6. If n is the positive integer, then $2^{3n} - 7n - 1$ is divisible by

   (a) 7 (b) 10 (c) 49 (d) 81
7. The number of irrational terms in the expansion of $(4^{1/5} + 4^{7/10})^{45}$ is :

   (a) 40 (b) 5 (c) 41 (d) none of these
8. $(1.1)^{10000}$ is 1000

   (a) Greater than (b) less than (c) equal to (d) none of these
9. If n is a positive integer than, $(\sqrt{3} + 1)^{2n+1} + (\sqrt{3} - 1)^{2n-1}$ is

   (a) An even positive integer (b) a rational number

   (c) An odd positive integer (d) an irrational number

10 The value of n in the expansion of $(a+b)^n$ if the first three terms of the expansion are 729, 7290 and 30375 respectively is,

(a) 2 (b) 4 (c) 6 (d) 8

11 Assertion (A) : the expansion of $(1+x)^n = C_0 + C_1x + C_2x^2 + ...+ C_nx^n$

Reason (R) :If x = -1, then the above expansion is zero.

12 Assertion (A) : Number of terms in the expansion of $(\sqrt{x} + \sqrt{y})^{10} + (\sqrt{x} - \sqrt{y})^{10}$ is 6

Reason (R) :If n is even then the expansion of $\{(a+b)^n + (a-b)^n\}$ has $(\frac{n}{2}+1)$ terms.

13 Which of the following is larger ? $99^{50} + 100^{50}$ or 101^{50}

14 If p is real number and if the middle term in the expansion of $(\frac{p}{2}+2)^8$ is 1120, find p.

15 Show that $2^{4n+4} - 15n - 16$, where $n \in N$ is divisible by 25.

16 If n is a positive integer then prove that, $3^{3n} - 26n - 1$ is divisible by 676.

Chapter -8 (Sequence and Series)

1 If a, 4, b are in Arithmetic Progression; a, 2, b are in Geometric Progression; then a, 1, b are in

(a) A.P. (b) G.P. (c) H.P. (d) None of these

2 The sum of arithmetic progression 2, 5, 8, ..., up to 50 terms is

(a) 3775 (b) 3557 (c) 3757 (d) 3575

3 The first term of a G.P. is 1. The sum of the 3rd and 5th terms is 90. Then the common ratio is :

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

4 Three numbers form an increasing G.P. If the middle term is doubled, then the new numbers are in A.P. The common ratio of G.P. is

(a) $2+\sqrt{3}$ (b) $2-\sqrt{3}$ (c) $2 \pm \sqrt{3}$ (d) None of these

5 If $\frac{1}{(b+c)}$, $\frac{1}{(c+a)}$, $\frac{1}{(a+b)}$ are in AP then

(a) a, b, c are in A.P. (b) a^2, b^2, c^2 are in AP

(c) $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P. (d) None of these

6 If $S_n = 3n + 2n^2$, then common difference of the A.P. is

(a) 3 (b) 2 (c) 6 (d) None of these

7 The third term of G.P. is 4. The product of its first 5 terms is

(a) 64 (b) 256 (c) 1024 (d) None of these

8 If 9 times the 9^{th} term of an A.P. is equal to 13 times of 13^{th} term, then the 22 term of the A.P. is

(a) 0 (b) 22 (c) 220 (d) 198

9 If x, 2y, 3z are in A.P. , where the distinct number x, y, z are in G.P. then the common ratio of the G.P. is

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

10 Let S_n denotes the sum of the first n terms of an A.P. If $S_{2n} = 3S_n$ then $S_{3n} : S_n$ is equal to

(a) 4 (b) 6 (c) 8 (d) 10

11 Assertion (A) : The 20^{th} term of the series 2x4 + 4x6 + 6x8 + ...+ (upto n terms) is 1680.
Reason (R) : If the sum of three numbers in A.P. is 24 and their product is 440. Then the numbers are 5, 8, 11 or 11, 8, 5.

12 A man saved Rs. 66000 in 20 years. In each succeeding year after the first year he saved Rs. 200 more than what he saved in the previous year. How much did he save in the first year ?

13 If pth, qth and rth terms of an A.P. and G.P. are both a, b and c respectively then show that $a^{b-c}, b^{c-a}, c^{a-b} = 1$

14 Father of Ashok is a builder, He planned a 12 storey building in Gurgaon sector 5. For this, he bought a plot of 500 square yards at the rate of Rs. 1000 /$yard^2$. The Builder planned ground floor of 5m height, first floor of 4.75 m and so on each floor is 0.25 m less than its previous floor.
(a) What is the height of the last floor ?
(b) Which floor no is of 3m height ?
(c) What is the total height of the building ?
(d) Up to which floor the height is 33m ?
(e) Which floor no. is half in height of ground floor ?

15 The sum of first p,q, r terms of an AP are a,b,c respectively. Show that $\frac{a}{p}$ (q-r) + $\frac{b}{q}$ (r - p) + $\frac{c}{r}$ (p-q) = 0

16 If in an AP the sum of first m terms is equal to n and the sum of first n terms is equal to m, then prove that the sum of (m + n) terms is - (m + n).

17 Solve the equation 1 + 4 +7 + 10 + ...+x = 287.

18 150 workers were engaged to finish a piece of work in a certain number of days. 4 workers dropped the second day, 4 more workers dropped the third day and so on. It takes 8 more days to finish the work now. Find the number of days in which the work was completed.

19 If the sum of first n, 2n and 3n terms of an AP be S_1, S_2 and S_3 respectively, then prove that $S_3 = 3 (S_2 - S_1)$.

STRAIGHT LINES
CHAPTER -9
MULTIPLE CHOICE QUESTIONS

1) If coordinates of A,B,C,D are (2,1), (0,-1), (-1,8), (4,3) then $m_{AB}.m_{CD}$ IS
(A) 1 (B) -1 (c) 0 (d) none of these

2) A (1,1) and B(2,-3) are two points and D is a point on AB such that AD =3AB, B lies between A and D then coordinates of D are :
(a) (4,11) (b) (-4, 11) (c) (-4, -11) (d) (4, -11)

3) The distance between the line $\frac{x}{a} - \frac{y}{b} = 1$ and point (b, a) is
(a) $\frac{|b^2 - a^2 - ab|}{a^2 + b^2}$ (b) $\frac{|-b^2 - a^2 + ab|}{\sqrt{a^2 + b^2}}$ (c) $\frac{|b^2 + a^2 - ab|}{\sqrt{a^2 + b^2}}$

(d) $\sqrt{b^2 + a^2}$

4) Distance between parallel lines x + 3y -9 =0 and x +3y +1 =0 is

(a) 3 units (b) 1 unit (c) $\sqrt{10}$ units (d) 10 units

5) Slope of the line 3x -2y +5 =0 is

(a) $-\frac{2}{3}$ (b) $-\frac{3}{2}$ (c) $\frac{2}{3}$ (d) $\frac{3}{2}$

6) The equation of line which cuts an intercept 2 units on positive side of the y-axis and makes an angle of 30^0 with the axis of x is

(a) $x - \sqrt{3}y + 2\sqrt{3} = 0$ (b) $x + \sqrt{3}y - 2\sqrt{3} = 0$

(c) $x + \sqrt{3}y = 0$ (d) $x - \sqrt{3}y = 0$

7) The angle between two lines whose slops are $-\frac{5}{6}$ and $\frac{1}{11}$ is

(a) 1 (b) -1 (c) 45^0 9d) 150^0

8) The equation of line 2x - 10y +5 =0 in intercept form is :

(a) $-\frac{x}{5} - \frac{y}{1} = 1$ (b) $\frac{x}{5} + \frac{y}{1} = 1$

(c) $-\frac{x}{5} + \frac{y}{1} = 1$ (d) $\frac{x}{5} - \frac{y}{1} = 1$

9) If slope of line is zero, then line is parallel to the

(a) x -axis (b) y-axis (c) both the axis (d) none of these

Assertion -Reason Questions

Each of these questions contains two statements Assertion (A) and Reason (R). Each of these questions have four alternative choices, any one of which is the correct answer. You have to select one of the options (a), (b), (c) and (d) given below.

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

10) Assertion : The equation of the straight line which passes through the point (2,-3) and the point of intersection of the lines x + y +4 =0 and 3x -y - 8=0 is 2x - y-7 =0.
Reason : Product of two perpendicular straight lines is -1.

11) Assertion : Line x + y =10 has equal intercepts on the axis.
Reason : Distance between two parallel lines 3x +4y =7 and 6x +8y = 10 is 2 units.

12) Assertion : Slope of the line 2x +4y = 5 is $-\frac{1}{2}$
Reason : Two lines are parallel if and only of product of their slope is -1.

13) Assertion : Slope of the line y = 2 is not defined.
Reason : Slope of a line making angle θ with the positive direction of x-axis is tan θ.

Long Answer Questions

14) Find image of the point P (-8, 12) with respect to the line mirror 4x +7y +13 =0.

15) If p is the length of perpendicular from the origin to the line $\frac{x}{a} + \frac{y}{b} = 1$, then prove that $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

16) Show that the path of a moving point such that its distance from two lines 3x - 2y =5 and 3x + 2y + =5 are equal, is a straight line.

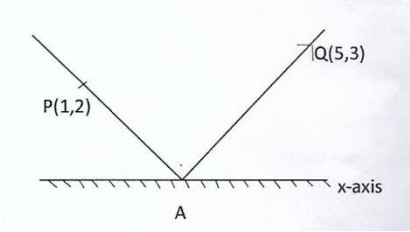
17) If p_1 and p_2 are the perpendiculars from the origin to the lines x sec α + y cosec α = a and x cos α - y sin α = a cos 2 α, prove that $4{p_1}^2 + {p_2}^2 = a^2$.

18) The points (1,3) and (5,1) are the opposite vertices of a rectangle. The other two vertices lie on the line y =2x +c. Find c and the remaining vertices.

19) Find the coordinates of the foot of the perpendicular drawn form the point (-1, 3) to the line 3x - 4y -16 =0

Case Study Based Questins

20) A ray of light passing through the point P (1,2) reflects on the x-axis at point A and reflected ray passed through the point Q (5,3), then



(i) The coordinates of the Point A are

(a) $(\frac{13}{5}, 0)$ (b) (-7, 0) (c) (7, 0) (d) $(-\frac{13}{5}, 0)$

(ii) The equation of incident ray is

(a) x - 4y + 7 =0 (b) x +3y =7 c) 5x -9y +5 =0 (d) 5x +4y =13

(iii) The equation of reflected ray is

(a) x - 4y +7 = 0 (b) 3x +2y =21 (c) 5x -4y =13 (d) 15x -38y = -39

(iv) The distance between points P and Q is

(a) $\sqrt{5}$ units (b) $\sqrt{17}$units (c) $\sqrt{13}$ units (d) 2 units

(v) The angle $\emptyset$ between incident ray and reflected ray is given by

(a) $\tan \emptyset = \frac{40}{9}$ (b) $\tan \emptyset = 0$ (c) $\tan \emptyset = \frac{\pi}{4}$ (d) $\tan \emptyset = \frac{11}{9}$

Worksheet -Conic Section

Chapter 10

MCQ

1) The length of the transverse axis is the distance between the :

(A) Two vertices B) Two Foci C) Vertex and the origin D) Focus and the vertex.

2) The length of the latus rectum of $x^2 = -9y$ is equal to

(A) 3 units B) -3 units C) 9/4 units D) 9 units.

3) The eccentricity of hyperbola is

(A) e = 1 B) e > 1 C) 0 < e < 1 D) e < 1

4) In an ellipse, the distance between its foci is 6 and the minor axis is 8, then its eccentricity is

(A) 1/2 B) 1/5 C) 3/5 D) 4/5

5) If a circle pass through (2, 0) and (0,4) and centre at x-axis then find the radius of the circle.

(A) 25 units B) -20 units C) 5 units D) 10 units

Note - <u>ANSWER THE FOLLOWING ASSERTION REASONING QUESTIONS ACCORDING TO GIVEN OPTIONS ONLY ONE OPTION IS CORRECT</u>.

a) Both Assertion and reason are correct and reason is correct explanation for Assertion.

b) Both Assertion and reason are correct but reason is not correct explanation for Assertion

c) Assertion is true but reason is false.

d) Assertion is false and reason is true.

6 **Assertion :** The equation of a parabola can be written in the form $y = ax^2 + bx + c$.

Reasoning : The general equation of a parabola is given by $y = a(x-h)^2 + k$, where (h,k) represents the vertex of the parabola.

7) **Assertion :** The eccentricity of an ellipse is always less than or equal to 1.

Reasoning : The eccentricity of an ellipse is given by the ratio of the distance between the foci to the length of the major axis. Since the distance between the foci is always less than or equal to the length of the major axis, the eccentricity is always less than or equal to 1.

8) **Assertion :** The equation $x^2 + y^2 + 4x + 6y - 12 = 0$ represents a circle.

Reasoning : The given equation can be rearranged as $(x-2)^2 + (y+3)^2 = 25$, which is an equation of a circle.

9) **Assertion :** The equation $\frac{x^2}{16} - \frac{y^2}{9} = 1$ represents a hyperbola.

Reasoning : The equation $x^2/16 - y^2/9 = 1$ is in the standard form of a hyperbola, where the coefficients of x^2 and y^2 have different signs.

10) **Assertion :** The equation of a circle is a special case of the equation of an ellipse.

Reasoning : In the equation of a circle, the coefficients of x^2 and y^2 are equal, whereas in the equation of an ellipse, they are unequal.

NOTE :- ANSWER THE FOLLOWING QUESTIONS :-

11) Determine the foci coordinates, the vertices, the length of the major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse $\frac{x^2}{49} + \frac{y^2}{36} = 1$.

12) Calculate the equation of a circle that passed through the origin and cuts off intercepts -2 and 3 from the x-axis and the y-axis respectively.

13) Calculate the equation of the parabola whose focus is (1, -1) and whose vertex is (2,1), Also, find its axis and latus-rectum).

14) Prove that the points (9,1) (7,9) (-2, 12) and (6, 10) are concyclic.

15 AB is a double ordinate of a parabola $y^2 = 4px$. Find the locus of its points of trisection.

Chapter -11(Introduction to Three Dimensional Geometry)

1) A point is on the x-axis. Which of the following represent the point ?

(a) (0, x, 0) (b) (0,0,x) (c) x, 0, 0) (d) None of these

2) What is the distance between the points (2, -1, 3) and (-2, 1, 3) ?

(a) $2\sqrt{5}$ (b) $\sqrt{5}$ (c) $4\sqrt{5}$ (d) 25

3 The maximum distance between points ($3\sin\theta$, 0, 0) and ($4\cos\theta$, 0, 0) is :

(a) 3 units (b) 4 units (c) 5 units (d) can not be determined.

4 Find the image of (-2, 3, 4) in the y z plane

(a) (-2, 3, 4) (b) (2, 3 4) (c) (-2, -3, -4) (d) (-2, -3, 4)

5 The perpendicular distance of the point P (6, 7, 8) from the XY -Plane is :

(a) 8 (b) 7 (c) 6 (d) None of these

6 The distance of the point P (a, b, c) from the x-axis is :

(a) $\sqrt{a^2 + c^2}$ (b) $\sqrt{b^2 + c^2}$ (c) $\sqrt{a^2 + b^2}$ (d) None of these

7 The locus of a point which moves so that the difference of the squares of its distances from two given points is constant, it is

(a) Straight line (b) plane (c) sphere (d) none of these

8 What is the length of foot of perpendicular drawn from the point P (3, 4, 5) on y-axis.

(a) $\sqrt{41}$ (b) $\sqrt{34}$ (c) 5 (d) None of these

9 Equation of y-axis is considered as

(a) x = 0, y = 0 (b) y=0, z =0 (c) z =0, x =0 (d) none of these

10 If a parallelepiped is formed by planes drawn through the corner points (5, 8, 10) and (3, 6, 8) parallel to the coordinate planes, then the length of diagonal of the parallelepiped is

(a) $2\sqrt{3}$ (b) $3\sqrt{2}$ (c) $\sqrt{2}$ (d) $\sqrt{3}$

11 L is the foot of the perpendicular drawn from a point P (3,4,5) on the xy-plane. The coordinates of point L are

(a) (3,0,0) (b) (0, 4, 5) (c) 3, 0, 5) (d) none of these

12 The locus of a point for which x = 0 is

(a) xy-plane (b) yz -plane (c) zx - plane (d) none of these

13 If the distance between the points (a, 0, 1) and (0,1,2) is $\sqrt{27}$, then the value of a is

(a) 5 (b) ± 5 (c_ -5 (d) non of these

14. The points on y-axis which are at a distance of 3 units from the point (2,3,-1)

(a) Either (0,-1,0) or (0, -7,0) (b) Either (0,1,0) or (0,7,0)

(c) Either (0,1,0) or (0,-7,0) (d) Either (0,1,0) or (0,-7,0)

15. The points (5,2,4) (6,-1,2) and (8, -7,k) are collinear, if k is equal to

(a) -2, (b) 2 (c) 3 (d) -1

16 Assertion (A) : the points A (2, 9, 12), B(1,8,8), C (2,11,8) , D (1,12,12) are the vertices of a rhombus.

Reason (R) : AB =BC =CD = AD and AC = BD

17. Assertion (A) : The coordinates of the point which divides the join of A(2,-1,4) and B (4,3,2) in the ratio 2:3 externally is C (-2, -9, 8)

18 The three vertices of a parallelogram ABCD are A (1,2,3), B (-1,-2,-1) and C(2, 3, 2). Find the coordinates of Point D.

19 Show that the three points A (2,3,4), B (-1,2,-3) and C (-4, 1, -10) are collinear and find the ratio in which C divides AB.

20. Find lengths of the medians of the triangle with vertices A (0,0,6), B (0,4,0) and (6,0,0)

21 Find centroid of a triangle, mid-points of whose sides are (1,2,-3), (2,0,1) and (-1,1, 4)

22 Find the ratio in which the line joining the points (1,2,3) and (-3, 4, -5) is divided by the xy-plane. Also, find the coordinates of the point of division.

23 Find the point in XY-plane which is equidistant from three points A(2,0,3), B (0,3,2) and C (0,0,1).

24 Find the locus of the point which is equidistant from the point A(0,2,3) and B(2, -2,1).

25 What are the coordinates of the vertices of a cube whose edge is 2 units, one of whose vertices coincides with the origin and the three edges passing through the origin, coincides with the positive direction of the axes through the origin ?

CHAPTER -12

WORKSHEET (LIMITS & DERIVATIVES

1) If f (x) = x 100 + x 99 + ...+x +1 , then f' (1) is equal to :

(a) 5050 (b) 5049 (c) 5051 (d) 50051

2 If y $\frac{\sin x+\cos x}{\sin x-\cos x}$, then $\frac{dy}{dx}$ at x =0 is equal to :

(a) -2 (b) 0 (c) lim x - π f(x) (d) Does not exist.

3 If $f(x) = \frac{x^n-a^n}{x-a}$ for some constant a, then f(a) is equal to:

(a) -1 (b) 0 (c) 1 (d) Does not exist.

4) Value of $\lim_{x\to 0} \frac{\cos 5x-\cos x}{x^2}$ is

(a) 0 (b) -12 (c) 1 (d) 12

5 $\lim_{x\to 0} \frac{\sin\frac{1}{x}}{\frac{1}{x}}$ is

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

Note : ANSWER THE FOLLOWING ASSERTION REASONING QUESTIONS ACCORDING TO GIVEN OPTIONS ONLY ONE OPTION IS CORRECT.

(a) both Assertion and reason are correct and reason is correct explanation for Assertion.

b) Both Assertion and reason are correct but reason is not correct explanation for Assertion

c) Assertion is true but reason is false.

d) Assertion is false and reason is true.

6) Statement : If f (x) = sin 2x - $\frac{1}{2}$cos2x + cot α , then f' (x) =0

Reason : Derivative of a constant function is always zero.

7) Statement :- $\lim_{x\to 0} \frac{\sin ax}{bx}$ is equal to $\frac{a}{b}$,

x -0

Reason : $\lim_{x\to 0} \frac{\sin x}{x}$ =1

8) Statement :- $\lim_{x\to 0} \frac{\cos 2x-1}{cos2x-1}$ is equal to 4,

Reason : $\lim_{x\to 0} \frac{\tan x}{x}$ =1

NOTE : ANSWER THE FOLLOWING QUESTIONS (LONG ANSWER TYPE QUESTIONS).

9) Evaluate : $\lim_{x \to 0} \frac{\sec 4x - \sec 2x}{\sec 3x - \sec x}$

10) Differentiate : $f(x) = x^5, e^x + x^3 \log x - 2x$ with respect to x.

11) If $y = \frac{\sqrt{x}}{a} + \frac{\sqrt{a}}{x}$ prove that :- $(2xy)\frac{dy}{dx} = \frac{x}{a} - \frac{a}{x}$

12) Differentiate : $\frac{\sqrt{1-\cos 2x}}{1+\cos 2x}$ with respect to x.

13) Find the derivative of sec (ax +b) using first principal.

14) Find the derivative of $\cot^2 x$ by first principal.

15) Find he derivative of $\sin^n x$ using first principal.

Chapter -13 (Statistics)

1 Range of a data is equalto :

(a) Range = Max Value -Min Value (b) Range = Max Value + Min Value

(c) Range = (Max Value - Min Value)/2 (d) Range = (Max Value +Min value /2

2 Relation between mean, median and mode is given by :

(a) Mode = 2 Median - 3 Mean (b) Mode = 2 Median + 3 Mean

(c) Mode = 3 Median - 2 Mean (d) Mode = 3 Median + 2 Mean

3 Find the median of 36, 72, 46, 42, 60, 45, 53, 46, 51, 49.

(a) 42 (b) 45.5 (c) 47.5 (d) 45

4 If the mean of first n natural numbers is 5n /9, n =

(a) 5 (b) 4 (c) 9 (d) 10

5 If the variance of the data is 121, the standard deviation of the data is :

(a) 121 (b) 11 (c) 12 (d) 21

6 The sum of 10 items is 12 and the sum of their squares is 18. The standard deviation is :

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

7 Consider the first 10 positive integers. If we multiply each number by -1 and then add 1 to each number, the variance of the numbers so obtained is

(a) 8.25 (b) 6.5 (c) 3.87 (d) 2.87

8 Coefficient of variation of two distributions are 50 and 60, and their arithmetic means are 30 and 25 respectively. Difference of their standard deviation is

(a) 0 (b) 1 (c) 1.5 (d) 2.5

9 Standard deviations for first 10 natural numbers is

(a) 5.5 (b) 3.87 (c) 2.97 (d) 2.87

10 The mean of 100 observations is 50 and their standard deviation is 5. The sum of all squares of all the observations is

(a) 50000 (b) 250000 (c) 252500 (d) 255000

11 Following are the marks obtained by 9 students in a mathematics test :

50, 69, 20, 33, 53, 39, 40, 65, 59. The mean deviation from the median is :

(a) 9 (b) 10.5 (c) 12.67 (d) 14.76

12 When added, the lives (in hours) of 5 bulbs were noted as follows :

1357, 1090, 1666, 1494, 1623. The mean deviations (in hours) from their mean is

(a) 178 (b) 179 (c) 220 (d) 356

13 Assertion (A) : The mean, mode and median of grouped data will always be different.

Reason (R) Mean = Sum of all observations/number of observations.

14 Assertion (A) : The range of the difference between two extreme observations of the distribution.

Reason (R) : The variance of a variate X is the arithmetic mean of the squares of all deviations of x from the arithmetic mean of the observations.

15 Mean and standard deviation of 100 observations were found to be 40 and 10, respectively. If at the time of calculation two observations were wrongly taken as 30 and 70 in place of 3 and 27 respectively, find the correct standard deviation.

16 Following are the marks obtained, out of 100, by two students Ravi and Hashina

Ravi	25	50	45	30	70	42	36	48	35	60
Hashina	10	70	50	20	95	55	42	60	48	80

Who is more intelligent and who is more consistent ?

17 Calculate the mean deviation about the mean for the following frequency distribution :

Class interval	0-4	4-8	8-12	12-16	16-20
Frequency	4	6	8	5	2

18 The mean life of a sample of 60 bulbs was 650 hours and the standard deviation was 8 hours. A second sample of 80 bulbs has a mean life of 660 hours and standard deviation 7 hours. Find the overall standard deviation.

19 Mean and standard deviation of 100 items are 50 and 4, respectively. Find the sum of all the item and the sum of the squares of the items.

20 Two sets each of 20 observations, have the same standard derivation 5. The first set has a mean 17 and the second a mean 22. Determine the standard deviation of the set obtained by combining the given two sets.

Chapter -14

Worksheet (Probability)

1) Three numbers are chosen from 1 to 20. Find the probability that they are not consecutive.

a) $\frac{186}{190}$ (b) $\frac{187}{190}$ c) $\frac{188}{190}$ d) $\frac{201}{209}$

2) Seven persons are to be seated in a row. The probability that two particular persons sit next to each other is

a) $\frac{1}{2}$ b) $\frac{1}{3}$ (c) $\frac{1}{4}$ d) None

3) The probabilities of happening of two events 'A' & 'B' and are 0.25 and 0.50 respectively. If the probability of happening of A and B together is 0.14, then probability that neither A nor B happens is

(a) 0.39 (b) 0.25 (c) 0.11 (d) none of these

4) If a probability of A to fall in an examination is 1/5 and that of B is 3/10. Then, the probability that either A or B fails is :

(a) 1/2 (b) 11/25 (c) 19/50 (d) none of these

5) 6 boys and 6 girls sit in a row at random. The probability that all the girls sit together :

(a) 1/432 (b) 12/431 9c) 1/132 (d) none of these

6) A pair of dice is rolled. If the outcome is a doublet, a coin is tossed. Then the total number of outcomes for this experiment :

(a) 40 (b) 42 (c) 41 (d) 43

Note : ANSWER THE FOLLOWING ASSERTION REASONING QUESTIONS ACCORDING TO GIVEN OPTIONS ONLY ONE OPTION IS CORRECT.

(a) Both Assertion and reason are correct and reason is correct explanation for Assertion.

b) Both Assertion and reason are correct but reason is not correct explanation for Assertion

c) Assertion is true but reason is false.

d) Assertion is false and reason is true.

7) Assertion : Two dice are thrown simultaneously. There are 11 possible outcomes and each of them has a probability 111.

Reason : Probability of an event (E) is defined as P(E) = $\frac{number\ of\ favourable\ oucomes}{Total\ number\ of\ outcomes}$

8) Assertion : The probability of a sue event is 1.

Reason : Let E be an event. Then, o $\leq$ P (E) $\leq$1

9) Assertion : In rolling a dice, event A = { 1,3,5} and event B = {2,4} are mutually exclusive events.

Reason : In a sample space, two events are mutually exclusive if they do not occur at the same time.

NOTE :- ANSWER THE FOLLOWING QUESTINS (LONG ANSWER TYPE QUESTIONS) .

10). Find the probability that when a hand of 7 cards are drawn from the well-shuffled deck of 52 cards, it contains :-

(i) all kings and (ii) 3 kings.

11) From a deck of 52 cards four cards are accidently dropped. Find the chance that the missing cards should be one from each type.

12) A coin is tossed three times consider the following event A : No head appears, B : Exactly one head appears and C : At least two heads appears do they form a set of mutually exclusively and exhaustive events.

13) A hockey match is played from 3pm to 5pm. A man arrives late for the match what is the prob. that he misses the only goal of the match which is scored at the 20th minute of the match ?

14) In a town of 6000 people 1200, are over 50 yr. old and 2000 are females. It is known that 30% of the females are over 50 yr. What is the prob. that a randomly chosen individual from the town is either female or over 50 yr.

NOTE : ANSWER THE FOLLOWING CASE BASED QUESTIONS :-

Nishant has an electricity shop. From an agent he got three bulbs which are manufactured by a new company. Nishant wants to know if any of three bulb is defective and classified as Good 'non-defective' and bad 'defective'.

Based on the above information, answer the following questions :

What is the sample space of three bulb to be good or bad ? [1]

(ii) Find the probability that there are no defective bulb ? [1]

What is the probability that there is exactly one bad bulb ? [2]

OR

(iii) Find the probability that there are at least two defective bulbs.