

# **ST. XAVIER'S SCHOOL, DORANDA**

## **SELF ASSESSMENT TEST – 2020**

### **ANSWERS AND MARKING SCHEME**

#### **INDEX**

<b>SUBJECT</b>	<b>PAGE NO</b>
<b>ENGLISH LANGUAGE</b>	<b>2 – 7</b>
<b>ENGLISH LITERATURE</b>	<b>8 – 25</b>
<b>PHYSICS</b>	<b>26– 45</b>
<b>CHEMISTRY</b>	<b>46 – 51</b>
<b>MATHEMATICS</b>	<b>52 – 71</b>
<b>BIOLOGY</b>	<b>72 – 83</b>
<b>COMPUTER SCIENCE</b>	<b>84 – 88</b>
<b>PHYSICAL EDUCATION</b>	<b>89 – 106</b>
<b>ACCOUNTANCY</b>	<b>107 – 113</b>
<b>ECONOMICS</b>	<b>114 – 134</b>
<b>COMMERCE</b>	<b>135 – 141</b>

# English Language : XII A B C

---

## Question 1.

Write a composition in approximately 450-500 words on any one of the following subjects. (You are reminded that you will be rewarded for orderly and coherent presentation of material, use of appropriate style and general accuracy of spelling, punctuation and grammar.) [20]

1. Everyday is a new day. Explore and Explicate this idea with your personal views.
2. Feminism is a not real in India. Give your views for or against the statement.
3. The difficulties that the present generation has to face are greater and more troublesome than those faced by the previous generations.
4. Mental Health.
5. Write an **original** short story with a title 'The Sea of Faith'

**Heading : A proper and suitable Heading with suggestive phrases** 2 Marks

**Structure of the Essay:** 4 Marks

- Different Paragraphs
- Uniformity in the size of the paragraphs
- Introduction
- Conclusion

**Understanding of the topic:** 4 Marks

- Good Knowledge on the topic
- Sufficient ideas on the topic

**Expression and Elaboration of Ideas:** 4 Marks

- Ability to Express Ideas well
- Able to elaborate at ease on the chosen topic
- Signs of awareness/ good arguments

**Grammar:** 4 Marks

- Tenses
- Brevity and Conciseness in Expression
- Good Vocabulary
- Spelling and Punctuation

**Overall Presentation:** 2 Marks

- Good Handwriting
- Clean Presentation

[Total Marks : 20]

## Question 2.

[15]

a. Prepare and compose a Statement of Purpose to be submitted to a well known University for your undergraduate studies. Follow the given guidelines to complete the same:

The Lead lines - Your Purpose and intents for seeking admission - your brief introduction - academic achievements - your co-curricular abilities - other achievements and awards - missions and associations - your vision statement

**Format :**

1. First paragraph :

- The applicant should mention his intention for seeking admission in the institution

- It should be very basic and specific lines.

- E.g. I feel proud to apply.....because.....

For the last two years I have been thinking of studying in your.....

2. Second paragraph should be personal details...who he is...residence...

3. The third paragraph and the following paragraphs should follow the abovementioned guidelines.

4. Each applicant must mention why he/she should be selected or preferred for admission

5. The achievements should look very normal and real.

6. The last paragraphs should mention the goals....vision statements...

Name signature

## Marking Scheme

<b>1. Following of Format</b>	<b>:</b>	<b>5 marks</b>
- <b>Maintenance of the required order of presentation</b>		
<b>2. Following the given guidelines</b>	<b>: - Each guideline has been properly presented</b>	<b>5 marks</b>
<b>3. General Grammar</b>	<b>:</b>	<b>5 marks</b>
- <b>Tenses</b>		
- <b>Spellings</b>		
- <b>Precise and concise</b>		
- <b>Good Vocabulary</b>		
<b>4. Overall Presentation</b>	<b>:</b>	<b>5 marks</b>
- <b>Neatness and good handwriting</b>		

[Total Marks 20]

b. As a member of the Student Council of your school, you wish to start an initiative for having some coaching classes for the students of the nearby slums. Write a proposal in not more than 150 words, stating the steps you would take to make it a success. [10]

Format :	Marks
Heading : Proposal to plantation of plants on a nearby highway	1
Opening statement : I would request you to .....	1
Statement of objectives : (why one wants to hold the day's programme)	3
a. .... b. .... c. ....	
<b>List of Measures to be taken to hold the day</b>	<b>3</b>
a. Day b. Venue c. Time d. Plans regarding finance, budget, programme, management etc.	
<b>Closing statement:</b> I would request to accept this proposal.....	1
Name Ashok Kumar	
Designation President of Environment Club	1

### Question 3.

a) In each of the following, sentence A is complete, while B is not complete the sentences B, Making it similar in meaning to sentence A write down only sentence B. [5]

i) A. He said, "I will arise and go to my father, and will say unto him: Father, I have sinned against heaven and before you, and am no more worthy to be called your son. "

**B: He said that he would arise and go to his father and would say unto him that he had sinned against heaven and before him and that he was no more worthy to be called his son.** ii) A:

Although they were ready to sing the song, the people did not want to listen to them. **B: Despite their readiness to sing the song, the people did not want to listen to them.**

iii) A: As soon as they run to touch the tree, the birds start clamouring.

**B: Hardly do they run to touch the tree when the birds start clamouring.**

iv) A: This wasn't the best way to solve the problem..

**B: There are better ways to solve the problem.**

v) A: I do not see any reason to remove you from the team.

**B: I do not see any reason to remove you from the team. Do I?**

b) Fill in the blanks with a suitable preposition (Do not write the sentences) [5]

1. Perhaps it was the grey morning, with the daylight no more than an apology---**to**---the departing night.
2. The teacher was inclined to abandon a class half-way-----**through**-----a lesson to the astonishment and delight of the people.
3. He finds life largely acceptable as long as the big worries are kept --**at**-- bay.
4. He is wrong and so has nothing to complain ---**about**----
5. He called .....**for**.....an explanation when he found him missing from the class.
6. Claire committed a faux pas when she wore black --**at**--- her cousin's wedding.
7. The ring has been handed-----**down**-----from mother to daughter.
8. I said all I could ---**with**----- a view to proving his innocence.

9. Let us partake --in--- a meal before we start.
10. Your words are --at---- variance with the facts.

c) Fill in each blank with the appropriate form of the word given in the brackets.

[5]

**(Do not write the sentences)**

The girl crouching in the small dark bedroom at the rear of the house jumped up in fright. "Grand father, grandfather," she (1) ----**pleaded**----- (plead), "Please do something." They (2) ----**have come**- (come). They (3) ----**have broken**----- (break) the door in. "Hide," (4) ---**urged**----- (urge) the old man and hobbled to his feet painfully. "Hide somewhere, anywhere, under the bed." In panic and desperation he (5) -----**stared**----- (stare) around the familiar room. The helpless old man blindly (6) -----**groped**-- (grobe) his way through the dark. Suddenly he (7)---**felt**----- (feel) the presence of someone in the room before he (8)----**could**----- (can) even speak, two strong arms (9)-----**went**----- (go) round his neck and almost (10)-----**strangled**----- (strangle).

**Question 4.**

**Read carefully the passage given below and answer the questions that follow:**

Sociologists have become increasingly concerned with the ways in which families *shape* children's development and overall well-being. This growth of interest has been fueled by rapid transformations in family structure, science and technology, deepening poverty among children, and the deteriorating well-being of disadvantaged children. Children's behaviour problems, in particular, are an important aspect of child development, and may be implicated in later adult outcomes. For example, life course research finds that early child temper tantrums may lead to later problems in life, such as downward occupational mobility, erratic work lives, and divorce and separation. Child development research finds continuity between early behaviour problems and later antisocial behaviour, while criminological research finds continuity between behaviour problems and later delinquency and crime. Such offenders in turn are more likely to suffer adult problems like joblessness, poverty, violence, and imprisonment.

The significance of the family in the genesis of children's behaviour problems is well documented. Both the internal dynamics of parent-child interactions and structural relationships involving families are implicated in the development of children. Research in child psychology has emphasized the importance of parenting styles on the well-being and control of children. Coercive or authoritarian control based on force, threat, or physical punishment of children tends to be ineffective in controlling and shaping children. In contrast, inductive or authoritative control based on reasoning, explaining, and understanding tends to be effective in shaping the lives of children.

Such differences in parenting styles can have a direct effect on child behaviour problems and juvenile delinquency. Criminological research has found that anti-social and delinquent behaviour is associated with parental rejection (or lack of attachment), as well as weak parental supervision and involvement with the child.

Both child development and parent-child interactions are conditioned by social structure. This includes both the family's internal closure as well as the family's ties to other institutions. The lack of internal closure, reflected in single-parenting, isolation from extended kin, and parents working outside the *home* may impede parent-child interactions and increases problem behaviour. In addition, families that are embedded in society have greater resources to invest in children, resulting in quality interactions and non-problematic behaviour. Conversely, families that are isolated from the labour market, impoverished, and stigmatized by welfare will have fewer social and material resources to invest in their children. The result will be weaker parent child bonds and greater behaviour problems exhibited by the children.

We use the concept of family social capital to conceptualize parent-child interactions, family structures, and family social context. Thus, we focus on the structural relations that give rise to social resources available for parents to invest in their children, and the different ways in which parents invest those resources. Here we emphasize the building of trust, the exchange of information, and the mutual obligations that develop between parents and their children. Each of these processes is here in structural relations. Families with both biological parents present, with strong kinship networks, and with parents embedded in the community (through jobs, voluntary associations, and the like) have structures that are conducive to building reciprocal trust, stable expectations, and strong normative controls. Family social *capital* invested in children is manifested in parenting practices, or parent-child interactions. Parents invest in their children by developing warm emotional bonds, building strong norms with consistent, positive sanctions, and providing support. These investments can dissuade children from problem behaviour.

But families influence children's social development through a dynamic process, which unfolds over the life course of the child. Therefore, we follow recent theorizing in criminology and adopt a life course framework for examining family social capital and child behaviour problems. We conceptualize parents' life course transitions as structural relations both within the family and between the family and other institutions. Parental role transitions, such as movements into and out of states such as poverty, welfare, employment, single-parenthood, and co-residence with extended kin, represent major shifts in internal closure within the family and the embeddedness of the family in society. Moreover, not only is the transition itself important, but the timing of that transition and the duration of the state is significant for the child. For example, chronic poverty may deplete social resources and thereby impair the control of children. Or early childhood poverty could have lasting effects on children by undermining the formation of parent-child bonds at a critical life stage.

Thus, both parents as well as children are to be in one close knit bond to have the maximum of results as a fully developed family. In our day to day life, each and every word or action has to be reciprocally beneficial. Physical proximity to psychological nearness, everything counts. Consider these things as long term investments. Today, in our fast-paced world, people somehow parent their wards so as to get quick results but parenting is not short term investments. Patience is one virtue that every parent has to inculcate. Biologically, each and every thing in the world has its own course of growth and life-course. Hence anticipating or accelerating it would mean unnatural and expected returns.

**a. Given below are three words/phrases. Find words which have similar meaning in the passage. [3]**

- |                     |   |           |
|---------------------|---|-----------|
| i. Weaken           | - | impede    |
| ii. involving force | - | coercive. |
| iii. Discourage     | - | dissuade  |

**b. For each of the words given below, write a sentence of at least ten words using the same word unchanged in form, but with a different meaning from that which it carries in the passage: [3]**

- i. Shape (You can't use it as a verb as in the passage)

The shape of Taj Mahal looks very majestic and beautiful from Yamuna End. [**Noun**]

- ii. Home (You can't use it as a noun with a meaning 'house for a family')

He wanted to drive home the importance of team spirit.  
This is my home office and I work from here.

iii. Capital (You can't use it with the meaning 'investment/resources')

New Delhi is the Capital of India for many years now.  
He was given capital punishment and the whole nation was upset with it.

**c. Answer the following questions briefly in your own words:**

i. What do you mean by '*continuity in behavioural pattern*'? [2]

- **Any behaviour is not an isolated fact. It is a result of many series of actions, thoughts and words. A behaviour of a person grows with time and has a proper transition. Moreover, it evolves basing itself on the past and current elements in a personality. Thus there is continuity in the way one attains one's behaviour. It is not random or sudden. Rather, it is the outcome of a sustained continuity.**

ii. How does the '*financial position*' of the parents affect the growth of children? [2] -

**The financial position of the parents has direct effect on the growth of children. The availing of opportunities and lack of resources do affect the children in planting a set of behavioural features and pattern. Children begin to compare and contrast their financial positions. The status and classes in society do have a lasting impression in the behaviour of children.**

iii. What is '*juvenile Delinquency*'? [2]

- **'Juvenile delinquency' is committing of crime by children or adolescents. This is an act of crime which is committed by young people. Children begin to inculcate a tendency to engage in anti-social activities and become a victim of delinquent behaviour.**

**d. In about 100 words of your own describe how one can have a well-groomed family Write your ideas in the form of a connected passage. (failure to keep within the word limit will be penalized) [8]**

**Your connected passage must be in GRIDS and it should have the following ideas:**

1. Families **shape** children's development and overall well-being.
2. Both the internal dynamics of parent-child interactions and structural relationships involving families are implicated in the development of children.
3. Parenting styles can have a direct effect on child behaviour problems
4. Father-Mother relationship must show good bonding to inculcate the meaning of love and care
5. The financial position of parents must teach children to contain needs suiting to their resources.
6. Social proximity is a good factor to have well-knit family
7. Ethics and Discipline must rule the behaviour of children to regulate a family.
8. Patience must always be there to inculcate values among children.

# LITERATURE IN ENGLISH

SECTION A (20 Marks) (Compulsory) THE TEMPEST: Shakespeare

## Question 1

Read the excerpts given below and answer the questions that follow:

### a. 'This Sir Prudence, who should not upbraid our course'

- i. Who is the speaker of the above line? Who is referred to as 'Sir Prudence'?
- [2]
- **Antonio** [1]
  - **Gonzalo** [1]
- ii. Which 'course' has the speaker referred to? In which terms is this 'course' mentioned just before this line?
- [2]
- **Murder of King Alonso** [1]
  - **I with this three obedient steel,  
Three inches of it, can lay to bed forever** [1]
- iii. Which animal is mentioned just after the above line and why has it been mentioned there?
- [2]
- **A cat** [1]
  - **For all the rest, they will take suggestion as a cat laps milk  
[Compares the others with cat: they Will not protest]** [1]
- iv. Which result is expected by the speaker and the person spoken to from this 'course' of action?
- [1]
- **With the death of Alonso, Sebastian Would be the king of Naples  
And Antonio would rule unopposed At Milan** [1]

### b. Caliban: ' 'tis custom with him, I' th' afternoon to sleep'

- i. Which instructions does the speaker issue to the persons spoken to just after the above line?
- [3]
- 1) **There you may brain him**
  - 2) **Having seized his books,**
  - 3) **With a log batter his skull**
  - 4) **Paunch him with a stake**
  - 5) **Cut his wezand with your knife. [all five 3 marks or else 2 ]**

- ii. How does the speaker describe the daughter of 'him' at this moment? [3]
- **And the most deeply to consider is the beauty of his daughter** [1]
  - **He himself calls her a nonpareil:** [1]
  - **I have never seen a woman but only Sycorax my mother but she as far surpasses Sycorax as greatest does least.** [1]

- iii. Which response is elicited here from one of the persons spoken to regarding the description of this daughter? [1]
- **Is it so brave a lass?...I will make her my queen.** [1]

**c. 'Sir, I am vexed; Bear with my weakness; my brain is troubled'**

- i. Who is the speaker of the above lines? Who is referred to as 'Sir' here? [2]
- **Prospero.** [1]
  - **Ferdinand.** [1]
- ii. Which request is made by the speaker for 'Sir' just after the above lines? How was this 'Sir' addressed at the start of this speech? [2]
- **If you be pleased: retire into my cell and there repose** [1]
    - **My son.** [1]
- iii. Which comparison is made by the speaker just before the above lines? [2]
- **We are all made of dreams** [1]
    - **and our life stretches from sleep before birth** [1] **to sleep after death.**

**SECTION B (60 Marks)**

Answer four questions in all, choosing at least one question from each of the three prescribed textbooks.

**THE TEMPEST**

**Question 2**

Referring to the character of Gonzalo, bring out the truths of the following:

- (a) A Noble Neapolitan. [5]

- Gonzalo was a **nobleman from Naples**. He had been chosen to carry out the plan to carry Prospero and Miranda to the sea and trying to kill them there. However, he didn't kill them but instead he gave them clothes, linen, and other necessities. Knowing how much Prospero cherished his books, he arranged for books from Prospero's library to be saved and available on the island
- An honest and trusted adviser to King Alonso of Naples, he has **a good heart** and an optimistic outlook, and is described as noble. Gonzalo took pity on them, supplying them not only with the food and water necessary to survive but also with those things that make life easier.
- His **sense of justice** persuaded him to treat Prospero and Miranda with kindness and so he provided them with 'Rich garments, linens, stuffs and necessaries' (I.2.164), as well as with food, water and books from Prospero's library.
- His continued **loyalty** to Alonso is shown in his reproach to Sebastian: 'My lord Sebastian, / The truth you speak doth lack some gentleness' (II.1).
- Prospero praises the old man's loyalty and perhaps sums up the audience's reaction to a likeable, loyal, talkative and cheerful nobleman: 'O good Gonzalo, / My **true preserver**, and a loyal sir / To him thou follow'st!' (V.1).

**(b) A Good Counsellor.**

[5]

- For all that Gonzalo represents a beacon of hope and kindness. For instance, when he tries to cheer Alonso up at the top of Act II, his words only offer cold comfort: "*Beseech you, sir, be merry. You have cause, / So have we all, of joy, for our escape / Is much beyond our loss*" (II.i).

Alonso, who believes he's just lost his son to the sea, doesn't find Gonzalo's cheerful words very **consoling**, despite their good intentions. Gonzalo's simplicity provides a source of hope when all things look bleak and useless.

Right at the start in Act 1 Scene1, he is presented as a person who **hopes** that Boatswain may be allowed to do his work. He gives most needed advice when one has none.

He is an object of amusement for Antonio and Sebastian, who talk circles around him and laugh at his expense. He knows he's an object of ridicule, but he remains steadfast in the face of their inconstancy. At one point, when Antonio tells him not to get upset on account of their jokes, Gonzalo **responds maturely**: "*No, I warrant you, I will not adventure my discretion so weakly*" (II.i). Ultimately, with the reconciliation that concludes the play, Gonzalo's good words win over his companions' cynicism.

**(c) A Philosopher**

[5]

- Gonzalo has been presented as a philosopher too in the play. He possesses a vision of his own and wants to paint the world of the time with his colourful wishes. There has been for long so much talk and debate on the

'Commonwealth Speech' of Gonzalo in this regard.

- Gonzalo says '*All things in common nature should produce without sweat or endeavor. Treason, felony, Sword, pike, knife, gun, or need for any engine Would I not have; but nature should bring forth of its own kind, all foison, all abundance, to feed my innocent people*'. Shakespeare has a very look at the state of affairs of Elizabethan age and comments how the world can have a better polity.
- Gonzalo, The mouthpiece of Shakespeare, brings out the mind of Shakespeare in establishing a **Utopian Society** as envisioned by *Thomas More* in his political philosophy/theses 'Utopia'.
- Gonzalo's new world has absence of status, property, and profession which assumes a unity and uniformity in many things among humans.
- Gonzalo thinks of a **commonwealth** has no sovereignty and which means no one will have dominion over anyone else.

### Question 3

[15]

The Character of Caliban is certainly filled with many dimensions. On one hand he is a dejected slave who wants his native land back to himself. He cries against colonial and alien Prospero. On the other hand, he is a humorous figure who demands respect for his peculiar statements. In keeping with these truths, analyse his character and bring out the originality of his character to address the issues and significance he makes in the play. Quote from the text to substantiate your claims.

[The following ideas must come in the presentation and the candidates are expected to add their own reflections and interpretation]

- **Textual quotes and references are mandatory. One is expected to refer to them in substantiating one's statements and analysis.**
- Prospero's dark, earthy slave, frequently referred to as a monster by the other characters, **Caliban is the son of a witch-hag and the only real native of the island** to appear in the play.
- He is an extremely **complex figure**, and he mirrors or parodies several other characters in the play.
- We see him first as the character that **rebels against his usurper Prospero**. He wants his freedom and insists that Prospero stole the island from him. Through his first speeches, Caliban demands his rightful status and shows how his master has wrongly enslaved him.
- On the other hand, Caliban's desire for sovereignty of the island mirrors the lust for power that led Antonio to overthrow Prospero. Caliban's conspiracy with Stephano and Trinculo to murder Prospero mirrors Antonio and Sebastian's plot against Alonso, as well as Antonio and Alonso's original conspiracy against Prospero. We see a **villain** in Caliban here.

- Caliban both *mirrors and contrasts with Prospero's other servant, Ariel.*

While Ariel is “an airy spirit,” Caliban is of the earth, his speeches turning to “springs, brine pits” (I.ii), “bogs, fens, flats” (II.ii.), or crabapples and pignuts (II.ii). While Ariel maintains his dignity and his freedom by serving Prospero willingly, Caliban achieves a different kind of dignity by refusing, to bow before Prospero’s pressure.

- Then, there is the **beastly Caliban** who hardly cares for the dignity of the daughter of his master, Miranda. He does not have the morality and ethics that the civilized have. Instead, he presents his horrid side to contrast himself with sophistication of Prospero, his master. Caliban’s design of ravishing the modesty of Miranda shows his unrefined and rotten side, being the son of the witch.

- Finally, and most tragically, Caliban becomes a parody of himself. In his first speech to Prospero, he regretfully reminds the magician of how he showed him all the ins and outs of the island when Prospero first arrived. Only a few scenes later, however, we see Caliban drunk and fawning before a new magical being in his life: Stephano and his bottle of liquor.

- Soon, Caliban begs to show Stephano the island and even asks to lick his shoe. Caliban repeats the mistakes he claims to curse. In his final act of rebellion, he is once more entirely subdued by Prospero in the pettiest way— he is dunked in a stinking bog and ordered to clean up Prospero’s cell in preparation for dinner. **He brings on the stage lot of humour needed to tantalize the audience.**

- Despite his savage demeanor and grotesque appearance, however, Caliban has a nobler, more sensitive side that the audience is only allowed to glimpse briefly, and which Prospero and Miranda do not acknowledge at all. *His beautiful speeches about his island home provide some of the most affecting imagery in the play*, reminding the audience that Caliban really did occupy the island before Prospero came, and that he may be right in thinking his enslavement to be monstrously unjust.

- Caliban’s swarthy appearance, his forced servitude, and his native status on the island have led many readers to interpret him as a **symbol of the native cultures** occupied and suppressed by European colonial societies, which are represented by the power of Prospero. Whether or not one accepts this allegory, Caliban remains one of the most intriguing and ambiguous minor characters in all of Shakespeare, a sensitive monster who allows himself to be transformed into a fool.

### **Marking Scheme for the Critical Presentations:**

- |  |         |
|--|---------|
| a. Introduction:                       | 1 Mark  |
| b. Good Understanding of Theme/Topic : | 2 Marks |
| c. Good Knowledge of Text :            | 4 Marks |

- d. Proper Textual References: 4 Marks
- e. Good Language and Expression: 2 Marks
- f. A Proper Conclusion: 2 Mark

-----

**Total Marks                      15 Marks**

## **ECHOES**

### **Question 4**

Referring closely to the short story 'The Sound Machine' by Roald Dahl, answer the following:

**(a) Describe the behaviour of Mr. Klausner while he was busy creating the machine. [5]**

- The protagonist of the story and inventor of the sound machine is described as a small and frail “moth of a man
- He is intensely dedicated to his research into the “world of sound” unavailable to human ears, displaying a painstaking attention to detail and an impassioned disposition.
- He becomes incredibly animated and passionate when he is asked about it, a quality that is off-putting to those around him.
- He is totally lost into his own world and is detached from the rest of the world. *He plugged the wire connections from the earphones into the machine and put the earphones over his ears. The movements of his hands were quick and precise. He was excited, and breathed loudly and quickly through his mouth. He kept on talking to himself with little words of comfort and encouragement, as though he were afraid— afraid that the machine might not work and afraid also of what might happen if it did.*
- His passion has given him a vision that there are numerous sounds and that he has to hear them.
- His passionate behaviour is coloured with a kind of intimidation which is obvious to Dr. Scott who does not feel at home in his company.
- He appears weird and strange in his theory of sounds. Mrs. Saunders senses his absurd side which has intimidating voice and looks.

**(b) Which theories and assumptions did Mr. Klausner have in his mind regarding the sounds and the world? [5]**

- The inventor, Klausner is obsessed with sound and has a theory. This theory states that *beyond the realm of sounds that humans can hear lies a whole undiscovered body of sounds. These sounds are produced at such a high frequency that the human brain cannot possess them.*
- And hence, to be able to hear these sounds, he creates a machine – a black box the size of a child’s coffin with wires, silver tubes, and dials that can together convert these high-frequency sounds to lowerfrequency notes that humans can hear. He shares this idea, reluctantly, with his doctor Scott who deems it implausible.
- "I believe," he said, speaking more slowly now, "that there is a whole world of sound about us all the time that we cannot hear. It is possible that up there in those high pitched inaudible regions there is a new exciting music being made, with subtle harmonies and fierce grinding discords, a music so powerful that it would drive us mad if only our ears were tuned to hear the sound of it.
- "I made a simple instrument that proved to me the existence of many odd inaudible sounds. Often I have sat and watched the needle of my instrument recording the presence of sound vibrations in the air when I myself could hear nothing. And those are the sounds I want to listen to. I want to know where they come from and who or what is making them."

**(c) Comment on the unexpected twists and turns as presented at the end of the story [5]**

- **Klausner becomes agitated and almost mad.**
- **His passion for sounds and the related theories lead him to believe the plants feel the pains inflicted upon them.**
- He began to wonder about other living things, and he thought immediately of a field of wheat standing up straight and yellow and alive, with the mower going through it, cutting the stems, five hundred stems a second, every second. Oh, my God, what would that noise be like? Five hundred wheat plants screaming together and every second another five hundred being cut and screaming and no, he thought, I do not want to go to a wheat field with my machine.
- He says, ‘ **I would never eat bread** after that. But what about potatoes and cabbages and carrots and onions? And what about apples? Ah, no. Apples are all right. They fall off naturally when they are ripe. Apples are all right if you let them fall off instead of tearing them from the tree branch. But not vegetables. Not a potato for example. A potato would surely shriek; so would a carrot and an onion and a cabbage.’
- Klausner may be mentally unstable. It is as though he is so **preoccupied with the sound machine** that he has no time for either people or other things. It is also possible that Klausner has a heightened sense of hearing. This may explain as to why the doctor does not hear the cries from the tree when Klausner strikes it with an axe for a second time.

- The fact that Dahl uses plant life and suggests that plant life has the ability to feel may be important as Dahl could be placing a **symbolic spotlight on environmental issues**. Perhaps Dahl is suggesting that not enough care is given to the environment. A stance that would not have been common at the time the story was written (1949).
- Though it is noticeable that Dr Scott is somewhat afraid of Klausner while he is applying the iodine to the tree. The fact that Dr Scott is applying the iodine on Klausner's instruction may also be important. **As Klausner is attempting to treat the tree as a human would be treated**. Klausner has attached feeling to the tree based on the sound he may or may not have heard.
- What had most likely started off as a pet project became an obsession to Klausner and fuelled by the excitement he felt he may have tipped himself over the edge.

### Question 5

[15]

With close reference to the short story The Singing Lesson; describe how the lesson as it progresses, becomes an echo of Miss Meadows' feelings. Also show how her personality the title is aptly justified in the story.

### The Critical analysis must include the following elements:

**Introduction:** in few words only.

- a. Who is the author and why is she popular?
- b. What is the theme of the story [already given in the topic of the question paper - **Echo of Miss Meadows' feelings**]

### Body of the Analysis:

- c. In *Different paragraphs* with textual quotes to prove the following points
- d. Provide your comments and analysis
- e. Do not merely paraphrase the text.
- f. Answer the questions - **WHAT, HOW AND WHY?**
- g. Use your own words to express your thoughts and opinions
- h. General accuracy of Grammar is must
- i. **TEXTUAL QUOTES TO PROVE YOUR STATEMENTS ARE MANDATORY.**

- We intend to show how there are changes in the mood as the story progresses.
- We will show the various symbols to support this theme.

- Ms. Meadows is a school teacher teaching music

- She comes from a traditional middle class background where single **unmarried women are not welcome to the social milieu**.
- Her first mood of sadness is all a result of her **rejection** from her fiancé for marriage.
- She is frustrated and worked up.
- *A class of singing lesson reflects the inner consciousness of Miss Meadows as if it were a monologue expressing the mental anguish and utter torment of her soul. Her innermost agony and heavyhearted state of mind peep through her interaction with her colleagues and students*
- Interior monologue is a modern novelistic device in fictional narrative perfected by eminent literary figures. Katherine Mansfield is one of those literary doyens who artistically uses monologue in “The Singing Lesson” with a **view to exploring the corridors of Miss Meadows’ psyche**.
- The story is characterized by paucity of dialogue and much emphasis is laid on the **inner workings of the soul of Miss Meadows**. Quite important is, therefore, Miss Meadows’ *gestures and expressions*.
- All her inner turmoil is the after effect of a letter from her lover who declines to marry her or rather intends to **break off their engagement**. This is what induces a stormy gust of **emotional turbulence** in her.
- Miss Meadows’ **mental anguish is entangled with her professional life**. The atmosphere of the school where she works is the theatre of the vivid drama of her personal turmoil.
- A subtle complex psychological study of her character is offered to us to peep into what storm is brewing in deep-seated anxious impulse of her psyche. The story is thus a good measure of how combative she is not to disclose her inner existential crisis.. *With despair – cold, sharp despair— buried deep in her heart like a wicked knife*
- Such **metaphorical** statement is the key to Miss Meadows’ present state of mind. The science mistress wishes her “Good morning” commenting about the arrival of winter. No doubt, we observe in the voice of the science mistress a slight utterance prolonged by the drawl of vowel sound; the way of answering as is evident in the short sentence she utters, “It is rather sharp”, is rather blunt dispassionate snatch of expression, but at deeper level it creates the impression on us that arrival of the **letter** from Basil....and its content is as sharp as the sharpness of a knife....*I feel more and more strongly that our marriage would be a mistake....not a marrying man.*

- The abrupt change is perceptible even in nature as winter is approaching; it is as if Miss Meadows' warmth of sunny spirit is gone; instead cold vapid spirit pervades her expression. It is through such subjective and sensory impression by which the objective reality is depicted. The writer uses such modernistic technique of impressionism.
- Such recurrent thought of her lover plagues her inner being and is reflected in her interaction. The writer presents the quoted expression of her lover directly in the narrative to bring home the parallel stream of obsessive gloom in her inner psyche. Another quoted word that is extracted by her from the letter of her fiancé is "disgust". This is the perception of her mind. She becomes fed-up with everything.
- Even the atmosphere of the singing lesson in the classroom is disrupted. In course of the singing lesson she utters her lover's name "Basil". It is an example of repression of bottled-up emotion that she is hardly able to share. Time and again, the third person narrator and Miss Meadows' monologue of agony trigger off the plot of the story. She instructs the girls to begin with page fourteen, **A Lament**. And furthermore, she insists on singing without any expression. It is symptomatically a lament of her private self. We can feel to what extent she is persistently preoccupied and the words of the letter flash across her mind. The flashback of previous moments she had enjoyed with her lover go to and fro across the corridor of memory lane.
- Then the next **telegram** arrives. Ms. Meadows is all ecstatic and overjoyed. So the next reflections are all on her happy ending finally.
- The writer presents a profound psychological study of human psyche as is evident in the character of Miss Meadows. It does have but a pervasive after-effect on her feminine sensibility. Life is a bundle of moments – sometimes a moment of pleasure or sometimes a moment of utter hopelessness and failure. The high-strung emotional personality of a music teacher and her subsequent behaviour are studied as minutely as a studious observer would do.
- The action of the story is confined to a particular class of singing lesson. The authorial statement strikes our attention to the overtly pessimistic attitude of Miss Meadows:
- Thus, a particular staggering moment of personal crisis churns up her morose mental state. Thus, the interior monologue is shown as an effective means of portraying the character of Miss Meadows in the story.

**[The two letters and the two songs must be quoted for textual References]**

**Marking Scheme for the Critical Presentations:**

g. Introduction:	1 Mark
h. Good Understanding of Theme/Topic :	2 Marks
i. Good Knowledge of Text :	4 Marks
j. Proper Textual References:	4 Marks
k. Good Language and Expression:	2 Marks
l. A Proper Conclusion:	2 Mark

-----

<b>Total Marks</b>	<b>15 Marks</b>
--------------------	-----------------

## REVERIE

### Question 6

Referring closely to the poem ‘Dover Beach’, answer the following:

(a) Describe how the poet presents dark times, hopelessness and pessimism in the poem. [5]

- “Dover Beach” is often considered to be one of the best lyrics of Matthew Arnold. Written probably around June 1851, the poem deals with one of Arnold’s most important themes—the loss of faith.
- In a sense, this poem stands on the crossroad between an age of faith and the emptiness of the modern world. The advances of science created a kind of spiritual vacuum but the final affirmation was to be sought out in human love
- This poem sincerely gives the memorable utterance of the Victorian problem of loss of faith. For a poet like Matthew Arnold, the search for some stability becomes a part of the agony he is undergoing. The agony is best reflected in the following lines of the poem: *“And we are here as on a darkling plain Swept with confused alarms of struggle and flight, Where ignorant armies clash by night”*
- In his poetry, he reflects the doubt of an age, which witnessed the conflict between science and revealed religion. One important theme, which runs through the poetry of Matthew Arnold, is the issue of faith and the **sense of loss that man can feel without faith.**
- There was in him a deep strain of melancholy and pessimism. Though religious by nature, he was **skeptical of system of belief** prevailing Victorian society. He was dismayed by the Oxford movement, the theological and liturgical disputes which afflicted the people in mid century.

- So, meditative and rhetorical, Arnold's poetry often depicts the problems of religious faith and **psychological isolation**. He severely criticized the loneliness which the society and its trends were offering. In his essays of criticism he vehemently spoke about it.
- He says : **Hath really neither joy, nor love, nor light,  
Nor certitude, nor peace, nor help for pain;**  
And this clearly indicates the issues which the poet was sorry about.

**(b) Comment on various symbols and other poetic devices used in the poem?**

[5]

- **The Sea**

Imagery related to the sea pervades the poem. The first line describes the sea as "calm" at high tide, and this description is reiterated in line five: "the tranquil bay." This early in the poem, the sea seems to represent stability— especially in contrast to the chaotic final image of the poem.

**Additional symbolic meanings.** Its repeating cycles—the rise and fall of tides, the advance and retreat of the waves—evoke eternity. They "begin, and cease, and then again begin," creating an "eternal" pattern. To Sophocles, the poem says, this rhythm symbolized the perpetual rise and fall of human misery.

Finally, to the speaker the **sea represents faith**. This is the most explicitly stated symbol in the poem, as the speaker refers to the "**Sea of Faith**." He describes how it was once "at the full" and is now—like a retreating wave— "withdrawing" and leaving the world a darker, harsher, more confusing place.

- **The Land**

Like the sea, the land seems to have two competing symbolic meanings. An early image of the *cliffs of England's shore* describes them as standing "glimmering and vast." This image of the land suggests its solidity and greatness. Indeed, the poem's first few lines suggest both the land and the sea represent strength and stability.

However, the final image of the poem shows a different side of the land. The "*darkling plain*" is the scene of "confused alarms" and clashing of "ignorant armies." Here the land seems to represent the domain of humankind and its tendency to violence and struggle. Because this image is presented in contrast with the Sea of Faith, the land becomes the symbol of humanity on its own, without the love and comfort faith provides.

- **The Shore**

Although the poem begins with similar symbolic interpretations of land and sea— both vast and unchanging—*the shore enters the poem as a place of conflict*. In line seven the speaker's attention is drawn to the meeting of land and sea: "from the long line of spray / Where the sea meets the moon-blanch'd land." The waves "fling" themselves against the land and then loudly grate against the rocky beach as they pull back. Through this sound, and the image of waves beating against the land, the shore represents conflict and change.

- What is the speaker's tone, or attitude, toward change, as revealed in the symbol of the shore? It might be tempting to see change as a benign, or even beneficial, force. But the speaker does not present it in a positive light. Rather, the sound of the sea and land making contact at the *shore brings to mind human misery, humankind's loss of faith, and eternal sadness*. The change described in Stanza 3—the withdrawal of the Sea of Faith—is "*melancholy*." It removes the "bright girdle" from the shore, leaving "vast edges drear / And naked shingles of the world." *The sense of loss in this image—of hope, of light—is palpable*.
- **Light and Dark**  
For Arnold, the *loss of religious faith is closely tied to and symbolized by the lack of light in the world*. In the first stanza both the land and the sea reflect the light, but it is the dim light of the moon, not the bright light of the sun. The brightest light of day has already gone from the world. The pulsation of light from the French shore first "gleams," then is "gone." This loss of light foreshadows the meaning of Stanza 3, in which Arnold describes the decline of faith and laments its loss. Here the speaker notes that in the past, faith was like a "bright girdle" around the world, clothing it in light. Not so now, he laments in Stanza 4, describing the world as having no light at all.
- The loss of light from the world leaves its inhabitants in *symbolic dark*. The "*darkling plain*" of the final stanza is a place of utter confusion, as soldiers who cannot be seen and who cannot see fight invisible opponents. The chaotic darkness of this image offers a bleak representation of the human state.

(c) How does the poet hope to tide over the problems?

[5]

- In the opening lines of the third stanza, the speaker addresses his companion directly:  
*'Ah, love, let us be true  
To one another! for the world'*  
He beseeches her that they must comfort each other, be faithful to one another. Only the loyalty and comfort of personal relationships can fill the void produced by the disappearing faith in God
- The loss of faith and humanity is all because of loss of hope that only love can bring back our original self. We can be good and beautiful again if we knew the real meaning of love.
- Although the word *love* does not appear until the final stanza, its use reveals the poem has all along been addressed to the speaker's love: "Ah, love, let us be true / To one another!" It is the speaker's love whom he calls to the window to hear and see the waves crash upon the shore. And it is fidelity between the two lovers that will provide the only possible respite from the chaos and misery of the world.
- The final image—of two people standing together on a "darkling plain" surrounded by "struggle and flight"—shows *love's persistence despite its embattled state*.

The poem 'Crossing the Bar' is a poem of affirmation and faith. The poet has presented wonderful examples of these facts. Critically analyse them by presenting your views. Quote profusely from the text substantiate your statements.

## The Critical analysis must include the following elements:

**Introduction:** in few words only.

- a. Who is the poet and why is he popular?
- b. What is the theme of the poem [already given in the topic of the question paper - **Confirmation and Faith**]

**Body of the Analysis:**

- c. In *Different paragraphs* with textual quotes to prove the following points
- d. Provide your comments and analysis
- e. Do not merely paraphrase the text.
- f. Answer the questions - **WHAT, HOW AND WHY?**
- g. Present the various **SYMBOLS**
- h. Describe the **ANALOGY/METAPHORS**
- i. Use your own words to express your thoughts and opinions
- j. General accuracy of Grammar is must
- k. **TEXTUAL QUOTES TO PROVE YOUR STATEMENTS**  
**ARE MANDATORY.**

- Alfred, Lord Tennyson's "Crossing the Bar" is a sixteen-line poem divided into four four-line stanzas of differing metrical structure. The stanzas follow a consistent **abab rhyme pattern**.
- The opening line establishes the poem's temporal setting, an unspecified ship that is ready to sail at sunset. As the sun descends, the light of the evening star, a beacon for mariners, rises. Line 9 again draws attention to the approaching evening but calls it "twilight" rather than "sunset." Once the final rays of light disappear, darkness will cover the world. This element neatly divides the poem into two sections, each containing 2 stanzas.
- **On the literal level**, the poem is a narration of a voyage. The mariner wants to cross the sandbar to get safely into the deep sea.
- **On the literary level** the poem speaks about the *final journey after death towards God and HOME - AN ABODE WITH GOD, THE CREATOR.*
- Tennyson's poem begins with the barest elements of setting. A ship is about to set sail on a long voyage at "Sunset and evening star." After a formal announcement, the "one clear call," the vessel will sail out

of the harbor, across the sandbar at the harbor's entrance, and into the sea. The anxious passenger, the poem's persona, hopes for a gentle crossing out of the harbor, one without turbulence associated with "moaning of the bar." Instead, he hopes for a tide that is "Too full for sound and foam" because such a gentle tide would be like the one "which drew [him] out the boundless deep" and into port. This realization allows the traveler to think of this voyage out as if it were merely a voyage "again home."

- The second section of the poem (stanzas 3 and 4) echoes the poem's first line with a second reference to the approaching night. Instead of the clear call, the sound of the "evening bell" signals the darkness and the scheduled sailing. Hoping for a cheerful departure, one with "no sadness of farewell," the persona senses the importance of this journey, whose course will lead far beyond the limits of "Time and Place." Still, the persona takes confidence in the hope of seeing the "Pilot face to face" after crossing the bar that separates the harbor and sea.

- **The symbol used in the poem are as follows:**

- **Sunset. : end of the life**
- **Evening star. : Venus, advance age and last time of the speaker**
- **Clear call. : reminder of upcoming death**
- **Evening bell : death knell, a sound that reminds the speaker it's time to go**
- **Bar (sand bar) : boundary between life and death**
- **Tide. : experience of dying, moving calmly and securely**
- **Boundless. : Ocean, i.e. eternity**
- **Home. : afterlife, being born again**
- **Twilight : last moment of life**
- **Dark : death**
- **Embark. : leaving the land of living and heading off the afterlife**
- **Bourne. : boundary or limits**

- **Flood. : Sea, death**
- **Far. : Unknown place**
- **Pilot. : God, who has been steering him on this course the whole time**
- **Sea. : death**
- **Sailing. : Journey towards death**
- **Crossing. : act of dying**

## Significance of symbols :

- The main theme of the poem is “**Death and dying** “. In this short meditative poem Lord Tennyson had drawn a parallel between a routine journey and the journey into death
- The poet has used the metaphor of a ship sailing into the sea to represent the journey of life and a **sand bar** — which is a ridge between the harbour and the open ocean as the barrier between life and death.
- If the sand bar is Tennyson’s metaphor for the boundary between life and death the “Crossing the Bar” is all about crossing from life to death, i.e. act of dying.
- But the poem is not just about death, it is also about what comes before death in most cases — old age.
- The “**sunset and evening star**” are symbolic of getting old. As the evening star appears in the sky at the time of sunset when the day ends metaphorically it refers the end of the life of the speaker.
- “**And one clear call for me!**”  
The sunset and evening star act like a “**call**” for the speaker to make his final journey from life to death. Thus he can hear a “ **clear call**” of death.
- Literally the ship is about to sail on a long voyage at sunset when the evening star rises in the sky. After a formal announcement the “**clear call**” the ship would sail out of the harbour across the sand bar into the vast ocean.
- The vast ocean is a symbol of death. When the waves crash against the sand bar a gloomy — moaning sound is produced. Here the poet compares this moaning sound with the pain and sorrow related with death. He says -

“**And there may be no moaning of the bar**

## **When I put out to sea.”**

The speaker hopes that when his ship will cross the sand bar there should be no moaning sound of the bar. Allegorically he hopes for a painless and smooth death without moaning.

- The speaker wishes for a tide that is **“Too full for sound and foam”** means a tide that is so full that it cannot produce any sound and foam and hence it appears as moving **“ asleep”**. Here he hopes that the feeling of death will be so overwhelming that all other feelings will be numbed.
- As the tide return again to the **“ boundless deep” i.e. ocean** from where it came, his soul will also be return to its home i.e. eternity.
- The speaker is trying to diminish the horror of death by drawing attention towards the fact that death is a part of the cycle of birth and death. For him death is just a returning home.

## **“ Twilight and evening bell**

### **And after that the dark”**

- Here “Twilight” is a symbol of last moments of his life and “evening bell” refers to the death knell, sound of which reminds him of his upcoming death.  
After this twilight, there will be nothing but” **the dark “**
- But the speaker hopes to **cross the bar** cheerfully with **“no sadness of farewell “** as the journey in death would lead him far beyond the limits of **“Time and Place”**. There will be possible for him to see his **Pilot** face to face. **“ I hope to see my Pilot face to face”**.
- He hopes that when the **“flood”** of death will take him far beyond the limits of Time and Place, he will be able to see the **God** face to face. Here by capitalizing the word **“Pilot”** the speaker refers to God, who as a skilled mariner will take his ship beyond the limits , across the bar.
- These lines indicates the poet’s belief in afterlife as he believes that dying is simply a stage and afterlife — a return home to eternity . Here the poet has used the word Pilot for God as the great power that controls and guides our lives.
- Thus the poem is all about death and accepting death rather than fearing the dark unknown.

## **Marking Scheme for the Critical Presentations:**

- Introduction: 1 Mark
- Good Understanding of Theme/Topic : 2 Marks
- Good Knowledge of Text : 4 Marks
- Proper Textual References: 4 Marks
- Good Language and Expression: 2 Marks
- A Proper Conclusion: 2 Mark

---

**Total Marks**

**15 Marks**

**MARKING SCHEME**  
**SELF ASSESSMENT TEST – 2020**  
**PHYSICS – XII (A, B)**

SECTION A

Question 1:

[1 x 12 = 12]

Answer -

(A)

i) (b)

ii) (c)

iii) (c)

iv) (b)

v) question → The level formed due to impurity atom in the forbidden gap very near to the valance band in p-type semiconductor is called

Answer → (d)

(B)

(i) When the voltage across a Zener diode exceeds its breakdown voltage, the voltage across Zener remains constant which means that even if the current flowing through the diode continues to increase.

(ii) Cylindrical wavefront

(iii) Electrons can revolve only in those orbits in which

their angular momentum is an integral multiple of  $\frac{h}{2\pi}$ ,

where h is Plank's universal constant.

(iv) infinity

(v) convex mirrors

(vi) drift velocity of free electrons decreases

(vii) The Electric field will be weakened.

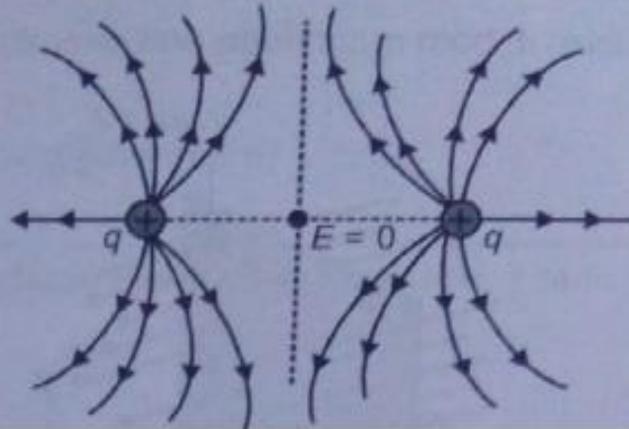
---

Question 2

Answer -

[for diagram [1]]

(c) Two similar charges of equal magnitude



The tangent to the electric field lines of force at any point gives the direction of electric field at that point. [1]

|

Question 3

Answer - The resistivity of a material is defined as the resistance offered by a conductor of that material of unit length and unit cross-section [1]

S.I. unit - (ohm x metre)  $\Omega$  m.

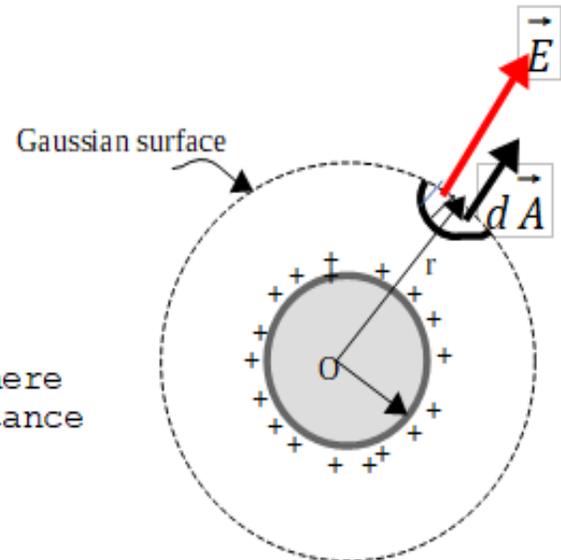
[1]

Question 4

Answer - Gauss Theorem in Electrostatics; According to this law the net flux through any closed surface is equal to the net charge inside the surface divided by  $\epsilon_0$ .

$$\oint \vec{E} \cdot d\vec{A} = \frac{Q_{\text{inside}}}{\epsilon_0}$$

[1]



Let Q be given on conducting sphere  
 Let a point outside be at a distance  
 " $r$ " from the centre O

Applying Gauss Law :

$$\Phi_{net} = \oint \vec{E} \cdot d\vec{A} = \oint E dA \cos 0^\circ = E \oint dA = \frac{Q_{inside}}{\epsilon_0}$$

$$E \times 4\pi r^2 = \frac{Q_{inside}}{\epsilon_0}$$

Therefore

$$E = \frac{1}{4\pi\epsilon_0} \frac{Q_{inside}}{r^2}$$

[1]

OR

We have the relation

$$\text{Dielectric constant } K = \frac{C}{C_0}$$

where  $C_0$  is the capacitance of  
 air filled Capacitor

Therefore,  $C = K C_0$

[1]

Also,  $C_0 = \frac{\epsilon_0 A}{d}$  therefore,  $C = K \frac{\epsilon_0 A}{\frac{d}{2}} = 2K C_0$

Therefore  $C = 2 \times 6 \times 8 \text{ pF} = 96 \text{ pF}$

[1]

**Question 5****Answer -**

Given that the metallic plug AB is carrying a current 'I'

If  $n$  = no. density of electrons

A = area Of cross section of the conductors

$v_d$  = drift velocity of electrons with charge 'e'

Then we have the relation  $I = neAv_d \Rightarrow v_d = \frac{I}{ne} \left( \frac{1}{A} \right)$  [1]

which shows that  $v_d \propto \frac{1}{A}$

Therefore the drift velocity of free electrons increases from end A to end B, because area of cross section at end B decreases. [1]

OR

if

f = focal length

R = Radius Of curvature of the mirror

then  $f = \frac{R}{2}$  [1]

Focal length is the property of spherical mirror. It does not depend on the colour of incident light. [1]

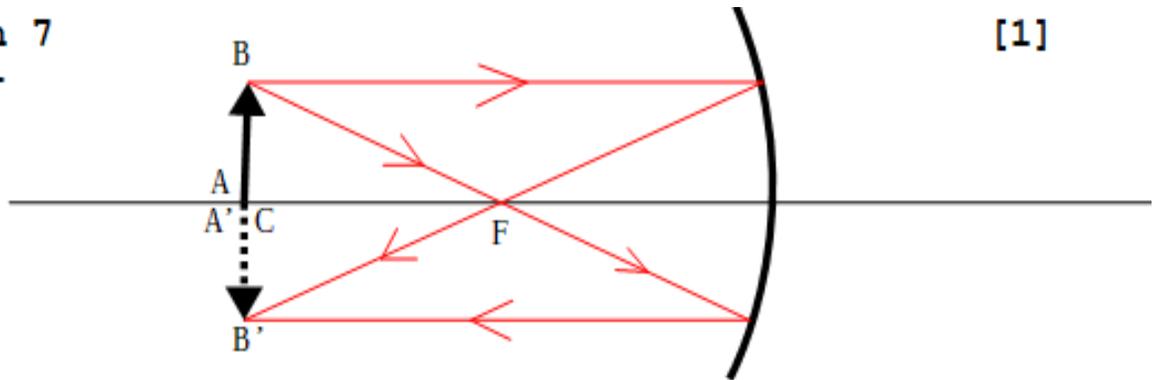
**Question 6****Answer -**

Real Image of object is not formed by convex mirror.

This is because the Real reflected rays diverge and do not meet at a point. The virtual image formation is determined where reflected rays are produced to intersect. [2]

**Question 7**

**Answer -**



[1]

Image A'B' is formed at C (centre of curvature)

The image is real, Inverted and of same size

[1]

**Question 8**

**Answer -**

Concave mirrors are used in large reflecting telescopes.

[1]

Concave mirror is used for shaving as magnified virtual image of face is formed.

[1]

**Question 9**

**Answer -**

Given Fringe width  $\beta = \frac{D\lambda}{d} = 10^{-3} m$

[1]

therefore distance between two slits

$$d = \frac{D\lambda}{\beta} = \frac{600 \times 10^{-9} m \times 1.5 m}{10^{-3} m} = 9 \times 10^{-4} m$$

[1]

**Question 9****Answer -**

Given Fringe width  $\beta = \frac{D\lambda}{d} = 10^{-3} m$  [1]

therefore distance between two slits

$$d = \frac{D\lambda}{\beta} = \frac{600 \times 10^{-9} m \times 1.5 m}{10^{-3} m} = 9 \times 10^{-4} m$$
 [1]

**Question 10****Answer -**

Energy of photon when the electron make a transition from

n=3 to n=2 is  $h\nu = \Delta E = E_3 - E_2$  [1]

$$h\nu = 13.6 \left[ \frac{1}{2^2} - \frac{1}{3^2} \right] = 1.9 eV$$
 [1]

**Question 11****Answer -**

LED is Light emitting diode- This is a designed forward-biased p-n junction diode which emits light spontaneously when energised. [1]

The diode is made of GaP (gallium phosphide) or gallium arsenic - phosphide (Ga As P). When p-n junction is forward biased, the electrons in n-region and holes in p-region move towards the junction. As they cross the junction the electrons and holes recombine and energy is released in a form of visible light. Since energy is required to generate an electron-hole pair, the same energy is released when electron and hole recombine.

[1]

**Question 12****Answer -****Truth table****[1]**

A	B	$G_1$	$G_2$	$Y = \overline{G_1 + G_2}$
0	0	1	1	0
0	1	1	0	0
1	0	0	1	0
1	1	0	0	1

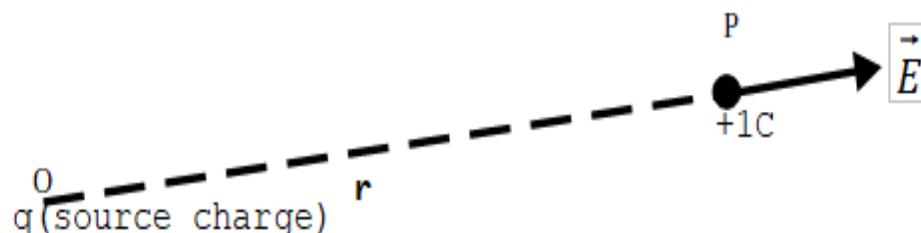
The output (Y) is of AND gate

**[1]**

|  
**SECTION C**

**Question 13****Answer -**

The potential energy of a point charge in an Electric field is defined as the work done in bringing the point charge from infinity to that point.



Potential at point P is equal to workdone against electric field in moving a unit charge  $+1C$  from large distance ( $\infty$ ) to point P.

$\vec{E}$  field at P (at a distance  $r$  from  $O$ ) due to source charge ( $q$ ) is directed along  $OP$ .

$$\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{q}{r^2} \hat{r} \quad \text{and} \quad \vec{F} = -(+1C)\vec{E} = -\vec{E}$$

for small displacement,  $d\vec{r}$ , workdone  $dW = \vec{F} \cdot d\vec{r}$

Therefore,  $dW = -\vec{E} \cdot d\vec{r}$  taking  $d\vec{r}$  to be radially outward

we get  $dW = -E dr \cos 0^\circ = -E dr$  [1]

Therefore,  $dW = -\frac{1}{4\pi\epsilon_0} \frac{q}{r^2} dr$  and  $V = \int dW$  OR

$$\text{Electric Potential (V)} = -\int_{\infty}^r \frac{q}{4\pi\epsilon_0 r^2} dr \quad \text{OR}$$

$$V = -\frac{q}{4\pi\epsilon_0} \left[ -\frac{1}{r} \right]_{\infty}^r \quad \text{Therefore} \quad V = \frac{q}{4\pi\epsilon_0 r} \quad [2]$$

#### Question 14

**Answer -**

Given Current density (I) =  $1 \times 10^{-7} \text{ Am}^{-2}$

Potential difference  $\Delta V = 3\text{V}$  and  $d = 60 \text{ cm}$

We have the relation  $E = \frac{\Delta V}{d} = \frac{3\text{V}}{60 \times 10^{-2} \text{m}} = 5\text{V/m}$  [1]

From Ohm's Law,  $J = \sigma E$  therefore

$$\text{conductivity}(\sigma) = \frac{J}{E} = \frac{1 \times 10^{-7} \text{ Am}^{-2}}{5\text{Vm}^{-1}} = 0.2 \times 10^{-7} (\Omega\text{m})^{-1}$$

[2]

Question 15

Answer -

Convex mirror should be preferred for looking at the traffic behind. [1]

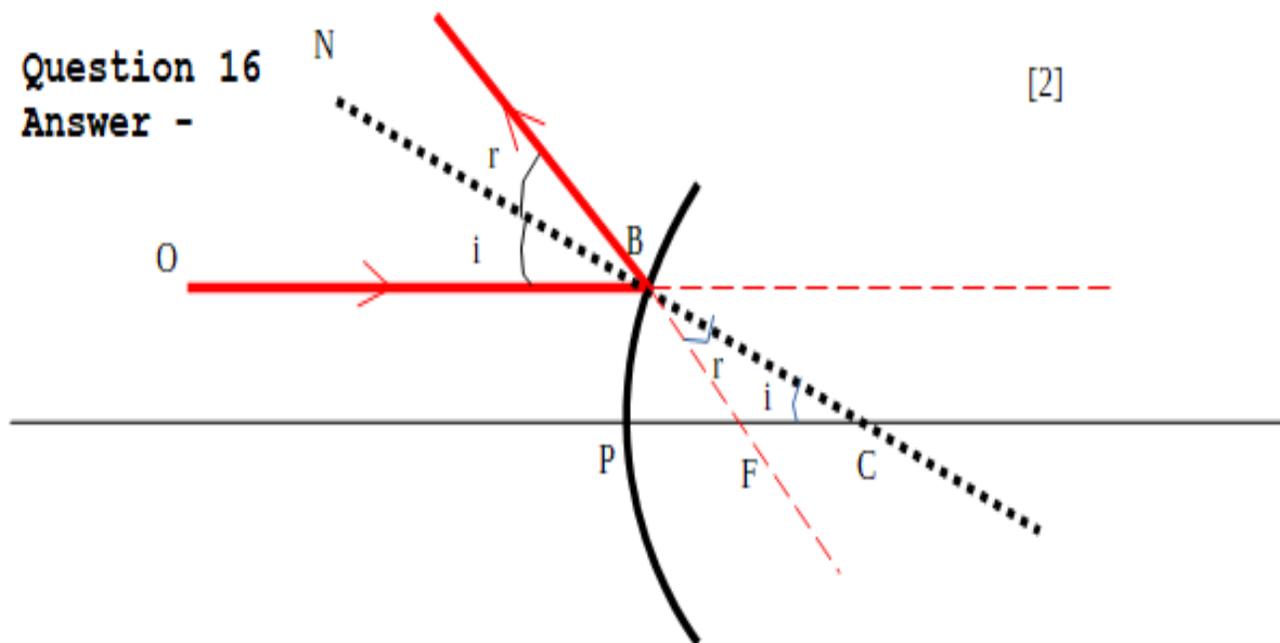
Because field view is wider and small images of all objects seen are erect.

[2]

Question 16

Answer -

[2]



angle  $i$  = angle  $r$

angle  $QBN$  = angle  $FCB$  =  $i$   
(corresponding angles)

angle  $ABN$  = angle  $FBC$  (vertically opposite)

Therefore In triangle  $FBC$   $\rightarrow$   $BF$  =  $FC$

since Aperture of the mirror is small therefore B is very near to P; so  $BF$  =  $PF$

so  $BF$  =  $PF$  =  $FC$

Also  $PF$  +  $FC$  =  $PC$  =  $r$  = Radius of curvature

OR  $2 PF$  (focal length  $[f]$ ) =  $r$  OR  $f$  =  $r/2$  [1]

OR

Given  $u = -20$  cm       $v = 12$  cm

we have the relation  $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$       [1]

therefore  $f = 30$  cm      [1]

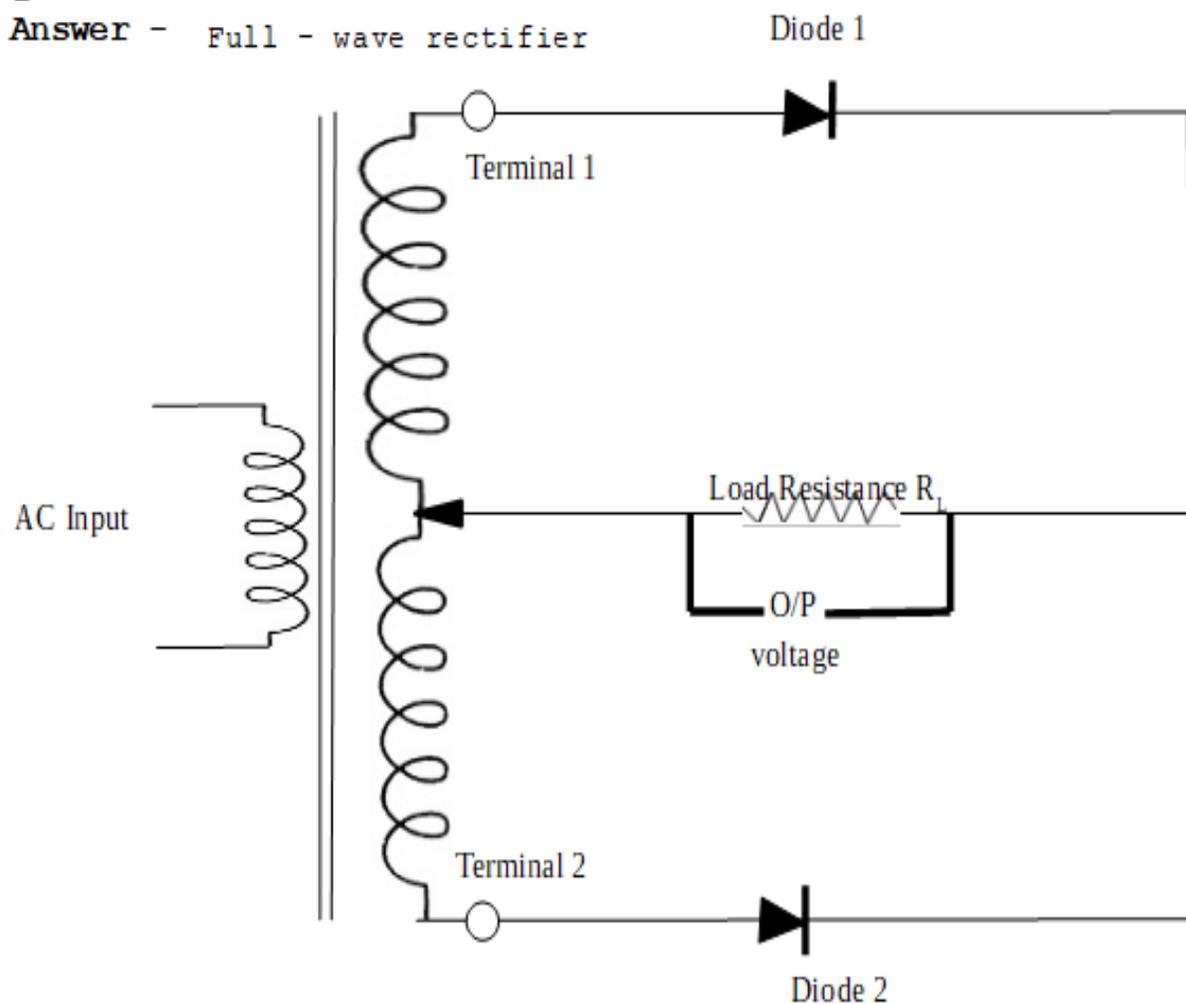
$r = 2f = 60$  cm      [1]

Diagram [2]

Labelling [1]

Question 17

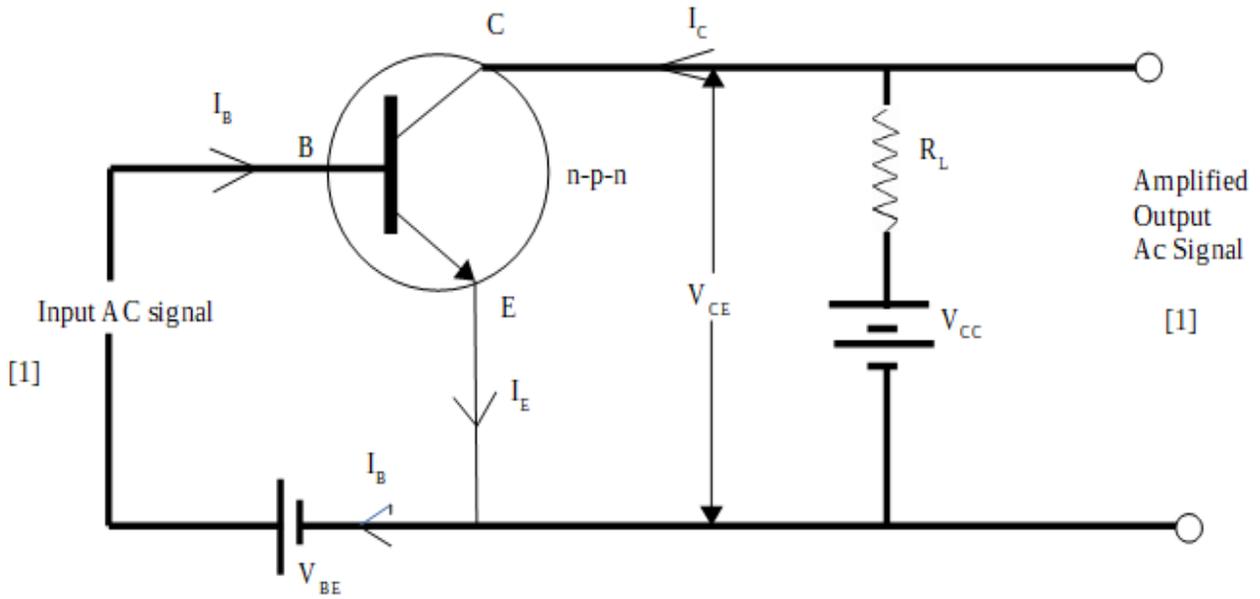
Answer - Full - wave rectifier



OR

**Answer** - Common-emitter Amplifier

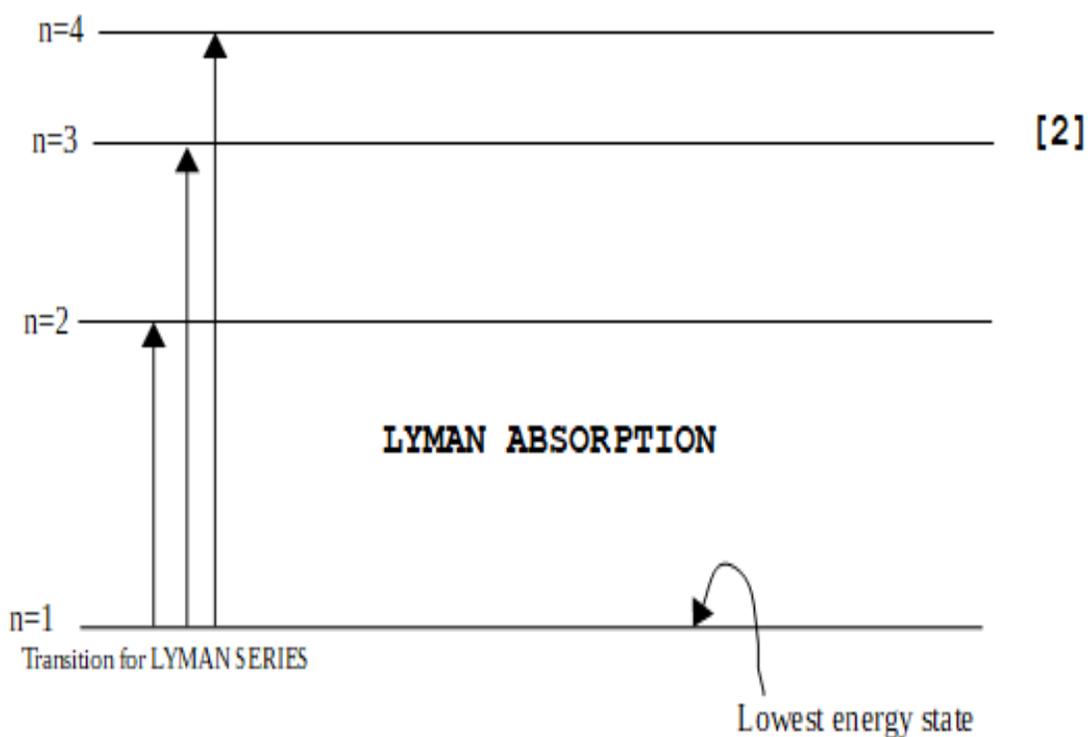
Labelling [3]



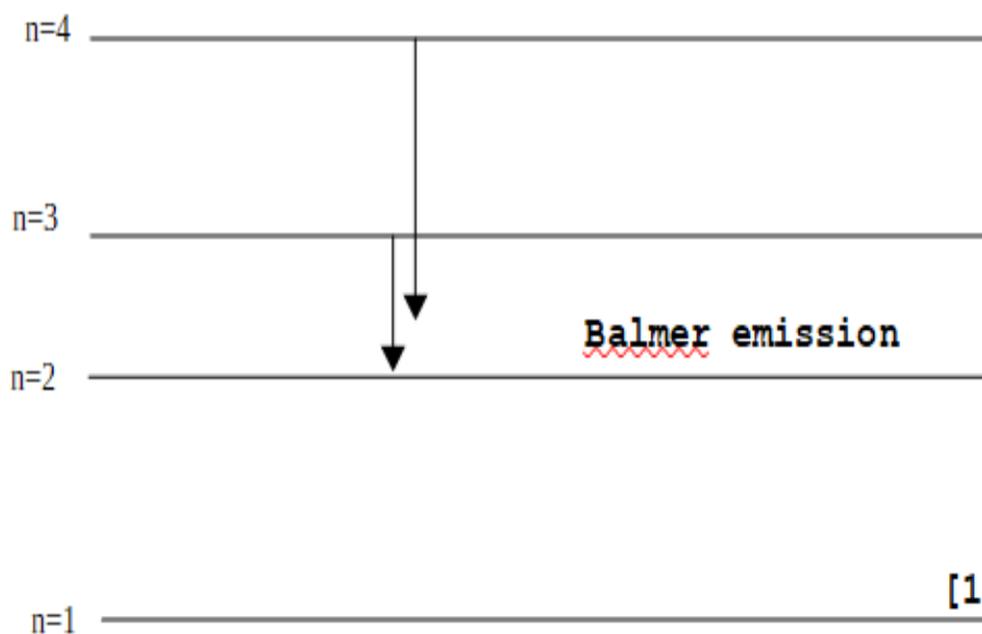
Question 18

Answer-

Absorption spectrum of Lyman series

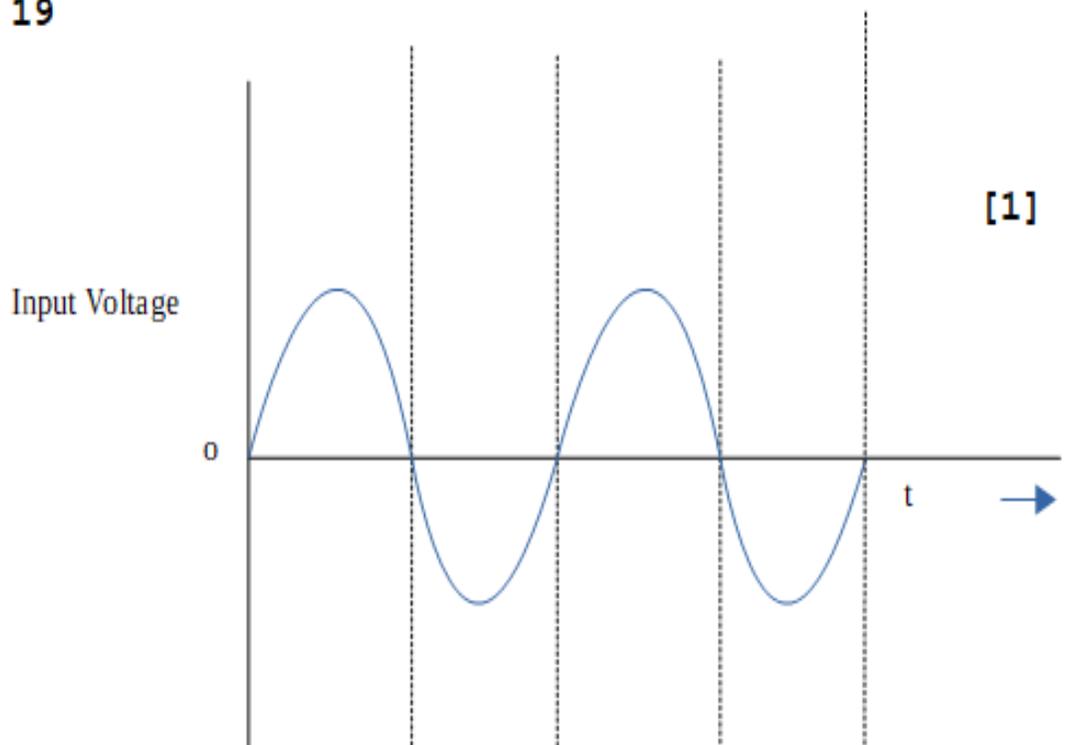


Emission Spectrum of Balmer series

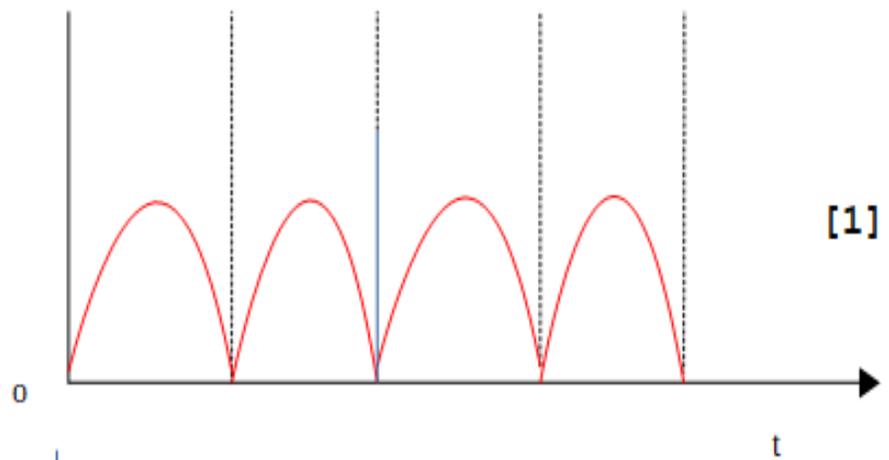


Question 19

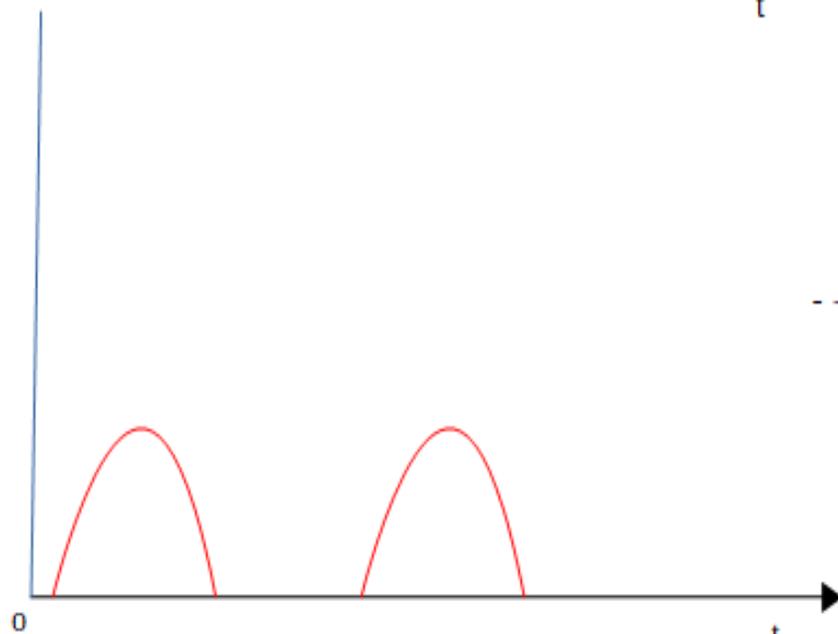
Answer -



Output voltage  
Full wave  
Rectifier



Output voltage  
Half-wave  
Rectifier



SECTION D

**Question 20**

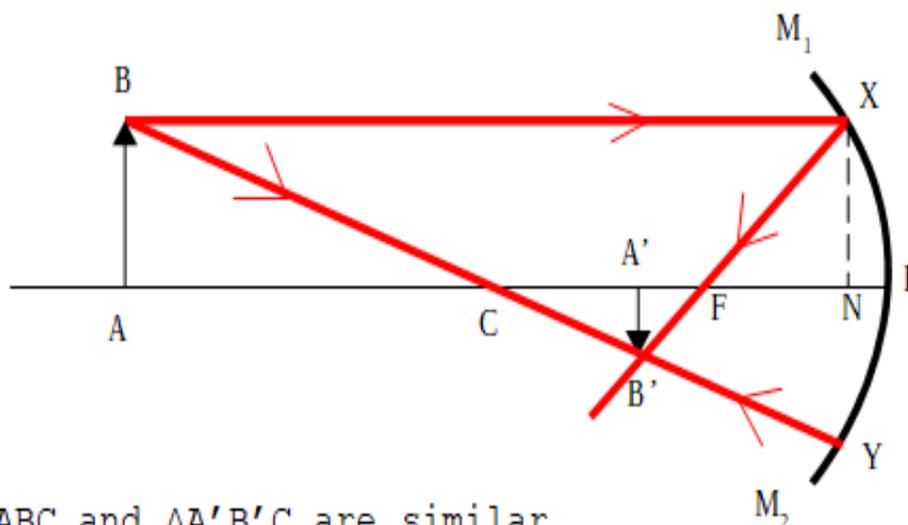
**Answer -**

- The pole of the mirror is taken as origin and principal axis as x-axis. A line passing through the pole and perpendicular to principal axis is taken as Y-axis. [1]

- Distances measured along principal axis to the right of the pole (along + X-Axis) are taken as positive and those left to the pole (along - X-axis) are taken negative [2]

- Distances measured upward (along + Y axis) from the principal axis are taken positive and the distances measured downward (along - Y-axis) below the principal axis are taken as negative. [2]

OR



[1]

$\triangle ABC$  and  $\triangle A'B'C$  are similar

Therefore 
$$\frac{AB}{A'B'} = \frac{CA}{A'C} \dots\dots \text{equn 1}$$

Also  $\triangle A'B'F$  and  $\triangle XNF$  are similar

$$\frac{XN}{A'B'} = \frac{NF}{FA'} \dots\dots \text{since } XN = AB \text{ Therefore } \frac{AB}{A'B'} = \frac{NF}{FA'}$$

Therefore from equn 1 we have

$$\frac{CA}{A'C} = \frac{NF}{FA'}$$

As X is very close to Pole P  $\Rightarrow NF = PF$

so  $\frac{CA}{A'C} = \frac{PF}{FA'}$  OR  $\frac{PA - PC}{PC - PA'} = \frac{PF}{PA' - PF}$  [1]

from sign convention:

AND  $u, v, f$  are object distance, Image distance and focal length respectively

we get  $\frac{-u - (-R)}{-R - (-v)} = \frac{-f}{-v - (-f)}$  OR  $\frac{-u + R}{-R + v} = \frac{-f}{-v + f}$

since  $R = 2f$  we get

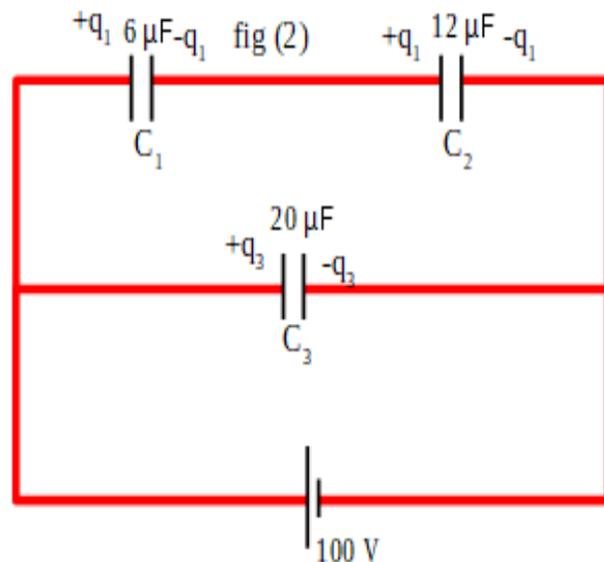
$$\frac{-u + 2f}{-2f + v} = \frac{-f}{-v + f}$$
 [1]

upon simplifying we get

$$uv = uf + vf \Rightarrow \frac{1}{f} = \frac{1}{u} + \frac{1}{v} \dots \text{Mirror formula}$$
 [2]

Question 21

Answer -



$$\frac{q_1}{C_1} + \frac{q_1}{C_2} = 100$$

OR

$$q_1 \left( \frac{1}{C_1} + \frac{1}{C_2} \right) = 100$$

[2]

upon substituting the values we get  $q_1 = 400 \mu\text{C}$  which charge on Capacitor  $C_1$  [1]

Stored Energy  $U$  in  $C_3$

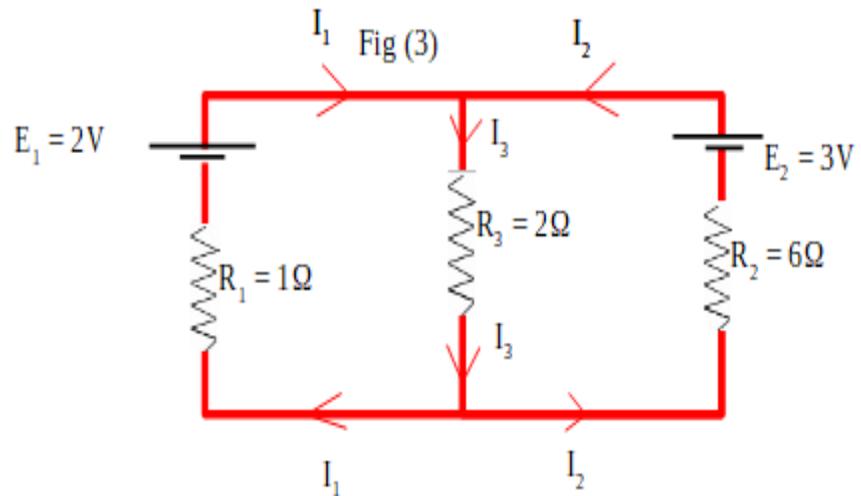
$$U = \frac{1}{2} C_3 V^2 = \frac{1}{2} \times 20 \times 10^{-6} \times (100)^2 \text{ J}$$

Therefore

$$U = 0.1 \text{ J}$$

[2]

OR



From KCL we get  $I_1 + I_2 = I_3$  ....eqn 1 [1]

Loop ABEFA Applying KVL [1]

$$-2I_3 - I_1 + 2 = 0 \text{ OR } 2I_3 + I_1 = 2 \dots \text{eqn 2}$$

Loop EBCDE Applying KVL [1]

$$2I_3 + 3 + 6I_2 = 0 \text{ OR } 2I_3 + 6I_2 = 3 \dots \text{eqn 3}$$

since  $I_3 = I_1 + I_2$  ... substituting  $I_3$  in eqn 2 and 3

we get the equations

$$3I_1 + 2I_2 = 2 \dots \text{eqn 4}$$

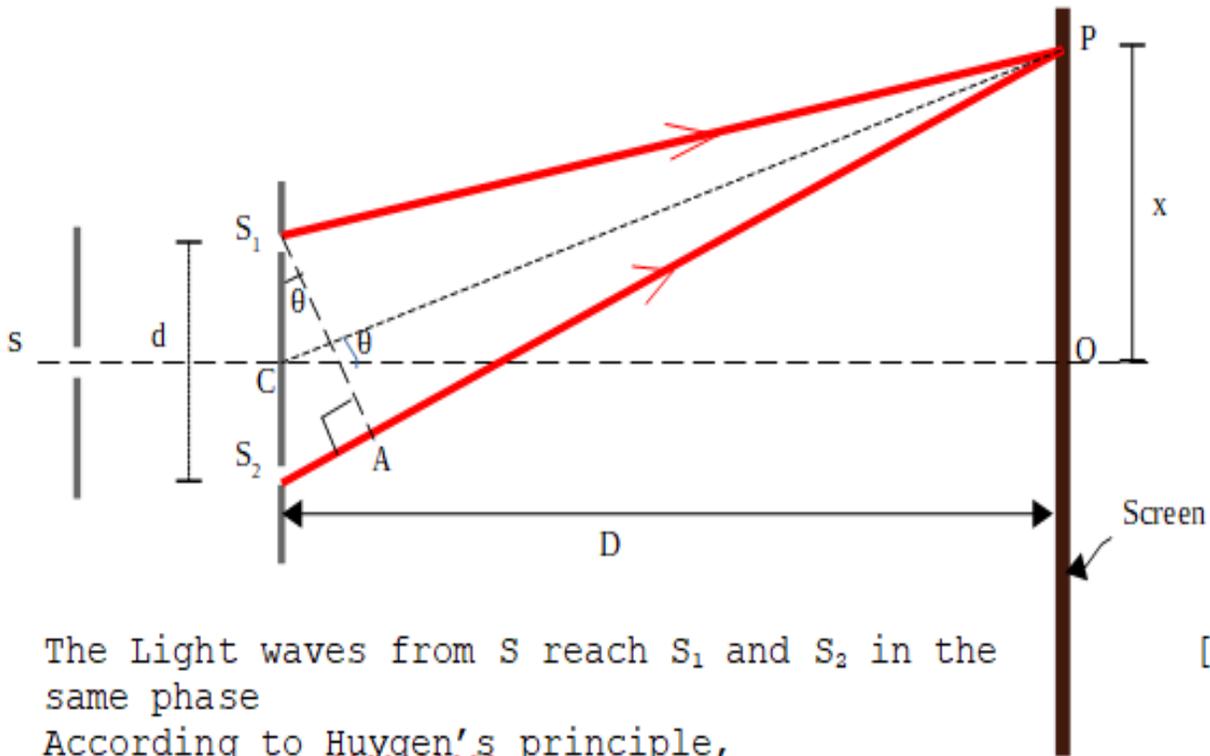
$$2I_1 + 8I_2 = 3 \dots \text{eqn 5}$$

Solving eqn 4 and 5 simultaneously we get

$$\boxed{I_2 = \frac{1}{4} A} \quad \boxed{I_1 = \frac{1}{2} A} \quad \text{and} \quad \boxed{I_3 = \frac{3}{4} A} \quad [2]$$

**Question 22**

**Answer -**



The Light waves from S reach  $S_1$  and  $S_2$  in the same phase [2]  
 According to Huygen's principle,

$S_1$  and  $S_2$  act as new light sources from which secondary wavelets originate

$S_1$  and  $S_2$  acts as coherent light sources as waves from them originate from the same wavefront and maintain a constant phase.

Path difference  $S_2P - S_1P = S_2P - AP = S_2A$  as  $S_1P = AP$  [1]

From  $\Delta S_1AS_2$   $\sin\theta = \frac{S_2A}{S_1S_2}$  .....(1)

from  $\Delta POC$   $\tan\theta = \frac{OP}{CO}$  as  $\theta$  is small  $\sin\theta \approx \tan\theta$

Therefore  $\frac{S_2 A}{S_1 S_2}$  OR  $\frac{S_2 A}{d} = \frac{x}{D} \Rightarrow S_2 A = \frac{x d}{D}$  which is a path difference

For position of bright fringes

$$\frac{x d}{D} = m \lambda \quad \text{where } \lambda \text{ is the wavelength of light}$$

$m = 0, 1, 2, \dots$

therefore position of  $m^{\text{th}}$  with respect to bright fringe at 0

$$x_m = m \frac{D \lambda}{d}$$

Position of Dark fringes  $\frac{x d}{D} = (2m - 1) \frac{\lambda}{2}$   
where  $m = 1, 2, 3, \dots$

therefore  $x_m = (m - \frac{1}{2}) \frac{D \lambda}{d}$

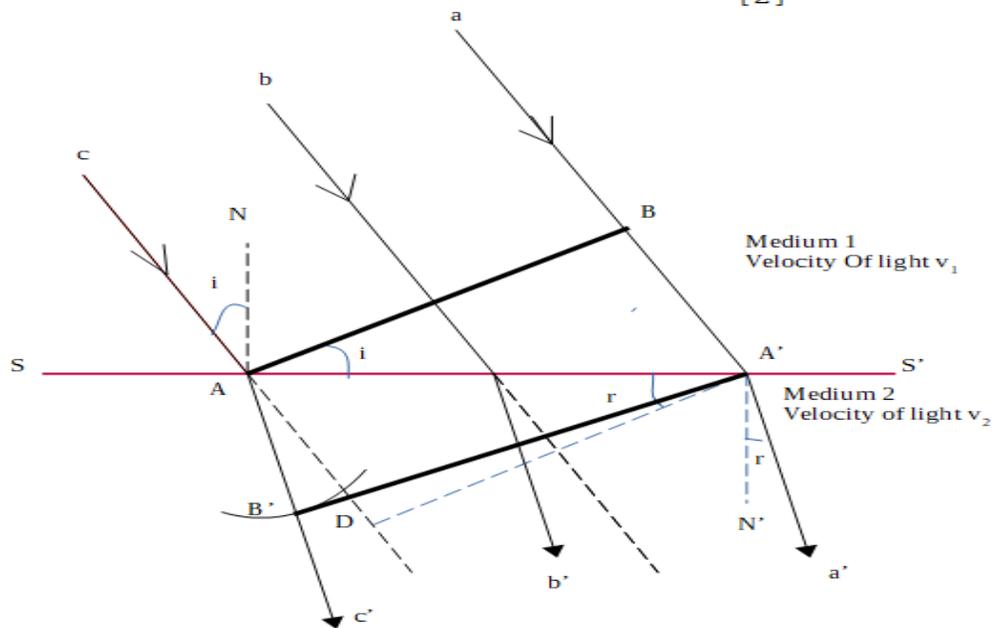
We get fringe width as

$$\text{Fringe width}(\beta) = x_{m+1} - x_m = \frac{\lambda D}{d} \quad [2]$$

---

OR

[2]



Let time  $t$  be taken by edge  $B$  of wavefront to reach  $A'$   
 so  $BA' = v_1 t$  [1]

After time  $t$  the secondary wavelet from  $A$  in medium 2  
 will be  $AB' = v_2 t$

As the rays of light are normal to the wave front, ;  $a, b, c$   
 and  $a', b', c'$  represents the incident and the refracted  
 rays respectively.

Let  $AN$  and  $A'N'$  be normal to  $SS'$  (section of plane  
 refracting surface)

since the angle between two straight lines is equal to  
 the angle between their normals ...

so  $i = \text{angle } CAN = \text{angle } A'AB$  and  $r = \text{angle } N'A'a' = \text{angle } AA'B'$

$$\frac{\sin i}{\sin r} = \frac{\sin A'AB}{\sin AA'B'} = \frac{BA'/AA'}{AB'/AA'} = \frac{BA'}{AB'} = \frac{v_1 t}{v_2 t} = \frac{v_1}{v_2} = \text{constant}$$

this is the Snell's Law of Refraction

[2]

**MARKING SCHEME**  
**SELF ASSESSMENT TEST - 2020**  
**CHEMISTRY**

Page 3.

CLASS XII: CHEMISTRY: F.M. 70  
 Prof(Dr) C.N.M. HANSHU. Page 1.

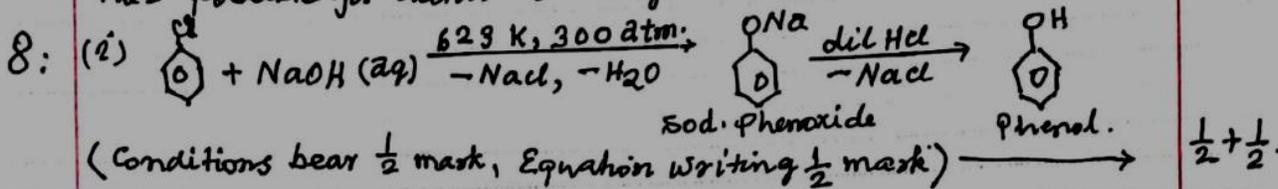
Question numbers	ANSWERS.	Distribution of marks
(I) (i)	Ester	1
(ii)	Aldehydic group OR $-\overset{\overset{O}{\parallel}}{C}-H$	1
(iii)	(a) Dehydration (b) Causing protonation	$\frac{1}{2} + \frac{1}{2}$
(iv)	$NO_2^-$ , $-CHO$ , etc.	1
(v)	All alkyl groups, $-NH_2$ , $OH^-$ etc.	1
(vi)	Aldol condensation	1
(vii)	Dehydrohalogenation	1
(viii)	Oxidation	1
(ix)	(a) chemical energy (b) Electrical energy.	$\frac{1}{2} + \frac{1}{2}$
(x)	1.1 V	1
(xi)	$E_{M^{n+}/M} = E_{M^{n+}/M}^\ominus - \frac{RT}{nF} \cdot \ln \frac{1}{[M^{n+}]}$	1
(xii)	$E_{M^{n+}/M} = E_{M^{n+}/M}^\ominus - \frac{0.0591}{n} \cdot \log \frac{1}{[M^{n+}]}$	1
(xiii)	0.0V	1
(xiv)	$cm^{-1}$ or $m^{-1}$	1
(xv)	mho, $\Omega^{-1}$ or S.	1
(xvi)	$\Omega cm$ .	1
(xvii)	$\Omega^{-1} cm^{-1}$ OR $S m^{-1}$ .	1
(xviii)	$E_{cell} \times \text{Electrical charge}$ OR $= nFE_{cell}$ .	1
(xix)	$\Delta_r G^\ominus = -nF \cdot E_{cell}^\ominus$ .	1
(xx)	$\Lambda_m = \Lambda_m^\ominus - A\sqrt{C}$	1
<u>SUBJECTIVE QUESTIONS OF 50 MARKS.</u>		
2.	FITTA Reaction $\text{C}_6\text{H}_6 + 2\text{Na} + \text{C}_6\text{H}_6 \xrightarrow[\text{Dry ether}]{\Delta} \text{C}_6\text{H}_5\text{C}_6\text{H}_5 + 2\text{NaCl}$ Diphenyl or Biphenyl	2
3.	<u>Peroxide effect</u> : Unsaturated alkenes when treated with HBr, in presence of an organic peroxide (like benzoyl peroxide $\text{C}_6\text{H}_5\overset{\overset{O}{\parallel}}{C}-O-O-\overset{\overset{O}{\parallel}}{C}\text{C}_6\text{H}_5$ ), addition of HBr takes place CONTRARY to Markownikoff's Rule. This is known as Peroxide effect OR KHARASCH effect.	1
	<u>Example</u> : $\text{CH}_3-\text{CH}=\text{CH}_2 + \text{HBr} \xrightarrow{\text{Peroxide}} \text{CH}_3-\text{CH}_2-\text{CH}_2\text{Br}$ (1-Bromo-propane)	1.
4.	Phenols are WEAK acids. So they are unable to decompose carbonates and bicarbonates of alkalimetals like $\text{Na}_2\text{CO}_3$ , $\text{NaHCO}_3$ etc	2
5.	Due to absence of intermolecular H-bonding, ethers have much lower boiling point. So it is used as a refrigerant. A mixture of ether and 'dryice' (solid $\text{CO}_2$ ) produce a temperature $-110^\circ\text{C}$ .	2.

6. Being a WEAKER reducing agent, benzaldehyde does not reduce  $\text{Cu}^{2+}$  ions in Fehling's solution. Rather it can reduce  $\text{Ag}^+$  ions readily, present in Tollen's reagent.

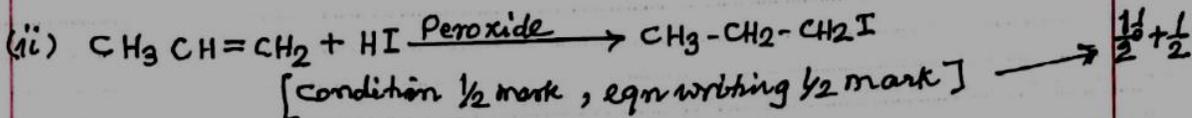
2.

7. Acetaldehyde can easily reduce  $\text{Ag}^+$  ions of Tollen's reagent into silver and itself is oxidised into acetic acid: But it is NOT possible for acetone to undergo oxidation to reduce Tollen's reagent.

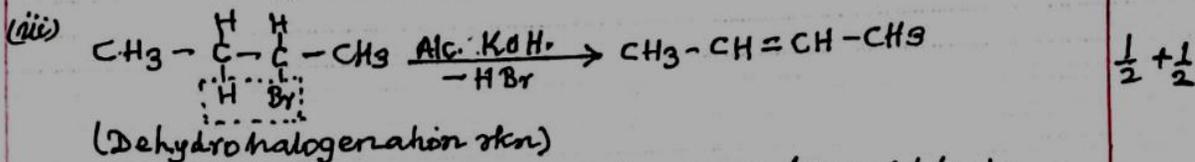
2.



$\frac{1}{2} + \frac{1}{2}$ .



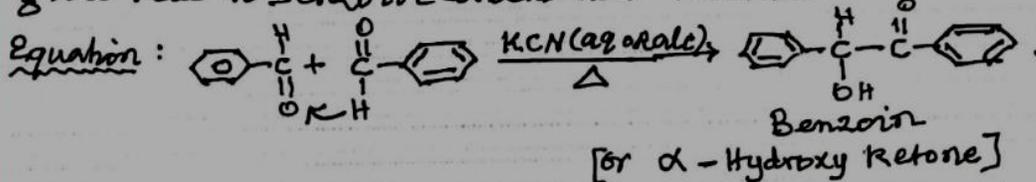
$\frac{1}{2} + \frac{1}{2}$



$\frac{1}{2} + \frac{1}{2}$

9. Benzoin Condensation: Two molecules of benzaldehyde mixed with aqueous OR alcoholic KCN OR NaCN, gives rise to 'Benzoin Condensation' reaction

1



1.

10. (i) It allows the flow of current by completing the circuit.

$\frac{1}{2}$

(ii) It maintains electrical neutrality by supplying negative ions ( $\text{Cl}^-$ ,  $\text{NO}_3^-$  etc) to neutralise the excess positive charge in the anode half-cell and positive ions ( $\text{K}^+$ ,  $\text{Na}^+$ ,  $\text{NH}_4^+$  etc) to the negatively charged solution of cathodic half-cell.

$\frac{1}{2}$   
 $\frac{1}{2}$   
 $\frac{1}{2}$

11. Electrode potential obtained under the following FOUR conditions, is called Standard Electrode Potential, denoted as  $E^\ominus$

(i) Concn of electrolytic soln must be 1.0 M

$\frac{1}{2}$

(ii) Temperature of solution must be 298 K.

$\frac{1}{2}$

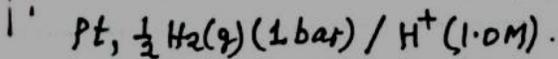
(iii) Atmospheric pressure should be 1 bar.

$\frac{1}{2}$

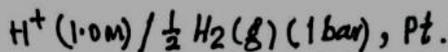
(iv) it should be determined relative to an SHE.

$\frac{1}{2}$

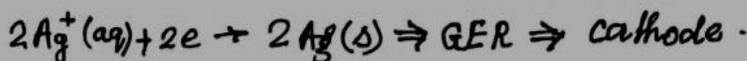
12. (a) An SHE, when acts as anode, is represented as



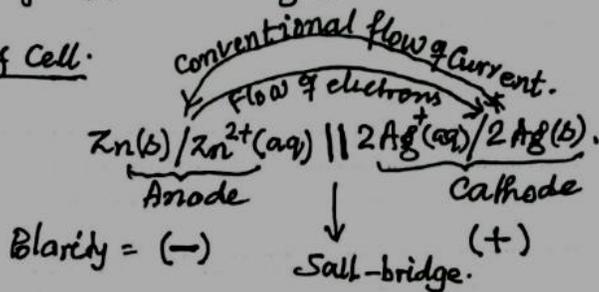
(b) The SHE when acts as cathode, is represented as:



13. Reactions:  $\text{Zn}(\text{s}) \rightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{e}^- \Rightarrow \text{LEO} \Rightarrow \text{Anode}$



(i) Depiction of Cell.



(ii) Electrode  $\text{Zn}/\text{Zn}^{2+}$  is negatively charged.

(iii) Current is carried from silver electrode to zinc-electrode.

(iv) Individual reaction of each cell is mentioned above

14. Factors affecting electrode potential are

- (i) Type of metals
- (ii) Concentration of ions of electrolyte
- (iii) Temperature of electrolytic solution
- (iv) Pressure on the system.

15. (i) The series of elements, arranged in order of their increasing standard reduction potential is called the electrochemical series.

(ii) (a) with increasing  $E^\ominus$ -value the oxidising power of an element increases.

(b) with decreasing  $E^\ominus$  value, the reducing power of an element increases:

(c) with decreasing  $E^\ominus$  value, tendency to lose electrons increases.

(d) with increasing  $E^\ominus$  value tendency to gain electrons increases.

(iii) Applications of electrochemical series:

(a) To know relative oxidising and reducing power of different elements

(b) Prediction of anode and cathode.

(c) Calculation of cell potential.

(d) To predict the feasibility of a redox reaction

(e) To know the reactivity of an element

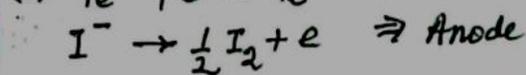
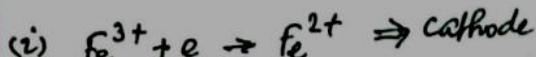
(f) To predict the capability of a metal to displace  $\text{H}_2$  gas from an acid.

15

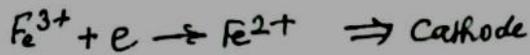
OR

⇒

Page 4.



$\therefore E_{\text{cell}}^{\ominus} = 0.77 - 0.54 = +0.23 \text{ V} > 0 \therefore \text{Redox rxn is feasible.}$



$\therefore E_{\text{cell}}^{\ominus} = +0.77 - 0.80 = -0.03 \text{ V} < 0, \text{ Not feasible.}$

$$(iii) \therefore E_{\text{Ag}^+/\text{Ag}} = E^{\ominus} - \frac{0.0591}{n=1} \cdot \log \frac{1}{[\text{Ag}^+]} = 0.80 - 0.0591 \{ \log \frac{1}{0.1} = \log 10 = 1 \}$$

$$= 0.80 - 0.0591 = 0.7409 \text{ V.}$$

16 (i) Conductance is the reciprocal of resistance. It is denoted by G.  $\therefore G = \frac{1}{R}$ ,  $\therefore \text{Unit of } G = \frac{1}{\Omega} = \Omega^{-1} \text{ or S.}$

(ii) Resistivity is defined as the resistance of a conductor of length 1 cm and area of cross-section 1 cm<sup>2</sup>. That is, it is the resistance of 1 cm<sup>3</sup> of a conductor.

(iii) Molar conductivity is defined as the conductance of a solution of volume V cm<sup>3</sup>, containing 1 g-mole of an electrolyte, placed between two electrodes, one centimetre apart. It is denoted by symbol  $\Lambda_m$

(iv) Equivalent conductivity is defined as the conductance of a solution of volume V cm<sup>3</sup>, containing 1-g equivalent of an electrolyte, placed between two electrodes, kept one centimetre apart. It is denoted as  $\Lambda_{\text{eq}}$ .

(v) Conductivity of a solution is defined as the conductance of a soln of length 1 cm and having area of cross-section 1 cm<sup>2</sup>. In other words, the conductance of 1 cm<sup>3</sup> of a solution of an electrolyte is called conductivity. It is denoted by Greek letter  $\kappa$  (Kappa).

16 (OR) Kohlrausch law: The limiting molar conductivity  $\Lambda_m^{\infty}$  of an electrolyte is the sum of limiting ionic conductivities of cation and anion, each multiplied with number of ions present in one molecule

of equivalent. It is deposited as ...

16 (ii) According to Kohlrausch law,

$$\begin{aligned}\Lambda_m(\text{CH}_3\text{COOH}) &= \lambda_{\text{CH}_3\text{COO}^-}^{\circ} + \lambda_{\text{H}^+}^{\circ} = (\lambda_{\text{CH}_3\text{COO}^-}^{\circ} + \lambda_{\text{Na}^+}^{\circ}) + (\lambda_{\text{H}^+}^{\circ} + \lambda_{\text{Cl}^-}^{\circ}) - (\lambda_{\text{Na}^+}^{\circ} + \lambda_{\text{Cl}^-}^{\circ}) \\ &= \Lambda_m(\text{CH}_3\text{COONa}) + \Lambda_m(\text{HCl}) - \Lambda_m(\text{NaCl}) \\ &= 91.0 + 426.1 - 126.4 = 390.7 \text{ S cm}^2 \text{ mol}^{-1}.\end{aligned}$$

(iii) Molar conductivity  $\Lambda_m = \frac{k \times 1000}{M} = \frac{4.95 \times 10^{-5} \text{ S cm}^{-1} \times 1000 \text{ cm}^3}{0.001028 \text{ mol}}$

or  $\Lambda_m = 48.15 \text{ S cm}^2 \text{ mol}^{-1}$ .

Now degree of dissociation  $\alpha = \frac{\Lambda_m}{\Lambda_m^{\circ}} = \frac{48.15 (\text{S cm}^2 \text{ mol}^{-1})}{390.5 (\text{S cm}^2 \text{ mol}^{-1})} = 0.1233$

$\therefore K = C\alpha^2 / (1-\alpha) = 0.001028 \times (0.1233)^2 / (1-0.1233) = 1.78 \times 10^{-5}$ .

17. (A) Faraday's first law of electrolysis: The amount of a substance deposited or liberated at an electrode during electrolysis, is directly proportional to the quantity of electricity passed through the electrolyte:

i.  $w \propto Q$  or  $w \propto I \times t$  or  $w = Z \cdot I \times t$  where  $Z$  is called the electrochemical equivalent,  $I$  is the current in ampere and  $t$  is the time in seconds:

(B) Faraday's 2nd law of electrolysis: when the same quantity of electricity is passed through different electrolytes, connected in series, the masses of the different metals deposited or liberated are directly proportional to their chemical equivalent masses:

18. (i) FARA DAY: The amount of electricity required to deposit one gram equivalent of a substance is called Faraday's Constant or a Faraday ( $= 1F = 96,487 \text{ C} \approx 96,500 \text{ C}$ )

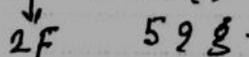
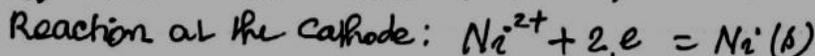
It may also be defined as the charge of one mole of electrons

i.  $F = 1.6022 \times 10^{-19} \text{ C} \times 6.023 \times 10^{23} \text{ electrons/mol} = 96,487 \text{ C/mol}$ .

(ii) Electrochemical equivalent ( $Z$ ) of a metal is defined as the mass of the metal deposited during electrolysis, by passing one coulomb of electricity:

e.g.  $Z_{\text{Ag}} = 0.00118 \text{ g/C}$  means that when one coulomb of electricity is passed thro'  $\text{AgNO}_3$  solution,  $0.00118 \text{ g}$  of  $\text{Ag}$  will be deposited at the cathode.

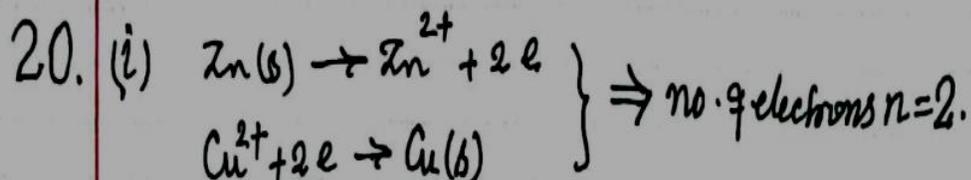
19.  $Q = 5 \times 20 \times 60 = 6000 \text{ (Axs)} = 6,000 \text{ C}$ .



$\therefore 2F = 2 \times 96500 \text{ C}$  yields  $59 \text{ g}$  of  $\text{Ni}$

$\therefore 6,000 \text{ C}$

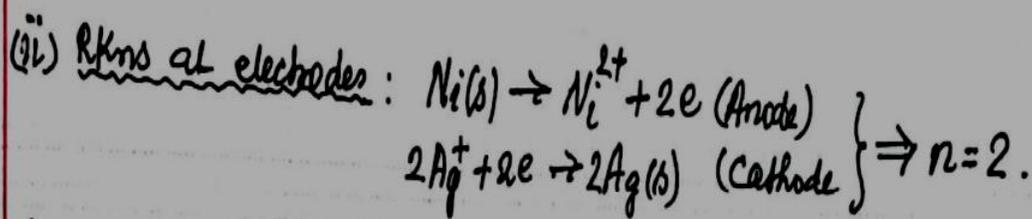
$59 \text{ g} \times 6000 \text{ C} / 2 \times 96500 \text{ C} = 1.834 \text{ g}$  of  $\text{Ni}$ .



we know that  $E_{\text{cell}}^{\ominus}$  of a Daniell Cell = 1.10 V.

$$\begin{aligned} \therefore \Delta_r G^{\ominus} &= -n \cdot F \cdot E_{\text{cell}}^{\ominus} = -2 \times 96,500 \text{ C mol}^{-1} \times 1.1 \text{ V} \\ &= -193000 \text{ C mol}^{-1} \times \frac{\text{J}}{\text{C}} \times 1.1, \left[ \because V = \frac{\text{J}}{\text{C}} \right] \\ &= -212300 \text{ J mol}^{-1} \end{aligned}$$

or  $\Delta_r G^{\ominus} = -212.3 \text{ kJ mol}^{-1}$ .



According to Nernst equation,

$$\begin{aligned} E_{\text{cell}} &= E_{\text{cell}}^{\ominus} - \frac{0.0591}{n=2} \log \frac{[\text{anode}]}{[\text{Cathode}]} \\ &= 1.05 - 0.02955 \left\{ \log \frac{0.16}{(0.002)^2} \right\} = \log \frac{16}{100 \times 4 \times 10^{-6}} = \log 4 \times 10^9 \\ &= \log 2^2 + \log 10^9 = 2 \log 2 + 4 \log 10 \\ &= 2 \times 0.301 + 4 = 4.602 \end{aligned}$$

$\therefore E_{\text{cell}} = 1.05 - 0.02955 \times 4.602 = 1.05 \text{ V} - 0.136 \text{ V} = 0.914 \text{ V}.$

1/2

1/2

**MARKING SCHEME**  
**SELF ASSESSMENT TEST - 2020**  
**MATHEMATICS**

81. (i) Expand  
 $0 - \tan u (\tan u - 0) + (0 + \sec u) \quad \text{--- 1 Mark}$

$= 0 - \tan^2 u + \sec u = 1 \quad \text{--- 1 Mark}$

(ii) Expand  
 $6(2x-10) - (-1)(4-20) + 2(10-10x) = 0$   
 $\Rightarrow 12x - 60 + (-16) + 20 - 20x = 0 \quad \text{--- 1 Mark}$

$\Rightarrow -8x - 76 + 20 = 0$

$\Rightarrow -8x = 56$

$\therefore x = \frac{56}{-8} = -7 \text{ A} \quad \text{--- 1 Mark}$

(iii)  $\lim_{u \rightarrow \pi/2} \left( \frac{x \sin u}{\cos u} - \frac{\sqrt{2}}{\sin u} \right)$   
 $= \lim_{u \rightarrow \pi/2} \left[ \frac{x \sin u - \sqrt{2}}{\cos u} \right] \quad (0/0)$   
 $\text{--- 1 Mark}$

$= \lim_{u \rightarrow \pi/2} \frac{\sin u + x \cos u}{\sin u}$

$= \frac{\sin \pi/2 + \pi/2 \times \cos \pi/2}{\sin \pi/2} = \frac{1+0}{1} = 1$   
 $\text{--- 1 Mark}$

(iv) Given.

$y = \sec^2(\pi/4 + u/2)$

Correct derivative

$\frac{dy}{du} = \frac{1}{\tan^2(\pi/4 + u/2)} \times \sec^2(\pi/4 + u/2)$

$= \frac{1}{\tan^2(\pi/4 + u/2)} \times \sec^2(\pi/4 + u/2)$   
 $\text{--- 1 Mark}$

$= \frac{2}{\sin(\pi/2 + u)} = \frac{1}{\cos u} = \sec u$

$\frac{dy}{du} - \sec u = 0 \quad \text{--- 1 Mark}$

$$\int \frac{x}{(x+1)(x+2)} dx$$

(2)

$$\text{Let } \frac{x}{(x+1)(x+2)} = \frac{A}{x+1} + \frac{B}{x+2} =$$

$$\therefore x = A(x+2) + B(x+1)$$

$$\begin{aligned} \text{put } x &= -2 \\ -2 &= 0 + Bx + 1 \\ B &= 2 \end{aligned}$$

$$\begin{aligned} \text{put } x &= -1 \\ -1 &= A \\ \therefore A &= -1 \end{aligned}$$

$$\therefore \frac{x}{(x+1)(x+2)} = \frac{-1}{x+1} + \frac{2}{x+2} \quad \text{--- 1 Mark}$$

$$\begin{aligned} \therefore \int \frac{x}{(x+1)(x+2)} dx &= -\int \frac{1}{x+1} + 2 \int \frac{1}{x+2} \\ &= -\ln|x+1| + 2\ln|x+2| \\ &= \log \frac{(x+2)^2}{x+1} + c \quad \text{--- 1 Mark} \end{aligned}$$

(vi) (1) Since  $|a-a|=0$  is div. by 5  
 $\therefore (a,a) \in R$  and  $R$  is Reflexive

(2)  $|a-b|$  is div. by 5 and  $(a,b) \in R$   
 $\Rightarrow |b-a|$  is div. by 5  
 $\Rightarrow (b,a) \in R$   
 $\therefore R$  is symmetric

(3)  $|a-b|$  is div. by 5 i.e.  $(a,b) \in R$   
 and  $|b-c|$  is div. by 5 i.e.  $(b,c) \in R$

$\therefore |(a-b) + (b-c)|$  is div. by 5

$\Rightarrow |a-c|$  is div. by 5  
 and so  $(a,c) \in R$   
 and  $R$  is transitive.

Since  $R$  is Reflexive, Symmetric and Transitive

$\therefore R$  is Equivalence

--- 1 Mark.

(vii)  $\sec^2(\tan^{-1}2) + \csc^2(\cot^{-1}3)$   
 put  $\tan^{-1}2 = \alpha$  and  $\cot^{-1}3 = \beta$   
 $\therefore \tan \alpha = 2$  and  $\cot \beta = 3$  — Marks  
 $\therefore dHS = \sec^2 \alpha + \csc^2 \beta$   
 $= (1 + \tan^2 \alpha) + (1 + \cot^2 \beta)$   
 $= (1 + 4) + (1 + 9)$   
 $= 5 + 10 = 15 = \text{RHS} \quad \text{— 1 Mark}$

(viii)  $I = \int_0^{\pi/2} \frac{\sin^3 x}{\sin^2 x + \cos^2 x} dx$  — ①

$I = \int_0^{\pi/2} \frac{\sin^2(\pi/2 - x) \sin(\pi/2 - x)}{\sin^2(\pi/2 - x) + \cos^2(\pi/2 - x)} dx$  — 1 Mark

$I = \int_0^{\pi/2} \frac{\cos^2 x \cdot \cos x}{\cos^2 x + \sin^2 x} dx$  — ②

Add ① and ②

$2I = \int_0^{\pi/2} 1 dx = [x]_0^{\pi/2} = \pi/2 - 0 = \pi/2$

$I = \pi/4$  — 1 Mark

(ix)  $\lim_{n \rightarrow 0} \frac{x - \sin x \cos x}{x^3} = \lim_{n \rightarrow 0} \frac{2x - 2\sin x \cos x}{2x^3}$   
 $= \frac{1}{2} \lim_{n \rightarrow 0} \frac{2x - \sin 2x}{x^3}$

$= \frac{1}{2} \lim_{n \rightarrow 0} \frac{-2 \cos 2x}{3x^2} = \frac{1}{2} \times \frac{-2}{3} \lim_{n \rightarrow 0} \frac{\cos 2x}{x^2}$   
 $= \frac{1}{3} \lim_{n \rightarrow 0} \frac{\sin 2x}{x} = \frac{1}{3} \lim_{n \rightarrow 0} \frac{2 \cos 2x}{1} = \frac{2}{3} \times 1$   
 $= \frac{2}{3}$  — 1 Mark

(x) one-one.  
 $\therefore 3x_1 - 2 = 3x_2 - 2$   
 $x_1 = x_2$   
 $\therefore f$  is one-one — 1 Mark

onto  
 $y = f(x) = 3x - 2$   
 $\therefore x = \frac{y+2}{3}$

$\forall y \in \mathbb{R} \exists x \in \mathbb{R}$ .

$\therefore f$  is onto — 1 MARKS.

Q2.

one-one.

$$f(u_1) = f(u_2)$$

$$\therefore 9u_1^2 + 6u_1 - 5 = 9u_2^2 + 6u_2 - 5$$

$$\Rightarrow 9(u_1^2 - u_2^2) + 6(u_1 - u_2) = 0$$

$$\Rightarrow (u_1 - u_2)(9(u_1 + u_2) + 6) = 0$$

$$\therefore u_1 - u_2 = 0 \quad \therefore u_1 = u_2$$

$\therefore f$  is one-one — 1 MARKS.

onto.

Range of  $f = S = \text{codomain of } f$

$\therefore f$  is onto

$\therefore f$  is one-one-onto — 1 MARKS.

So  $f$  is invertible.

$$\text{Now } y = f(u) = 9u^2 + 6u - 5$$

$$\Rightarrow 9u^2 + 6u - 5 = y$$

$$\Rightarrow (3u + 1)^2 - 6 = y$$

$$\Rightarrow (3u + 1)^2 = y + 6$$

$$\therefore 3u + 1 = \sqrt{y + 6}$$

$$\therefore u = \frac{\sqrt{y + 6} - 1}{3}$$

Now  $f(u) = y$  and  $f$  is invertible.

$$\therefore f^{-1}(y) = u = \frac{\sqrt{y + 6} - 1}{3}$$

$\therefore$  inverse function of  $f: S \rightarrow N$  is

$$f^{-1}(y) = \frac{\sqrt{y + 6} - 1}{3}$$

— 1 MARKS.

$$\therefore f^{-1}(43) = \frac{\sqrt{43 + 6} - 1}{3} = \frac{\sqrt{49} - 1}{3} = \frac{7 - 1}{3} = \frac{6}{3} = 2$$

$$f^{-1}(163) = \frac{\sqrt{163 + 6} - 1}{3} = \frac{\sqrt{169} - 1}{3} = \frac{13 - 1}{3} = \frac{12}{3} = 4$$

1 MARKS

Q3. ~~Prove that~~

(6)

$$\text{LHS} = \begin{vmatrix} a & b & ax+by \\ b & c & bx+cy \\ ax+by & bx+cy & 0 \end{vmatrix}$$

$R_1 \rightarrow xR_1 \quad R_2 \rightarrow yR_2$

$$= \frac{1}{xy} \begin{vmatrix} ax & bx & ax^2+bxxy \\ by & cy & bxy+cy^2 \\ ax+by & bx+cy & 0 \end{vmatrix}$$

1 mark

$R_1 \rightarrow R_1 + R_2$

$$= \frac{1}{xy} \begin{vmatrix} ax+by & bx+cy & ax^2+2bxy+cy^2 \\ by & cy & bxy+cy^2 \\ ax+by & bx+cy & 0 \end{vmatrix}$$

1 mark

$R_1 \rightarrow R_1 - R_3$

$$= \frac{1}{xy} \begin{vmatrix} 0 & 0 & ax^2+2bxy+cy^2 \\ by & cy & bxy+cy^2 \\ ax+by & bx+cy & 0 \end{vmatrix}$$

1 mark

Expanding

$$= \frac{1}{xy} \left[ 0 - 0 + (ax^2+2bxy+cy^2)(b^2xy+by^2) \right]$$

$$= \frac{1}{xy} \times xy (b^2 - ac)(ax^2+2bxy+cy^2)$$

$$= (b^2 - ac)(ax^2+2bxy+cy^2)$$

$$= \text{RHS}$$

1 mark

Q4. Given that

(7)

$$\cos x + \cos y + \cos z = \pi$$

$$\Rightarrow \cos x + \cos y = \pi - \cos z$$

$$\Rightarrow \cos(xy - \sqrt{1-u^2} \sqrt{1-y^2}) = \pi - \cos z$$

1 Marks

$$\Rightarrow xy - \sqrt{1-u^2} \sqrt{1-y^2} = \cos(\pi - \cos z)$$

$$\Rightarrow xy - \sqrt{1-u^2} \sqrt{1-y^2} = -\cos(\cos z)$$

1 Marks

$$\Rightarrow xy - \sqrt{1-u^2} \sqrt{1-y^2} = -2$$

$$\Rightarrow (xy + 2)^2 = (\sqrt{1-u^2} \sqrt{1-y^2})^2$$

1 Marks

$$\Rightarrow x^2 y^2 + 2^2 + 2xy \cdot 2 = (1-u^2)(1-y^2)$$

$$\Rightarrow x^2 y^2 + 2^2 + 2xy \cdot 2 = 1 - u^2 - y^2 + u^2 y^2$$

$$\therefore x^2 y^2 + 2^2 + 2xy \cdot 2 = 1$$

1 Marks.

Q5.

Given that

$$f(x) = x^3 - 3x^2 + 3x$$

$$\therefore f'(x) = 3x^2 - 6x + 3$$

1 Marks

$$= 3(x^2 - 2x + 1)$$

1 Marks

$$\therefore f'(x) = 3(x-1)^2 > 0$$

2 Marks.

$\therefore f(x)$  is strictly increasing

or.

Given that

$$f(x) = 2x^2 - 10x + 24$$

(1)  $f(x)$  is polynomial function.

$\therefore f(x)$  is continuous

1 Marks

(2)  $\frac{df(x)}{dx} = 4x - 10$  which finite in  $(2, 7)$

$\therefore f(x)$  is derivable

(3)  $f(2) = 17$   $f(7) = 57$

1 Marks

$$\therefore f(2) = f(7)$$

1 Marks

②

$$\therefore \underline{f(c) = f(b) - f(a)}$$

$\therefore$  LMV conditions satisfied.

$$\therefore f'(c) = \frac{f(b) - f(a)}{b - a}$$

$$\therefore 4c - 10 = \frac{57 - 17}{7 - 2}$$

$$\Rightarrow 4c - 10 = \frac{40}{5} = 8$$

$$\Rightarrow 4c = 18$$

$$\therefore c = \frac{18}{4} = \frac{9}{2} = 4.5 \in (2, 7)$$

1 Marks.

Q7.

OY

(9)

$$I = \int \frac{1}{x^2+16} dx = \frac{1}{8} \int \frac{e}{x^2+16} dx$$

$$= \frac{1}{8} \int \frac{8/h^2}{x^2+16/h^2} dx$$

$$= \frac{1}{8} \int \frac{1 + \frac{4}{h^2} + \frac{4}{h^2} - 1}{x^2 + \frac{16}{h^2}} dx$$

$$= \frac{1}{8} \int \frac{1 + \frac{4}{h^2}}{x^2 + \frac{16}{h^2}} dx - \frac{1}{8} \int \frac{1 - \frac{4}{h^2}}{x^2 + \frac{16}{h^2}} dx \quad \text{--- 1 Mark}$$

$$= \frac{1}{8} \int \frac{1 + \frac{4}{h^2}}{(x - \frac{4}{h})^2 + 6} dx - \frac{1}{8} \int \frac{1 - \frac{4}{h^2}}{(x + \frac{4}{h})^2 - 6} dx$$

$$\text{Put } x - \frac{4}{h} = t \quad \left| \quad \text{Put } x + \frac{4}{h} = u \right.$$

$$(1 + \frac{4}{h^2}) dx = dt \quad \left| \quad (1 - \frac{4}{h^2}) dx = du \right.$$

$$= \frac{1}{8} \int \frac{dt}{t^2+6} - \frac{1}{8} \int \frac{du}{u^2-6} \quad \text{--- 1 Mark}$$

$$= \frac{1}{8} \int \frac{dt}{t^2+(2\sqrt{2})^2} - \frac{1}{8} \int \frac{du}{u^2-(2\sqrt{2})^2}$$

$$= \frac{1}{8} \times \frac{1}{2\sqrt{2}} \tan^{-1} \frac{t}{2\sqrt{2}} - \frac{1}{8 \times 2 \times 2\sqrt{2}} \log \frac{u-2\sqrt{2}}{u+2\sqrt{2}}$$

$$= \frac{1}{16\sqrt{2}} \tan^{-1} \left( \frac{x - \frac{4}{h}}{2\sqrt{2}} \right) - \frac{1}{32\sqrt{2}} \log \frac{x + \frac{4}{h} - 2\sqrt{2}}{x + \frac{4}{h} + 2\sqrt{2}} + C$$

--- 2 Marks.

Q6.

Given that  
 $y = e^{m \sin^{-1} x}$ find  $\frac{dy}{dx}$ .

1 MARKS

$$\frac{d^2y}{dx^2}$$

1 MARKS

Arrangement of l.h.s.

$$(1-x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} - m^2 y$$

Simplify l.h.s. and to get 0

And  $\therefore$  l.h.s. = R.H.S.

2 MARKS

Q7.  $I = \int x^2 e^{x^3} \cot(e^{x^3}) dx.$

put  $e^{x^3} = t$

Ad  $\frac{d}{dx} \frac{d e^{x^3}}{dx} \times \frac{dx}{dx} = \frac{dt}{dx}$

$$e^{x^3} \times 3x^2 = \frac{dt}{dx}$$

$$\therefore dx = \frac{dt}{3x^2 e^{x^3}} \quad \text{1 MARKS}$$

$$\therefore I = \int x^2 e^{x^3} \cot(e^{x^3}) dx.$$

$$= \int x^2 e^{x^3} \cot \times \frac{dt}{3x^2 e^{x^3}} \quad \text{1 MARKS}$$

$$= \int \cot dt$$

$$= \frac{1}{3} \text{ sint} = \frac{1}{3} \sin(e^{x^3}) + C \quad \text{2 MARKS}$$

Q8.

Given that

$$x = a \sin \theta \quad y = a \cos \theta$$

$$\therefore \frac{dy}{dx} = \frac{d(a \cos \theta)}{d(a \sin \theta)} = \frac{\frac{d(a \cos \theta)}{d\theta}}{\frac{d(a \sin \theta)}{d\theta}}$$

$$\frac{dy}{dx} = \frac{2 \cos \theta \times -\sin \theta}{3 \sin^2 \theta \times \cos \theta} = -\frac{\cos \theta}{\sin \theta} = -\cot \theta \quad \text{1 MARKS}$$

Now  $\frac{dy}{dx} = 2 - 4x$

$$\therefore \left(\frac{dy}{dx}\right)_{x=1} = -1$$

1 Mark

$\therefore$  Equation of Tangent

$$\frac{dy}{dx} = \frac{y-m}{x-m}$$

$$\therefore -1 = \frac{y - \frac{9}{\sqrt{2}}}{x - \frac{9}{\sqrt{2}}}$$

$\therefore$  Equation of Tangent

$$x + y = \frac{9}{\sqrt{2}}$$

1 Mark

Equation of Normal

$$\frac{dy}{dx} = -\frac{1}{\frac{dy}{dx}} = \frac{y-m}{x-m}$$

$$\therefore 1 = \frac{y - \frac{9}{\sqrt{2}}}{x - \frac{9}{\sqrt{2}}}$$

$\therefore$  Equation of Normal is

$$x - y = 0$$

1 Mark

OR.

Given that

$$f(x) = 2x^3 - 15x^2 + 36x + 1$$

$$\text{Find } f'(x) = 6x^2 - 30x + 36$$

And factorise

for increasing

$$f'(x) \geq 0$$

And get interval

It is increasing in the interval  $(-\infty, 2] \cup [3, \infty)$

For decreasing

$$f'(x) \leq 0$$

And get the interval

It is decreasing in the interval  $[2, 3]$

1 Mark

89. LHS =  $(\tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{7}) + (\tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{8})$

=  $\tan^{-1} \left( \frac{\frac{1}{5} + \frac{1}{7}}{1 - \frac{1}{5} \times \frac{1}{7}} \right) + \tan^{-1} \left( \frac{\frac{1}{3} + \frac{1}{8}}{1 - \frac{1}{3} \times \frac{1}{8}} \right)$  — 1 MARKS

=  $\tan^{-1} \left( \frac{\frac{12}{35}}{\frac{34}{35}} \right) + \tan^{-1} \left( \frac{\frac{11}{24}}{\frac{23}{24}} \right)$

=  $\tan^{-1} \left( \frac{126}{124} \right) + \tan^{-1} \frac{11}{23}$

=  $\tan^{-1} \left( \frac{6}{17} + \frac{11}{23} \right)$  — 1 MARKS

=  $\tan^{-1} \left( \frac{\frac{6}{17} + \frac{11}{23}}{1 - \frac{6}{17} \times \frac{11}{23}} \right)$

=  $\tan^{-1} \left( \frac{325}{391-66} \right)$  — 1 MARK

=  $\tan^{-1} \left( \frac{325}{326} \right) = \tan^{-1} 1$

=  $45^\circ = \text{RHS.}$  — 2 MARKS

810. Matrix Representation — 1 MARKS

$Ax = B$

where  $A = \begin{bmatrix} 1 & -2 & -2 \\ -1 & 3 & 0 \\ -2 & 0 & 1 \end{bmatrix}$   $x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$

$B = \begin{bmatrix} 5 \\ -4 \\ 4 \end{bmatrix}$  — 1 MARKS.

Value of  $|A|$  — 1 MARKS

$|A| = \frac{\text{Adj} \cdot A}{|A|} = \text{Adjoint of } A$

Adjoint of  $A = \begin{bmatrix} C_{11} & C_{21} & C_{31} \\ C_{12} & C_{22} & C_{32} \\ C_{13} & C_{23} & C_{33} \end{bmatrix}$

$$\text{Adjoint of } A = \begin{bmatrix} C_{11} & C_{21} & C_{31} \\ C_{12} & C_{22} & C_{32} \\ C_{13} & C_{23} & C_{33} \end{bmatrix}$$

(14)

1 MARKS

$$A^{-1} = \frac{\text{Adj. } A}{|A|}$$

1 MARKS

$$\text{And } x = A^{-1} \cdot B$$

1 MARKS

$$\therefore x = -\frac{31}{11}, y = -\frac{25}{11} \text{ and } z = -\frac{16}{11}$$

1 MARKS.

OR.

Find inverse of matrix

$$A = \begin{bmatrix} -1 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$$

Find  $|A|$

1 MARKS.

$$A^{-1} = \frac{\text{Adj. } A}{|A|}$$

1 MARKS

$$\text{Adj. } A = \begin{bmatrix} C_{11} & C_{21} & C_{31} \\ C_{12} & C_{22} & C_{32} \\ C_{13} & C_{23} & C_{33} \end{bmatrix}$$

And correct values of all cofactors

2 MARKS

$$\therefore A^{-1} = \frac{\text{Adj. } A}{|A|}$$

$$\therefore A^{-1} = \begin{bmatrix} 1 & -1 & 1 \\ -8 & 7 & -5 \\ 5 & -4 & 3 \end{bmatrix}$$

2 MARKS.

Ans.

Q11. Given that

$$y = x \times \sin(aty)$$

$$\therefore \frac{dy}{du} = \frac{d(x \times \sin(aty))}{dx}$$

$$= \frac{du}{du} \times \sin(aty) + x \times \frac{d(\sin(aty))}{du}$$

$$\text{now } \frac{dy}{du} = 1 \times \sin(aty) + x \times \frac{d(\sin(aty))}{d(aty)} \times \frac{d(aty)}{du}$$

$$\frac{dy}{du} = \sin(aty) + x \times \cos(aty) \times \frac{dy}{du}$$

$$\frac{dy}{du} = \frac{\sin(aty)}{1 - x \cos(aty)}$$

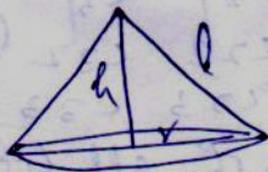
$$\text{now } y = x \sin(aty)$$

$$\therefore x = \frac{y}{\sin(aty)}$$

$$\therefore \frac{dy}{du} = \frac{\sin(aty)}{1 - \frac{y}{\sin(aty)} \times \cos(aty)}$$

$$\therefore \frac{dy}{du} = \frac{\sin^2(aty)}{\sin(aty) - y \cos(aty)}$$

Q12



Curved surface area of cone =  $\pi r l$

$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$

$$\therefore l = \pi r l$$

$$V = \frac{1}{3} \pi r^2 h$$

$$\therefore l^2 = h^2 + r^2$$

1 MARKS.

1 MARKS

Now  $S^2 = \pi^2 r^2 l^2$   
 $\therefore S^2 = \pi^2 r^2 (h^2 + r^2)$

(16)

Now  $V = \frac{1}{3} \pi r^2 h$  ——— 1 MARKS

$\therefore r^2 = \frac{3V}{\pi h}$

$\therefore S^2 = \pi^2 \times \frac{3V}{\pi h} \left( h^2 + \frac{3V}{\pi h} \right)$

$S^2 = \frac{3\pi V}{h} \left( h^2 + \frac{3V}{\pi h} \right)$

$= 3\pi V h + \frac{9\pi V^2}{\pi h^2}$

Now  $\frac{dS^2}{dh} = 3\pi V + 9\pi V^2 \frac{dh^{-2}}{dh}$  ——— 1 MARKS

$= 3\pi V - 9\pi V^2 \times 2h^{-3}$

$= 3\pi V - 18\pi V^2 h^{-3}$

Solve

$\frac{dS^2}{dh} = 0$  ——— 1 MARKS

$\frac{d^2 S^2}{dh^2} > 0$  ——— 1 MARKS.

$\therefore S^2$  is ~~is~~  $S^2$  and hence  $S$  is minimum.

————— 1 MARKS.

Q13.  $I = \int \frac{1}{x^2 - 5x + 6} dx$

$= \int \frac{1}{(x-2)(x-3)} dx$  ——— 1 MARKS

do the partial fraction.

$\frac{1}{(x-2)(x-3)} = \frac{1}{x-3} - \frac{1}{x-2}$

$I = \int \frac{1}{x-3} dx - \int \frac{1}{x-2} dx$  ——— 2 MARKS

$= \ln|x-3| - \ln|x-2|$  ——— 1 MARKS.

$$I = \log \frac{u-3}{u-2} + c \quad \text{--- 1 Mark} \quad (17)$$

Q14.  $I = \int_0^{\pi/2} \log \tan u \, du$

$$I = \int_0^{\pi/2} \log (\cot(\pi/2 - u)) \, du \quad \text{--- 1 Mark}$$

$$I = \int_0^{\pi/2} \log \sin u \, du$$

$$I + I = \int_0^{\pi/2} \log \cos u \, du + \int_0^{\pi/2} \log \sin u \, du$$

$$= \int_0^{\pi/2} \log \sin u \, du \quad \text{--- 1 Mark}$$

$$\Rightarrow 2I = \int_0^{\pi/2} \log \frac{2 \sin u}{2}$$

$$= \int_0^{\pi/2} \log \frac{\sin 2u}{2} \, du$$

$$= \int_0^{\pi/2} \log \sin 2u \, du - \int_0^{\pi/2} \log 2 \, du \quad \text{--- 1 Mark}$$

Put  $2u = t$   
 $du = \frac{1}{2} dt$  --- 1 Mark

$$\begin{aligned} \therefore 2I &= \int_0^{\pi} \log \sin t \times \frac{1}{2} dt - \log 2 \int_0^{\pi/2} du \\ &= 2 \int_0^{\pi/2} \log \sin t \times \frac{1}{2} dt - \pi/2 \log 2 \end{aligned}$$

$$= \int_0^{\pi/2} \log \sin t \, dt - \pi/2 \log 2 \quad \text{--- 1 Mark}$$

$$2I = I - \pi/2 \log 2$$

$$\therefore I = -\pi/2 \log 2 \quad \text{--- 1 Mark}$$

Q13.

OR

(18)

$$I = \int_0^{\infty} \log\left(x + \frac{1}{x}\right) \times \frac{1}{1+x^2} dx$$

$$\text{put } x = \tan \theta$$

$$dx = \sec^2 \theta d\theta$$

1 Mark

$$\therefore I = \int_0^{\pi/2} \log\left(\frac{\sec \theta}{\tan \theta} + \frac{1}{\sec \theta}\right) \times \sec^2 \theta d\theta$$

$$= \int_0^{\pi/2} \log\left(\frac{1+\cos^2 \theta}{\sin \theta \cos \theta}\right) d\theta$$

1 Mark

$$= \int_0^{\pi/2} \log 2 d\theta - \int_0^{\pi/2} \log \sin 2\theta d\theta$$

$$= \log 2 \int_0^{\pi/2} d\theta - \frac{1}{2} \int_0^{\pi} \log \sin t dt$$

$$\text{where } 2\theta = t \\ d\theta = \frac{1}{2} dt$$

$$= \log 2 \cdot \frac{\pi}{2}$$

1 Mark

$$= \frac{\pi}{2} \log 2 - \frac{1}{2} \times \frac{\pi}{2} \int_0^{\pi} \log \sin t dt$$

$$= \frac{\pi}{2} \log 2 - \frac{\pi}{4} \int_0^{\pi} \log \sin t dt$$

1 Mark

$$= \frac{\pi}{2} \log 2 - \left(-\frac{\pi}{4} \log 2\right)$$

$$= \frac{\pi}{2} \log 2 + \frac{\pi}{4} \log 2$$

1 Mark

$$= \frac{3\pi}{4} \log 2$$

1 Mark

Section B

19

B15 (a)

Solve  $\sin 6x + \sin(6\sqrt{3}x) = -1$

Correct Application of formulae

$\sin x + \sin y$

1 marks.

And  $x = -\frac{1}{12}$

1 marks

(b) one - one.

To prove  $f: \mathbb{N} \rightarrow \mathbb{N}$  s.t.  $f(x) = 2x$  is one - one

1 marks

not onto

To prove  $f: \mathbb{N} \rightarrow \mathbb{N}$  s.t.  $f(x) = 2x$  is not onto

1 marks.

(c)

$f \circ g(x) = f(g(x))$   
 $= f(x^2 + 6)$   
 $= 6(x^2 + 6) + 2$   
 $= 6x^2 + 36 + 2$   
 $= 6x^2 + 38$

1 marks.

(d)

$g \circ f(x) = g(f(x)) = g(6x + 2)$   
 $= (6x + 2)^2 + 6$   
 $= 36x^2 + 24x + 4 + 6$   
 $= 36x^2 + 24x + 10$

1 marks.

Q 16. Evaluate.

(20)

$$I = \int_0^{\pi} \frac{x + \tan x}{\sec x + \tan x} dx.$$

$$I = \int_0^{\pi} \frac{(\pi - u) + \tan(\pi - u)}{\sec(\pi - u) + \tan(\pi - u)} du \quad \text{--- 1 Mark}$$

$$= \int_0^{\pi} \frac{(\pi - u)x + \tan u}{-\sec u - \tan u} du$$

$$= \int_0^{\pi} \frac{(\pi - u) \tan u}{\sec u + \tan u} du$$

$$= \int_0^{\pi} \frac{\pi \tan u}{\sec u + \tan u} du - I$$

$$2I = \pi \int_0^{\pi} \frac{\tan u}{\sec u + \tan u} du \quad \text{--- 1 Mark.}$$

$$= \pi \int_0^{\pi} \frac{\sin u}{1 + \sin u} du$$

$$= \pi \int_0^{\pi} \frac{\sin u (1 - \sin u)}{\cos^2 u} du.$$

$$= \pi \left[ \int_0^{\pi} \tan u \sec u du - \int_0^{\pi} \tan^2 u du \right]$$

$$= \pi \left[ (\sec u)_0^{\pi} - (\tan u)_0^{\pi} + (u)_0^{\pi} \right]$$

$$= \pi \quad \text{--- 1 Mark.}$$

$$= \pi [(-1) - 0 + \pi]$$

$$= -2\pi + \pi^2$$

$$\therefore I = \frac{\pi^2}{2} - \pi \quad \text{--- 1 Mark.}$$

or.

Integrate

$$I = \int \frac{(\ln \log x)^2}{x} dx$$

$$\text{put } \ln \log x = t$$

$$\frac{1}{x} = \frac{dt}{dx}$$

$$dx = x dt$$

--- 1 Mark

$$\begin{aligned} \therefore I &= \int \frac{t^2}{x} \times x dt && \text{--- 10 Marks.} \\ &= \int t^2 dt \\ &= \frac{t^3}{3} && \text{--- 1 Mark.} \\ &= \frac{(1+\log x)^3}{3} + C && \text{--- 1 Mark.} \end{aligned}$$

Q107 verify Rolle's theorem for  $f(x) = \sin x - \sin 2x$  in  $[0, \pi]$

- (1)  $f(x)$  is continuous --- 1 Mark
- (2)  $f(x)$  is diff. --- 1 Mark
- (3)  $f(0) = f(\pi)$  --- 1 Mark

$$f'(c) = 0$$

$$\therefore c = \cos^{-1}(0.843) \in (0, \pi)$$

$$c = \cos^{-1}(-0.593) \in (0, \pi)$$

--- 1 Mark.

or

$$\text{If } x = a \cos t - b \cos t \quad y = a \cos t + b \sin t$$

Prove that  $\frac{d^2y}{dx^2} = -\frac{4y^2}{y^3}$

$$\frac{dy}{dx} = \frac{d(a \cos t + b \sin t)}{d(a \cos t - b \cos t)}$$

$$\frac{dy}{dx} = \frac{\frac{d(a \cos t + b \sin t)}{dt}}{\frac{d(a \cos t - b \cos t)}{dt}} \quad \text{--- 1 Mark}$$

$$\frac{dy}{dx} = \frac{-a \sin t + b \cos t}{a \cos t + b \sin t} \quad \text{--- 1 Mark}$$

$$\therefore \frac{d^2y}{du^2} = \frac{d}{du} \left( \frac{dy}{du} \right)$$

(22)

$$= \frac{d}{du} \left( \frac{-a \sin t + b \cos t}{a \cos t + b \sin t} \right)$$

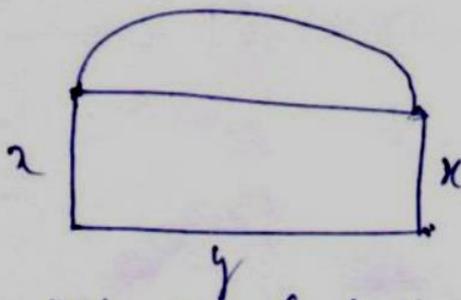
After simplification

— 1 Mark

$$\frac{d^2y}{du^2} = - \frac{27y^2}{y^3}$$

— 1 Mark

Q18.



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

$$\text{Perimeter of window} = 2x + y + \pi \frac{y}{2}$$

$$\therefore \text{Area of window} = 2xy + \frac{1}{2} \pi x \left( \frac{y}{2} \right)^2$$

— 1 Mark

$$A = 2xy + \frac{1}{2} x \pi \times \frac{y^2}{4}$$

$$= 2xy + \frac{\pi y^2}{8}$$

— 1 Mark

$$\text{Now } k = 2x + y + \frac{\pi y}{2}$$

$$2x = k - y - \frac{\pi y}{2}$$

$$\therefore x = \frac{1}{2}k - \frac{y}{2} - \frac{\pi y}{4}$$

$$A = \left( \frac{1}{2}k - \frac{y}{2} - \frac{\pi y}{4} \right) y + \frac{\pi y^2}{8}$$

$$\frac{dA}{dy} = 0$$

~~— 1 Mark~~

— 1 Mark

$$x = \frac{k}{\pi+4} \text{ and } y = \frac{2k}{\pi+4}$$

$$\left( \frac{d^2A}{dy^2} \right) < 0$$

A is max.

— 1 Mark

**MARKING SCHEME**  
**SELF ASSESSMENT TEST – 2020**  
**BIOLOGY**

**NOTE:** While correcting the answers, if a scientific name (eg. *Mangifera indica*) is misspelled then no marks shall be allotted. In case of a technical/scientific term (eg. Osmoregulation, Acetylcholine) if the spelling is wrong but you are able to make out the term through its pronunciation, marks shall not be deducted otherwise no marks shall be allotted.

**PART I (20 Marks)**

Answer all questions

**Question 1:**

(A) Answer the following: (1 x 10=10)

a. Give a scientific term for the entry of pollen tube into an ovule through integument.

**Mesogamy**

b. Name the technique of preservation of egg, tissue and embryo at -196°C under liquid nitrogen.

**Cryopreservation**

c. Who proposed “Rivet-popper hypothesis”.

**Paul Ehrlich**

d. Name a bacteria used as a bio-control agent.

**Bacillus thuringiensis**

e. Expand IPM.

**Integrated Pest Management**

f. Define Parthenocarpy. Give an example.

**The process of formation of fruit without fertilisation. Banana**

g. Differentiate between perisperm and endosperm.

**Perisperm is the diploid persistent nucellus in the form of a transparent sheath in seed where as endosperm is a triploid structure produced after triple fusion in seed for nutrition.**

h. If a leaf cell consists of 30 chromosomes then write the number of chromosomes in Embryosac and Endosperm.

**Embryosac – 15 and Endosperm - 45**

i. Name the chemical component present in exine of pollen grain.:

**Sporopollenin**

j. What is Apomixis?

**The process of formation of seed without fertilisation or without involving meiosis and syngamy.**

(B) Each of the following statement has four choices. Choose the best option in each case:

**(5)**

i. The minute cells which separate from the developing ova during their maturation are called

- a. Primary spermatogonia
- b. Secondary oogonia
- c. Primary oogonia
- d. **Polar bodies**

ii. Acrosome reaction in sperms is triggered by

- a. Release of fertilizin
- b. Capacitation
- c. **Release of lysine**
- d. Influx of Na ions into the sperm

iii. Given below are four methods (A-D) and their modes of action (i-iv) in achieving contraceptive. Select their correct matching from the four options that follow:

Method	Mode of Action
A. The pill	i. prevents sperms reaching cervix
B. Condom	ii. prevents implantation
C. Vasectomy	iii. prevents ovulation
D. Copper-T	iv. semen contains no sperms

- a. A-(ii),B-(iii), C-(i), D-(iv)
- b. **A-(iii),B-(i), C-(iv), D-(ii)**
- c. A-(iv),B-(i), C-(ii), D-(iii)
- d. A-(iii),B-(iv), C-(i), D-(ii)

iv. Gene with multiple effect is

- a. Codominant
- b. **Pleiotropic**
- c. Linked
- d. None of these

v. The type of antibodies which shows allergic reactions when combined to antigens

- a. IgA
- b. IgM
- c. **IgE**
- d. IgG

(C) Write the full form of the following:

**(1/2 x 4 = 2)**

- i. ZIFT **Zygote Intra Fallopian Transfer**

- ii. ELISA Enzyme Linked Immuno Sorbent Assay
- iii. IVF In-vitro Fertilization
- iv. RCH Reproductive and Child Health Care Programme

(D) Define the following terms: (1+1+1 = 3)

- i. Spermiogenesis- formation of spermatozoa from spermatid/  
transformation of spermatid into sperm.
- ii. Polygenic Inheritance-The inheritance of one particular trait determined by more than one non-allelic genes.
- iii. Actively Acquired Immunity- The immunity acquired during life time by experience when the body itself produces antibodies.

**PART II**  
**Section A**

**Question 2:**

Name the microbe used in production of: (A) Lactic acid (B) Citric acid. (2)

**A: Lactobacillus /Lactic acid bacteria** (1 mark)

**B: Aspergillus niger** (1mark)

**Question 3:**

a. An anther with malfunctioning tapetum fails to produce viable pollen grains. Give reasons. Why? (2)

**Tapetum is the inner most layer of pollen sac, which provides nutrition to the developing pollen grains so if nutrition is not adequate then nonviable pollen grains will be produced.** (2marks)

Or

b. Why is development of embryo sac considered monosporic in Angiosperms?

**It is developed from one functional megaspore out of four produced by megasporogenesis and rest three degenerate.** (2marks)

**Question 4:**

Explain 2 use of microbes in beverages and bakery industries .Write the scientific name also. (2)

**Saccharomyces cerevisiae is used in beverage industry for production of beverages like wine, beer, rum by fermentation of fruit juices.** (½ +½)

**Saccharomyces cerevisiae is used in bakery industry for fermentation of dough for cake and cookies.** (½ +½)

**Question 5:**

What is biogas plant? Write two advantages of it and name the bacteria used in this process (2)

**Biogas plant is a plant setup for production of biogas by using animal dung. (½marks)**

- i. It produces biogas for cooking and lightning (½ marks)**
- ii. It produces manure which increases fertility of soil. (½ marks)**

**Methanobacterium. (½ marks)**

**Question 6:**

Differentiate between hyaluronidase and hyaluronic acid. Name the three accessory glands of male reproductive system. (2)

**Hyaluronidase is a sperm lysine present in the acrosome of the sperms which dissolves the hyaluronic acid during fertilization while hyaluronic acid is a mucopolysaccharide which glues the follicle cells in corona radiata.(1 mark)**

**Seminal vesicles, Prostate gland and Cowper's/Bulbo-urethral gland (1 mark)**

**Question 7:**

Explain the mechanism of action of B lymphocytes on antigens. (2)

**When antigens enter the body fluid, B cells gets activated and converts into plasmablasts which divides and multiply to form plasma cells that produces antibodies (2 mark)**

OR

Explain the mechanism of action of T lymphocytes on antigens.

**When antigens enter the body, T cells get activated and converts into lymphoblasts that multiply and produces clones as Cytotoxic cells - it destroys the antigen containing cells; Helper cells - it activated the B-lyphocytes to produce antibodies and Suppressor cells - suppresses the function of both cytotoxic and helper cells.(2 mark)**

**Question 8:** (2)

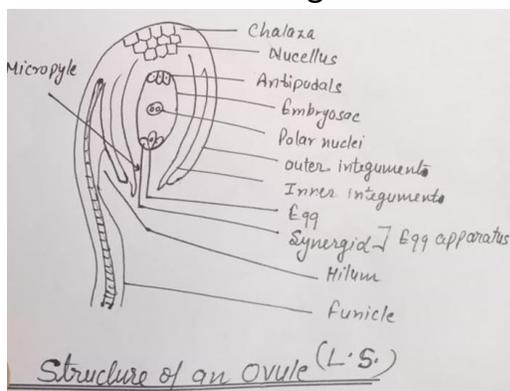
Enlist the changes taking place in ovary and uterus during Secretory/Luteal Phase Also mention the role of hormones during this phase.

**In Ovary: Remnants of graafian follicle converts into yellow cell mass, corpus luteum which now secretes progesterone and estrogen necessary to maintain the thickened uterine wall. (1mark)**

**In uterus: Further thickening of uterine wall (endometrium), less uterine movement, endometrium is now soft, thick and highly vascularised.(1 mark)**

**Question 9:**

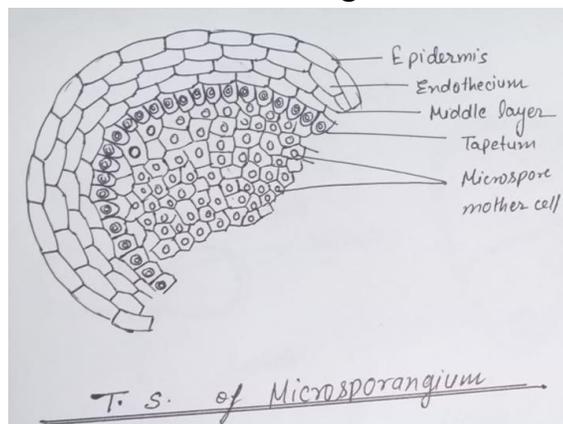
Draw a well labelled diagram of L.S. of an anatropous ovule. (3)



(1 ½ diagram + 1 ½ any three correct labelling)

Or

Draw well labelled diagram of T.S. of microsporangium.



(1 ½ diagram + 1 ½ any three correct labelling)

**Question 10:**

Write the scientific name of the microbe and one medical use of following: (3)

- A. Cyclosporine A : Trichoderma polysporum : used as immunosuppressive agent in organ transplantation. ( 1 mark)
- B. Streptokinase: Streptococcus : used as clot buster for removing clots of blood from blood vessels of patients. (1 mark)
- C. Statin: Monascus purpureus : used as blood cholesterol lowering agent. (1 mark)

**Question 11:** What is organic farming? Explain role of any two bio-fertilisers and two bio control agents in organic farming. (3)

**Organic farming is the farming without the use of any chemical. In this method instead of chemical fertilisers bio fertilisers are used whereas instead of chemical pesticides bio-pesticides are used. (1mark)**

- i. In place of chemical fertilisers bio fertilisers are used such as: Azospirillum, Azotobacter and Rhizobium which fixes nitrogen in soil and increases the fertility. (1mark)
- ii. Instead of Chemical pesticides natural predators are used to kill pathogen. Eg:Ladybird beetle is used to get rid of Aphids. Dragonfly is used to eat mosquitoes or Trichoderma or Baculovirus are also used as bio-control agents. (1mark)

**Question 12:** Explain any three methods of Ex-situ conservation of biodiversity. (3)

**Ex-situ conservation is the method of conserving threatened plants and animals away from their natural habitat in zoological parks, botanical gardens etc.**

- i. **Botanical garden:** it is the place where flora can be conserved in a systematic manner. Botanical gardens are a well tended area displaying a wide range of plants labelled with their botanical names. It also supports research. Eg: National Botanical Research Institute, Lucknow
- ii. **Cryopreservation:** the technique of preservation of egg, tissue and embryo at  $-196^{\circ}\text{C}$  under liquid nitrogen. At this low temperature any biological activity leading to biochemical reactions that would lead to cell death is effectively stopped. It is applicable for both plant and animal germplasm.
- iii. **Wild life safari :** it is a safari park in which hundreds of animals wander freely around in their natural habitats. It promotes tourism and wild life photography.
- iv. **Gene (Germplasm) Bank:** A gene bank is an institution where valuable plant material likely to be irretrievably lost in the wild or in cultivation is preserved in a viable condition.
- v. **Seed bank:** The storage of material in the form of seeds is one of the most widespread and valuable *ex situ* approaches to conservation. A seed bank stores seeds to preserve genetic diversity.

(Any three points 3X 1 = 3marks)

**Question 13:**

Define gene mutation. Explain the types of gene mutation. (3)

**“A sudden change in one or more genes is called gene mutation”(1/2mark)**

**Types of gene mutation:**

**i.Inversion:** change in base sequence of a cistron in the reverse order

GCC TAT TTG ----- GTT TAT CCG (1/2 mark)

**ii.Substitution:** replacement of nitrogen base by another nitrogen base. It is of two types: Transition – when a purine is replaced by another purine; pyrimidine by another

pyrimidine. Transversion – when a purine is replaced by pyrimidine and vice-versa.  
(1/2 + 1/2 mark)

iii. Frame-shift : When reading of the frame of base sequence shifts laterally either in forward direction due to insertion of one or more nucleotides or in backward direction due to deletion of one or more nucleotides. (1/2 + 1/2 mark)

OR

“ABO blood group is an example of Co-dominance and Multiple Alleles. Explain (3)  
ABO blood group is represented by the gene I which has three alleles  $I^A, I^B$  and  $i$ . It shows codominance because in a heterozygous individual with  $I^A I^B$  both the alleles are able to express independently in the phenotype of the individual as the person will have AB blood group. (1mark)

Multiple alleles – because there are more than two forms of alleles  $I^A, I^B$  and  $i$  of a gene I at the same locus on the chromosome due to which there can be four blood groups as shown in the table: (2 mark)

Allele of Parent I	Allele of Parent II	Genotype of the offspring	Blood group of the offspring
$I^A$	$I^A$	$I^A I^A$	A
$I^A$	$I^B$	$I^A I^B$	AB
$I^A$	$i$	$I^A i$	A
$I^B$	$I^A$	$I^A I^B$	AB
$I^B$	$I^B$	$I^B I^B$	B
$I^B$	$i$	$I^B i$	B
$i$	$i$	$ii$	O

#### Question 14.

Describe the post-zygotic events leading to implantation and placenta formation in humans. Mention any two functions of placenta. (3)

Zygote undergoes repeated mitosis (cleavage) to form 2,4,8,16,32 celled stage called morula where cells gets organised as outer and inner cell mass leaving a space called blastocoels. This stage is termed as blastocyst which gets implanted in the endometrium. It takes seven days after fertilisation and occurs in fallopian tube/oviduct. (1 mark)

Placenta is a disc like structure formed by the villi of chorion(chorionic villi) which is present around the foetus as extra embryonic membrane and villi of uterine wall. (1 mark)

Placenta helps in the diffusion of respiratory gases, nutrients, removal of nitrogenous wastes of foetus, endocrine gland.(Any two functions – 1 mark)

#### Question 15.

Mention the causative agent and two preventive measures for the following diseases:

(3)

- a. Gonorrhoea – *Niesseria gonorrhoeae*. avoid homosexuality, avoid sexual contact with infected person, use of antibiotics (1/2 + 1/2 mark)
- b. Dengue – *Flavi virus*. By checking mosquito breeding, oral/intravenous rehydration, intravenous fluid or blood transfusion for blood platelets. (1/2+1/2 mark)
- c. Diphtheria – *Corynebacterium diphtheria*. Use of antibiotics like Penicillin and an antitoxin to neutralise the diphtheria toxin. (1/2+1/2 mark)

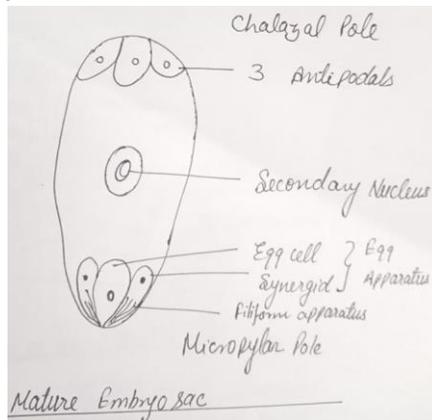
### Section C

Question:16

(A) How does megaspore mother cell develop into 7 celled, 8 nucleate embryosac in Angiosperm. Draw a labelled diagram of mature embryosac (3)

The functional megaspore enlarges in size and divides by three continues mitotic division to produce 8 nuclei, out of which 3 rearrange themselves at chalazal and forms 3 antipodals by wall formation. 3 nuclei at micropylar and rearrange to form egg apparatus by wall formation in which middle one is egg and on either side of egg is synergids. 2 polar nuclei in centre fuses to form secondary nucleus.

(1½ marks)



(1 ½ diagram)

(B) Explain four causes of loss of Biodiversity briefly (2)

- i. **Habitat loss and fragmentation by deforestation:** it is the most important cause of biodiversity loss due to increasing human population as a result of which the forest coverage is shrinking. (½ marks)
- ii. **Over exploitation of plants and animals:** most of the wild animals are killed by human beings for various reasons like pharmaceutical, perfumes, cosmetics etc. As a result of which overexploitation of wildlife is occurring.

(½ marks)

iii. Alien species invasion: Introduction of any exotic species deliberately causes adverse effect on natural flora and fauna of that area. Eg: Nile perch introduced in Victoria lake in east Africa lead to extinction of more than 200 species of Cichlid fish in that lake. (½ marks)

iv. Co-extinction in case of mutually beneficial relationship or in host parasite interaction. So if one species becomes extinct then it causes the extinction of associated species. Eg: Lichens. (½ marks)

OR

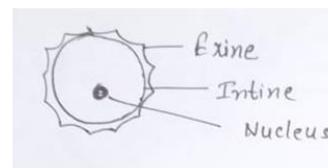
(A) What is double fertilisation? Name the scientist who observed it for the first time. Explain its steps. (2)

In case of Angiosperms fertilisation takes place twice which is known as double fertilisation. (½ marks) It was first observed by Nawaschin (½ marks). It occurs in two steps:

- i. Process of fusion of first male gamete with egg cell is termed as true fertilisation or syngamy. It produces zygote. ( ½ marks)
- ii. Process of fusion of second male gamete with secondary nucleus (diploid) is termed as triple fusion. It produces Triploid endosperm.(½ marks)

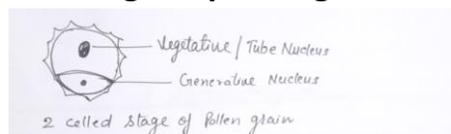
(B) Trace the events of development of a mature male gametophyte from pollen mother cell. Draw required diagram. (3)

- i. Pollen mother cell undergoes meiosis and produces 4 microspores or pollen grains. Each pollen grain consists of outer exine and inner intine with a haploid nucleus.



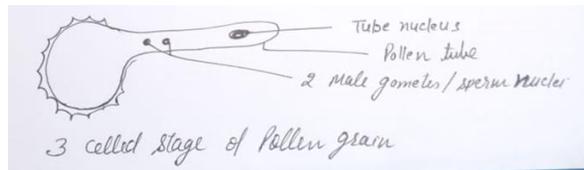
(½ + ½ )

- ii. This nucleus comes at the base and divides unequally, larger nucleus is tube/ vegetative nucleus whereas smaller lens shaped nucleus is termed as generative nucleus. This stage of pollen grains is termed as two celled stage.



(½ + ½ )

- iii. Finally generative nucleus divided by mitosis and produces two male gametes or sperm nuclei. At this stage pollen grain is termed as mature or three celled stage. Pollen tube emerges out from germ pore which carry tube nucleus in front followed by two male gametes.



( $\frac{1}{2} + \frac{1}{2}$ )

### Question:17

- (A) Explain the different steps involved in sewage treatment plant before it can be returned into natural water bodies. (3)

It is majorly done in two steps: Primary Treatment and Secondary Treatment

**Primary Treatment:** In this step sequential filtration takes place to remove debris, twigs, pebbles, stones followed by sedimentation in which most of the organic material settles down.

Settled organic matter is termed as primary sludge and liquid part is termed as effluent. (1 marks)

**Secondary treatment:** In secondary treatment chemical decomposition of organic matter takes place in three major steps.

- i. **Aeration tank:** in this tank air is continuously supplied for growth of aerobic bacteria and fungus which causes decomposition of remaining organic matter in sewage water and BOD reduces. It is then transferred to settling tank.
- ii. **Settling tank:** In settling tank there is no supply of air, so remaining organic matter settles down and termed as Activated sludge. Bacterial and fungal flocks of activated sludge are used as inoculums. Now the remaining water is transferred to the anaerobic sludge digester. (1 marks)
- iii. **Anaerobic sludge digester:** in this tank all aerobic bacteria and fungus die and anaerobic bacteria decompose remaining organic matter and produces biogas.

Finally, this water is treated with chlorine and released into water bodies. (1 marks)

- (B) Why should Biodiversity be conserved? Give two reasons. (2)

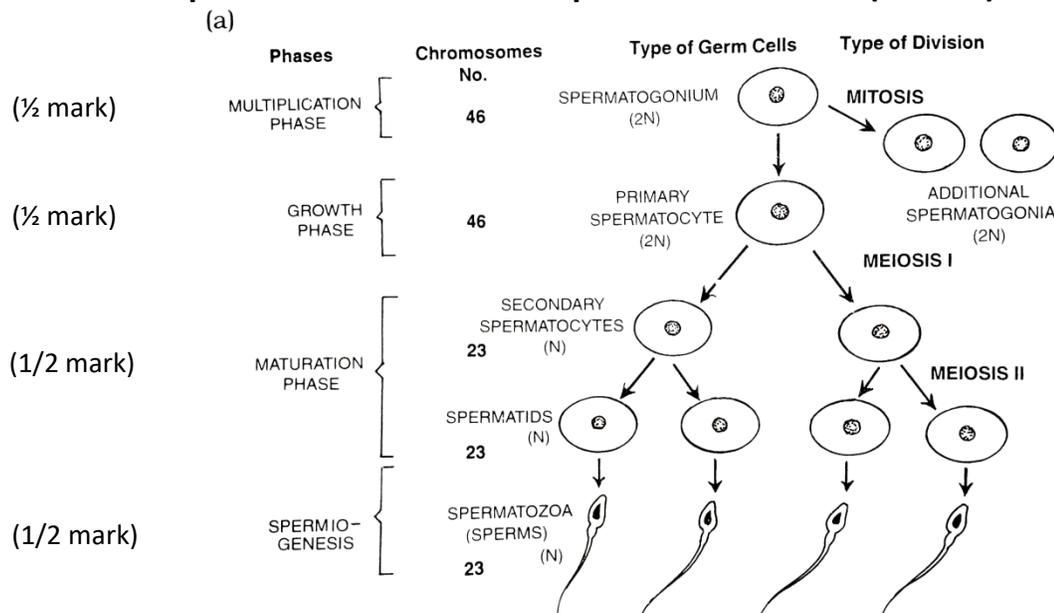
**Biodiversities are to be conserved due to following reasons:**

- i. **Narrowly Utilitarian: Human being derives countless direct economic benefits from forest. Biodiversity provide us plenty of plant and animal products for which we can pay. Eg: spices, timber etc. So conservation of biodiversity is important. (1 marks)**
- ii. **Broadly utilitarian: Biodiversity also provide us priceless valuable things like fresh air, beauty of nature etc. It provides many ecosystem services. Eg: Pollination by bees, birds etc. So for aesthetic pleasure we should conserve biodiversity. (1 marks)**

OR

(A)What is spermatogenesis? Briefly describe the process of spermatogenesis. (3)

**Spermatogenesis is the process of formation of sperms in the testis (1 mark)**



(B) Explain the significant role of hormones during spermatogenesis. (2)

**Hypothamus releases Gonadotopin Releasing Hormone which reaches the Anterior lobe of pituitary gland to secrete -**

**i. ICSH/LH which helps the Leydig cells to secrete testosterone(1/2 mark)**

**ii. FSH which helps in the process of spermatogenesis(1/2 mark). FSH also stimulates Sertoli cells to produce two factors – Androgen Binding Protein which concentrates testosterone and stimulates spermatogenesis(1/2 mark) + Protein Inhibin which suppresses FSH synthesis (1/2 mark).**

### Question 18

Give the scientific name of the parasite that causes malaria in humans. At what stage does this parasite enter the human body. Trace its life cycle in human body. (5)

***Plasmodium falciparum* (1/2 mark)**

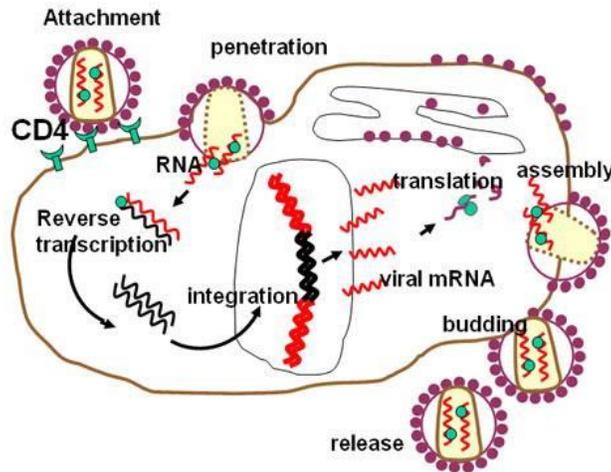
**It enters the human body as Sporozoites (1/2 mark)**

In human sporozoites enter the blood stream and reaches liver (1 mark) where it multiplies asexually into merozoites (1 mark) which may either move into the RBC where it reproduces and ruptures it and realises a toxic byproduct, haemozoin causing chills and high fever recurring every 3-4 days (1 mark) or develops into gametocytes, thus repeating the cycle between primary and secondary hosts.(1mark)

OR

Draw and explain the replication of retroviruses taking place in infected human cells.

(5)



(2 marks for the labelled diagram)

- HIV attaches itself and binds with the plasma membrane of the T helper cell.
- HIV enters the cell and uses the enzyme, reverse transcriptase to make a DNA copy.
- The single stranded DNA replicate to form double stranded DNA copy(ds DNA).
- ds viral DNA integrates into the DNA of host cell and directs it to produce viral RNA.
- Viral RNA brings synthesis of viral protein.
- Viral protein and RNA strands assembles giving rise to new viruses which are released from the host cell before they die.
- (THERE ARE SIX POINTS – ½ X 6 =3 marks)

\*\*\*\*\*

**MARKING SCHEME**  
**SELF ASSESSMENT TEST – 2020**  
**COMPUTER SCIENCE**

**PART I**

Attempt all questions from this Section

**Question 1.**

- a) State Biconditional law and prove it with the help of a truth table.  
 [1]

$$p \Leftrightarrow q$$

$$= (p \Rightarrow q) \cdot (q \Rightarrow p)$$

$$pq + p'q'$$

<b>p</b>	<b>Q</b>	<b>p'</b>	<b>q'</b>	<b>Pq</b>	<b>p'q'</b>	<b>pq + p'q'</b>
0	0	1	1	0	1	1
0	1	1	0	0	0	0
1	0	0	1	0	0	0
1	1	0	0	1	0	1

- b) Draw the truth table of the given propositional logic expression.

$$(x' \Rightarrow y') \wedge (y \vee x) \quad [1]$$

Answer:  $= (x + y) \cdot (y + x)$

<b>X</b>	<b>Y</b>	<b>x+y</b>	<b>y+x</b>	<b>(x+y)(y+x)</b>
0	0	0	0	0
0	1	0	0	0
1	0	0	0	0
1	1	1	1	1

- c) Find the dual for the Boolean equation:  $AB' + B(C' + A) + 1 = 1$ .

[1]

answer:  $A+B'.B+C'.A.0=0$

- d) Convert the Boolean expression  $F(X,Y,Z) = (X'+Y'+Z) \cdot (X'+Y+Z)' \cdot (X+Y+Z)$  into its cardinal form.

[1]

Answer :  $F(X,Y,Z) = \pi(6, 5, 0)$

- c) Minimize  $F = XYZ + XY'Z' + XY'Z + X'Y'Z'$  using Boolean laws.

[1]

$$= (XYZ + XY'Z) + (XY'Z' + X'Y'Z')$$

$$= XZ(Y + Y') + Y'Z'(X + X') \quad Y+Y'=1 \quad X+X'=1$$

$$= XZ + Y'Z'$$

**Question 2.**

- a) What is underflow in stack?

[2]

- b) What is copy constructor?

[2]

- c) Convert the following infix expression to its prefix form:

$$M * (N / P) / R^{\wedge} S$$

[2]

- d) What is function overriding?

[2]

- e) Each element of an array `arr[50][20]` requires 2 bytes of storage. If the address of `arr[3][2]` is 2000. Find the base address and address of `arr[15][10]`. The array is stored as **Column**

**Question 3.**

The following function is a part of the class which will perform Binary Search . Assume that all other function/method, variables are already defined. Fill correct Expressions at ?1?, ?2?, ?3?, ?4?, ?5?. [5]

```
int anyFunc(int a[], int s, int i, int j)
{
    int d,u=0;
    while(?1?)
    {
        d=?2?;
        if(a[d]==s)
            u=1;
        else if(?3?)
            i=d+1;
        else
            j=?4?;
    }
    return(?5?);
}
```

answer:

?1?  $i \leq j \ \&\& \ u == 0$   
 ?2?  $(i+j)/2$   
 ?3?  $a[d] > s$   
 ?4?  $d-1$   
 ?5?  $u$

**PART - II**  
**SECTION A**

*Answer any two questions(10 Marks each).*

**Question 4.**

a) Given If  $F(A,B,C,D) = \Sigma (5, 7, 8, 10, 12, 14, 15)$  [5]  
 i) Reduce the above expression by using Karnaugh's map.  
 ii) Draw the logic diagram of the reduced expression.

b) Given  $F(P,Q,R,S) = \pi (0,2,3,6,8,10,11,14,15)$  [5]  
 i) Reduce the above expression by using Karnaugh's map.  
 ii) Draw the logic diagram of the reduced expression.

**Question 5.**

a) Define Contingent. Draw truth table? [2]  
 b) Write contrapositive of  $p \Rightarrow q$ ? [2]  
 b) Draw Binary to Decimal Encoder. Include Truth table. [4]

c) Consider the following truth table and write the POS expression where A, B and C are input and X as output. [2]

A	B	C	X
0	0	0	1

0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

**Question 6.**

- i) What is tautology? [2]
- ii) Draw a logic diagram of Full Adder. [2]
- iii) Construct truth table for Equivalence. [2]
- iv) 4 coins are tossed up. A player wins only atleast 3 coins turns head. Draw a truth table & reduce it using Karnaugh map. [4]

**SECTION B**

*Answer any two questions(10 Marks Each).*

**Question 7.**

Design a class **Duplicate** which will remove all duplicates from the array. Assume that the array is sorted.

If the array has the following sorted numbers:

1 2 3 3 4 4 4 5 5 6 6

The resultant array should contain each element once. The output should be:

1 2 3 4 5 6

Some members of the class are given below:

<b>Class name</b>	<b>Duplicate</b>
<b>Data Member</b>	
int ar[]	An array to store integer data.
int size	Size of the array.
<b>Member functions/Methods</b>	
Duplicate(int n)	a constructor to initialize size of the array.
void acceptData()	to input integer data to be stored in the array using keyboard input.
void removeDup()	To remove all duplicates from the array.
void dispData()	to print all the data present in the array.

Specify the class **Duplicate** giving all the details as specified. Also define the main function to create an object and call accordingly to enable the task.

**Question 8.**

Write a program which will input a string and perform the following task:

<b>Class name</b>	<b>Str01</b>
<b>Data Member</b>	
Str	String to be taken as input through keyboard.
Len	Length of the String.
<b>Member functions/Methods</b>	
Str01	a constructor to initialize data members.
void inputString()	to input a string using keyboard.

void putin(int, char)	To insert the given character at a specified position and display the changed string. (without using insert function)
void takeout(int)	To remove character from the specified position in the string and display the changed string. (without using delete function)
void change()	To replace each character in the original string by the character which is at a distance of 2 moves ahead. For example "ABCD" becomes "CDEF", "XYZ" becomes "ZAB".

Specify the class **Str01** giving all the details as specified. Also define the main function to create an object and call accordingly to enable the task.

### Question 9.

Write a program to accept 2 dates and find the difference in days between the 2 dates.

Example: INPUT:

Date 1 : 25/3/2020

Date 2 : 6/10/2020

OUTPUT: Difference = 94 days

Class name	Date
Data Member	
dd,mm,yy	Integer type data to store date, month and year.
Member functions	
Date(...)	Parametrized constructor to initialize dd,mm and yy.
boolean isLeap(int y)	To check whether y is a leap year or not.
boolean dateValidate(int d, int m, int y)	To check whether d, m and y forms a valid date or not.
int dayno(Date td)	To convert a date into number of days since jan 1 of the year specified in date object.
int dateDifference(Date prv, Date pre)	To find the difference of date.

Specify the class **Date** giving all the details as specified. Also define the main function to create an object and call accordingly to enable the task.

## SECTION C

*Answer any two questions(5 Marks Each).*

### Question 10.

**Shelf** is a kind of data structure which can store at the most 20 books. The **Shelf** restriction is that a book can be kept into the **Shelf** or removed only at one end i.e. on the top.

The class **Shelf** has the following details:

**Class name** : **Shelf**

**Data members:**

book[] : array of string of maximum 50 locations to store books.

name : string variable to store name of book to be kept in the array book[].

limit : integer as maximum capacity of the array.

top : integer to indicate topmost book into the **Shelf**.

**Member functions**

**Shelf** () : a constructor to store blank in the array book[].

**Shelf** (int nx) : a constructor to assign nx to limit and -1 to top.

void dispList() : to display list of books in the **Shelf**.

boolean isEmpty() : : returns true, if **Shelf** is empty otherwise returns false.

void putTheBook() : input name of the book into variable name and adds it on the top into

the array book[] if **Shelf** is empty otherwise prints a message “**Shelf** is overflow”.

void removeBook() : removes a book from the top of the **Shelf**, if **Shelf** is not empty and print the book name, otherwise outputs a message “**Shelf** is underflow”.

Specify the class **Shelf** giving details of constructor **Shelf** (int nx) and functions boolean isEmpty(), void putTheBook(), void removeBook() only. Assume that other constructors and functions are already written for you. You do not need to write the main function.

**Question 11.**

A super class **Record** has been defined to store the names and ranks of 50 students. Define a sub class **Rank** to find the highest rank along with the name. The details of both classes are given below:

**Class name : Record**

**Data Members / instance variables:**

name[ ] : to store the names of students  
 rnk[ ] : to store the ranks of students

**Member functions:**

Record() : constructor to initialize data members  
 void readvalues() : to store names and ranks  
 void display() : displays the names and the corresponding ranks

**Class name : Rank**

**Data Members / instance variables:**

index : integer to store the index of the top most rank

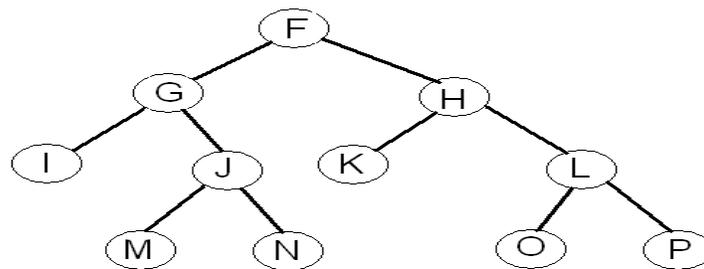
**Member functions / Methods**

Rank() : constructor to invoke the base class constructor and to initialize index to 0  
 void highest() : finds the index location of the topmost rank and store it in index without sorting the array.  
 void display() : displays the name and ranks along with the name having the topmost rank.

Assume that the super class **Record** has been defined. Using the **concept of inheritance**, specify the class **Rank** giving details of the **constructor()**, **void highest()**, **void display()**.

The super class and the main function need not be written.

**Question 12.**



- i) Name the sibling of L [1]
- ii) Write the pre order traversal of the tree. [1]
- iii) Draw left subtree of the root. [1]
- iv) List leaf nodes. [1]
- v) What is the height of the tree. [1]

**MARKING SCHEME**  
**SELF ASSESSMENT TEST – 2020**  
**PHYSICAL EDUCATION**

SECTION A

1. "Games and sports are man's cultural heritage". Elaborate this statement in your own words. [8]

For a clear-cut understanding of 'Games and Sports as a Cultural Heritage,' it is essential to understand the meaning of culture. Generally, the word 'culture' is misunderstood. Because it is usually heard "our school organises a number of cultural programmes but not the sports programmes". Even a music teacher usually says that nowadays, students are more interested in playing cricket, tennis and basket-ball, etc., instead of cultural activities. It means that sports and games are not included in cultural activities. It is completely wrong to think so. The culture is that, which people invented and which must be transmitted to each new generation. It includes ideas, knowledge, beliefs, laws, morals, traditions, art and habits as well as all invented materialistic things like tools, buildings, and all technology. Culture respondents transmitted behavioural pattern of living norms and standards. Culture is learned, people cannot exist outside the culture. They must participate and share it either in a negative or positive way.

Culture is acquired behaviour and is entirely the product of social invention, dependent on learning and communication for its transmission and maintenance. Mankind have the ability to create their own culture but at the same time they become products of culture. They also have the responsibility to transmit it to succeeding generations. Culture is a way of life. It includes our language, religion, dress, eating habits, values, beliefs, customs, games and sports. Present is an image of the past. Games and sports, traditions and values are derived from them and they are products of a long period of social inheritance.

Heritage is something that is left from the past to the present and from the present to the future with the proper modification. Heritage is to be protected by the present and coming generation; without the heritage there cannot be any link between the past, present and future.

As a matter of fact, culture has historical bases. It involves values, ideas and patterns. The word 'culture' is derived from the verb 'to cultivate' which also means to 'create'. So cultural heritage means the transfer of the values, traditions and conventions of the past to the present and from the present to the future with appropriate modifications. Now, it can be properly understood whether games and sports are man's cultural heritage or not.

In fact, games and sports are not new to the people of this world. Indeed, games and sports were started when man came into existence on the earth. To understand it clearly, we will have to peep into our own past. All the present activities are based on the events of days and years gone. Many of today's activities have their forerunners in history. It helps to understand the present better and can be gained by studying the past. From the earliest times to the present, either directly or indirectly, games and sports have played an important part in the lives of all people. Sometimes these activities have been motivated by a factor such as the necessity for earning a livelihood, whereas sometimes it has resulted from a desire to live a fuller life. It is clear that the objectives of games and sports have changed over the course of history, so at present time they are directed at the better development of human beings not only physically but also emotionally, socially and intellectually. This changed concept of games and sports has come as a result of many years of experience and study in regard to the values inherent in participating in games and sports under qualified leadership.

The major difference between today's sports and games and that of the past is that there are set rules and regulations of each and every game at present time, but in the past there were no set rules. Sports and games were alive in the form of physical activities, which were indispensable needs of that time. These activities of running, jumping and throwing were a part of man's life in order to save himself from wild animals and hunting for the meal. 'Survival of the fittest' was the principle in those dark ages. In the tribal period, hunting, dancing and chasing the wild animals were usual affairs. Youths were given training to develop their physical fitness. Slowly and steadily, these activities were changed in the form of games and sports with specific rules and regulations.

**Answer written should be sufficient enough to justify your answer.**

2. How do games and sports contribute in various ways towards the development of an individual? Explain. [8]

At the level of the individual in this world, sports and games act as an indispensable vehicle which leads towards physical, mental, social, emotional and moral development of the individual. Most precisely in other words, it can be said that sports and games play a vital role in the harmonious development or all round development of an individual. They improve the personality of an individual. Earlier, games and sports used to be considered as a means 'of recreation only but now the importance of games and sports has been realized. Today, sports and games contribute towards the development of an individual in the following ways:

**(a) Physical Development**

Persistent participation in games and sports from an early age enhances the physical development of an individual through capacity building in physical coordination, through the positive use of energy and the promotion of healthy bodies. Sports and games lead to proficiency in the neuro-muscular coordination which ultimately make the movements refined. Well-organized games and sports are stimulant to physical growth. They shape the body and enhance the physical aspect of an individual. Participation in games and sports is one of the best means to maintain the optimum health from childhood to adulthood. Games and sports help an individual at all the levels to gain endurance, speed, strength, flexibility, coordinative abilities and good body composition etc.

**(b) Mental Development**

Sports and games provide ample opportunities for individuals to participate in creative experiences. There is no doubt that individuals learn to make judgements, utilize reflective and creative thinking and obtain knowledge about the rules and regulations of games and sports. Indeed, there is a two way process of games and sports. They need alertness of mind, deep concentration and calculated movements. As a matter of fact, the mastery of various games and sports also requires the cultivation of some degree of mental and motor coordination. Games and sports help an individual to draw conclusions from various situations which occur in playgrounds.

**(c) Social Development**

Sports and games provide a number of ways for social development of an individual. Through games and sports the players, who belong to different places, come closer to one another. They adjust themselves according to the situations. Human relations are developed through participation in sports and games. In fact, it is a better source for attaining as well as developing the social qualities like co-operation, courtesy, fair play, sportsmanship, tolerance, sympathy, brotherhood, obedience of rules and regulations to remain in discipline, respect, self-respect, helpfulness, patience and harmony etc. The above mentioned traits or qualities are developed among individuals efficiently in the field of sports and games. Sports and games have the potential to facilitate civilized adjustment as a member of society. They also contribute to the promotion of democracy as they allow for an individual to be evaluated on

the basis of ability and performance. Even it is said that sports and games are just like fields where seeds of high character are sown and a harvest of better man is reaped.

#### **(d) Emotional Development**

Every individual has various types of emotions like, pleasure, hope, jealousy, hate, fear, distress, anger, wonder, lust, loneliness etc. If an individual does not have appropriate control over these emotions, he may become abnormal and uncontrollable. These emotions are vital for every individual but excess of these is always bad. Indeed, sports and games help in developing these emotions and tend to enable the individuals to have proper control over these emotions.

In a nutshell, it can be concluded that sports and games play a very significant role in the all round development or harmonious development of an individual. Games and sports develop and enhance the personality of individuals because all the essential traits or qualities are developed through games and sports. In fact, the personality of an individual is moulded and shaped well in games and sports. Even in the Olympic charter it is mentioned:

"The goal of olympism is to place sport at the service of the harmonious development of man, with a view to promote a peaceful society concerned with the preservation of human dignity".

**ALL POINTS TO BE MENTIONED ALONG WITH EXPLANATION [2 marks for each point]**

3. Explain the role of physical education in promoting: [4+4=8]  
(a) National Integration (b) Development of attitudes.

#### **(a) National Integration**

India is a vast country. It is a multi-racial and multi-lingual country. It is a land of many communities, languages, religions and sects. We usually hear 'Unity in Diversity' about India. As a matter of fact, we differ with each other in many facets of life. People, living in different states and territories, sometimes raise their regional demands and cry for their fulfillment. In fact, it is better if people start thinking in terms of nation rather than their regions. This type of problem creates many hindrances in the path of the development of our country. Hence, it can be said that national integration is the major task before us. It is our foremost and indispensable requirement of the hour. National integration is so much essential for us that, through it, we can ameliorate our country and can enter in the group of developed countries.

Through the programmes of physical education and sports, we can attain national integration upto some extent if not completely. Through sports and games, we come closer and meet together. We come to know the standard of living of others and thus ideas are shared. We get opportunity to solve many problems. In the field of sports, various social traits are developed such as cooperation, fraternity, friendship, brotherhood, helpfulness, tolerance, adjustment among individuals, honesty and sincerity etc. Sports and games teach us a lesson of unity because without unity it is hard to get success in the field of sports. At various situations in sports, we depend upon co-operation of our team players. Besides quarrels, there is a common rivalry. Although it is limited to a few participants only, yet it offers an experience of belonging together of a community and of nations. In fact, it plays a vital role in promoting integration of a nation.

Owing to this aspect of sports and games, the Olympic games were started in 1896 by the endeavours of a French-man, De-Coubertin. These games are emblem of peace, fraternity, cooperation and brotherhood. Other national and international games are also held for this reason. Team spirit is usually developed in the field of sports and it helps in achieving national integration. Owing to this, we are unable to achieve the targets set by De-Coubertin. The socio-political role was played by Adolf Hitler in Olympic Games when Jesse Owens won four gold medals in Berlin Olympic Games. Adolf Hitler refused to greet him only due to racial discrimination. The countries were divided to participate in Moscow

Olympic Games in 1980. The American lobby refused to take part in those games. Such type of boycott can be seen easily in these games. This can be seen, while a state level team or national level team is selected for international level competitions. So, such trends should be stopped immediately for the betterment of society to attain national integration.

### **(b) Development of attitudes.**

Attitude is our mental and physical state through which our life is affected. If we are having an interest and have it for a prolonged period, it becomes our attitude. It may be called the last stage of interest. There are various types of attitudes such as religious attitude, attitude to win, attitude towards exercise, attitude towards physical fitness, attitude towards discipline and sympathetic attitude etc. Here our concern is about sympathetic attitude and attitude to win, attitude towards physical fitness, attitude towards obedience and attitude towards discipline. When an opponent meets an accident during the match, he may get serious injuries. At this juncture, every player of his team and opponent's team has sympathetic attitude towards the injured player. This type of feeling comes to every player spontaneously. At that time, the players of opposite team forget any ill-will or malice. Usually, the sympathetic attitude of players can be observed very well during matches, when someone gets hurt. All the players rush towards the place immediately where someone is seriously injured. In the same way attitude to win, attitude towards physical fitness, attitude towards obedience and discipline is also developed through games and sports.

**Answer written should be sufficient enough to justify your answer.**

#### **4. What do you mean by sports training? Elaborate the importance of sports training in the field of games and sports.**

**[8]**

The word 'Training' is not a new word, people have been using it since archaic period. Training means the process of preparation for some task. But here our main task is fitness and conditioning for sports and games. It is only due to that this term is mostly used in sports and games. So, it is called 'sports training'. The concepts of 'training' and sportsman's 'preparation' seem to coincide, but are not identical. Preparation is broader both in volume and content. In fact, preparation is a complex process and directly influences the sportsman's development and ensures the necessary degree of readiness for success. This complex system includes: sports training, sports competitions and special nutrition, etc. Sports training is the main component and the basic form of preparing the sportsman. In other words, it is systematically planned preparation with the help of various exercises which is generally used for a longer duration.

So, sports training must be understood as a specialised process of all-round physical conditioning aimed at the preparation of sportspersons for performance in games and sports. Sports training should be based on scientific facts if we want to get good results in competition. If it is not possible, it should be based on the results of successful practices. "According to Martin, "Sports training is a planned and controlled process in which, for achieving a goal, changes in complex sports motor performance, ability to act and behaviour are made through measures of content, methods and organisation."

#### **Importance of Sports Training**

Sports training is extremely important in the field of games and sports. The following points clearly indicate the importance of sports training:

- i) Improves the required level of physical fitness components
- iv) Helps in injury prevention.
- iii) Improves the rate of waste product disposal.
- ii) Helps in perfection of skills.
- v) Improves postural alignment.
- vi) Improves balance and reaction time.

- vii) Speeds up recovery time.
- viii) Improves muscle to fat ratio.
- ix) Improves concentration.
- x) Helps in educating and improving mental capabilities.
- xi) Helps in gaining more knowledge of the concerned sports.
- xii) Increases muscle tone and facilitates good blood circulation.

**i) Improves the required level of physical fitness components.**

We are well aware that there are two types of components of physical fitness i.e., health related and performance or skill related components. All the components of physical fitness, whether health related or performance related, are essential in the field of games and sports. The requirement of these components such as cardio-vascular endurance, muscular strength, body composition, speed, balance, power, flexibility and agility etc. differ from sports to sports. For example, in contact sports like wrestling, judo, kabaddi etc. muscular strength, endurance and agility etc. are indispensable, whereas, flexibility and muscular strength are mainly required in gymnastics and diving. Sports training plays a very significant role in the improvement of the required level of physical fitness components.

**ii) Helps in perfection of skills.**

Technique training forms a vital component of sports training which aims at acquiring skills of the specific sport. The role of technique and the amount of technique training differ from sport to sport. In gymnastics and combative sports there are various techniques to be learnt and mastered, whereas, in track and field events one or two techniques are to be learnt and mastered. Sports training not only helps in learning the sports' techniques but also helps in perfection of various skills of sports.

**iii) Improves the rate of waste product disposal.**

Whenever sportspersons engage in playing any game, sport or exercise, waste products are formed. The disposal of waste products is essential. If these waste products are not excreted or disposed immediately, the efficiency of sportspersons is affected badly. Sports training help in improving the rate of waste products' disposal and finally it leads to the improvement in sports performance.

**iv) Helps in injury prevention.**

Sports training plays a very important role in injury prevention. As a matter of fact, most of the sportspersons are not well aware that sports training is essential for injury prevention. Sports training helps in the development of strength, flexibility and agility necessary to protect joints from injury. Proper training can reduce or alleviate the incidence of injury but there is always a chance for injury even if the body is properly protected and conditioned.

**v) Improves postural alignment.**

Good postural alignment is essential for presenting good performance in the field of games and sports. Even good postural alignment reduces the expenditure of calories for performing any activity. It has already been observed that sports training is helpful in improving the postural alignment.

**vi) Improves balance and reaction time.**

Sports training improves the balance ability and reaction time. These abilities play a significant role in various games and sports. As a matter of fact, balance ability and reaction ability are helpful in improving the sports performance.

**vii) Speeds up recovery time.**

Regular sports training speeds up the recovery time following physical exercise or competition. This enables the body to cope with the demands of training more effectively and also makes it more resistance to injury and illness.

**viii) Improves muscle to fat ratio.**

Sports training plays a very effective role in improving muscle to fat ratio. In fact, it is beneficial in getting good body composition. If muscle to fat ratio is improved there will be less expenditure of calories while performing in games and sports (specially in jumping and running). As a matter of fact, a

sportsperson will have to carry extra fat if the ratio of muscle to fat is not good. A good ratio is always better in presenting good performance.

**ix) Improves concentration.**

Sports training improves concentration which ultimately enhances the sports performance. In most of the sports and games concentration contributes a lot.

**x) Helps in educating and improving mental capabilities.**

Performance in sports is a result of complete personality of the sportsperson. Sports training provides education and improves mental capabilities of a sportsperson. Here, education means development of positive beliefs, values, interests and attitudes towards sports training and development of personality traits and qualities which are significant for successful training such as honesty, confidence, self-control, self-esteem and courage etc. It can be said that sports training helps in developing complete personality of sportsperson which finally enhances performance in sports.

**xi) Helps in gaining more knowledge of the concerned sports.**

Sports training helps in gaining more knowledge to sportspersons of their respective sport. It also enables them to learn about the importance of having a healthy mind and body. Such type of knowledge definitely helps in presenting good performance in sports.

**xii) Increases muscle tone and facilitates good blood circulation.**

Sports training increases muscle tone which is beneficial in preventing injuries. Along this, it facilitates good blood circulation which alleviates fatigue and finally leads to increased performance.

**1 marks for the first part of the question. 1 marks for writing all the points in one place and 6 marks for explaining any 9 points if the content is small or 8 points if the content is little big.**

**5. Define warming-up and elucidate the advantages of warming-up for sportspersons in detail.**

**[8]**

Warming-up is usually performed to do an activity in most refined and efficient way. It is a short term activity and it is done prior to any competition or training. It helps the sportsperson to prepare physically, mentally and physiologically for any type of training or competition. In fact, it is necessary to prepare those muscles, which are involved in that specific activity, sport or game. If proper warming-up is done, muscles become ready to respond efficiently. It is a process in which muscles are warmed-up by running, jogging and taking some free hand exercises prior to the training or competition. This preparation before competition or training is called warming-up.

**Advantages of Warming-up**

Most of the eminent educationists and exercise physiologists are of the opinion that warming-up is essential for attaining better performance in the field of sports and games. The advantages of warming-up are described below:

- i) Increases the Body Temperature.
- ii) Decreases the Viscosity of Muscles.
- iii) Increases the Speed of Nerve Impulses.
- iv) Decreases the Resistance in Muscle Capillaries.
- v) Increases the Speed of Transfer of Oxygen and Fuel to Tissues.
- vi) Increases Metabolic Rate.
- vii) Reduces the Anxiety and Tension.
- viii) Enhances Cooling Efficiency.

- ix) Reduces the Blood Lactic Acid.
- x) Warming-up Avoids Injury.
- xii) Increases the Speed of Muscles.
- xiii) Increases Strength.
- xiv) Increases Endurance.
- xv) Increases Explosive Power.
- xvi) Improves Specific Skills.
- xvii) Improves Neuro-muscular Co-ordination.
- xviii) Improves the Level of Performance.
- xix) Warming-up Decreases Reaction Time.
- xx) Warming-up Brings Second Wind More Readily.

**i) Increases the Body Temperature.**

A proper warming-up increases the body and muscle temperature. So, it is beneficial for the sportspersons. Research studies show that if the muscles have been slightly warmed-up just before the activity, the performance is improved. Failure to warm-up before vigorous activity may lead to tearing of muscle fibres. In fact, if the muscle is warmed up, the speed with which the muscle contracts and relaxes and the force of contraction are all increased.

**ii) Decreases the Viscosity of Muscles.**

Warming-up decreases the viscosity of muscles. Research studies indicate that if a previously inactive muscle is stimulated repeatedly, the first few contractions are often small and irregular and relaxation is incomplete. After this, the contractions become stronger and relaxation is complete. It occurs due to decrease in the viscosity of muscles. Hence, the rate of muscular contraction and relaxation becomes faster and efficient. The chances of injury or wear and tear of muscles and ligaments are reduced.

**iii) Increases the Speed of Nerve Impulses.**

Warming-up increases the speed of nerve impulses, which improves and sharpens the reaction time of sportspersons. Improvement in reaction time is always beneficial approximately in most of the games and sports.

**iv) Decreases the Resistance in Muscle Capillaries.**

Research studies also reveal that warming-up decreases the resistance in muscle capillaries.

**v) Increases the Speed of Transfer of Oxygen and Fuel to Tissues.**

A proper warming-up increases the speed of transfer of oxygen and fuel to tissues. It occurs due to the enhancement of blood flow through the muscles by dilating the small blood vessels. This improves the functional condition of muscle by increasing its oxygen supply.

**vi) Increases Metabolic Rate.**

Warming-up increases the metabolic rate which ultimately enhances energy level. In fact, the metabolic rate increases due to rise in core temperature. If there is an increase in temperature by 0.5°C, the metabolic rate increases by 7 per cent. If the metabolic rate is higher, there will be higher production of energy.

**vii) Reduces the Anxiety and Tension.**

Warm-up is very useful in reducing the anxiety and tension of sportspersons specially at the time of competition. It is also advantageous in helping to either reduce or increase the motivational level of sportsperson.

**viii) Enhances Cooling Efficiency.**

After warming-up, the body is able to activate the mechanisms which allow it to cool during physical exertion, such as sweating. It means that the sportspersons will not overheat early at the time of practice or competition.

**ix) Reduces the Blood Lactic Acid.**

Research studies indicate that heart rate and consumption of oxygen are directly related to muscle temperature. Higher the temperature, higher will be the consumption of oxygen and heart rate and, thus, blood lactic acid is reduced.

**x) Warming-up Avoids Injury.**

Several scholars claim that failure to warming-up may lead to tearing of muscles. Morehouse and Miller also support this idea. Muscles remain in tone up position after proper warming-up whereas without proper warming-up, muscles are loosened. Without proper warming-up, muscles may cramp more frequently. Thus, the danger of injury is reduced when an athlete or sportsperson is completely warmed up which increases the speed with which he is able to react. Injury is a common phenomenon to those who do not perform adequate warming-up before training period or competition.

**xii) Increases the Speed of Muscles.**

Speed of muscles increases after warming-up. Many scholars advocate that tearing of muscle fibres is common without adequate warming-up. Hamola, a physiologist found that "Pulled muscle occurs in the relaxed fibres those antagonistic to the contracting fibres." This happens because the relaxed fibres do not respond to the pull suddenly placed on them by the rapidly contracting muscles. Increases Flexibility. Warming-up increases flexibility but, if proper warming-up is not done then body will be less flexible. After warming-up, we can exert the force upto maximum reach (distance).

**xiii) Increases Strength.**

Warming-up increases the strength whereas local heating does not increase the strength rather causes in decreasing it. There are many informations that strength can be increased upto some extent by proper warming-up.

**xiv) Increases Endurance.**

Some eminent physiologists hold the opinion that warming-up does not increase endurance and speed. But, on the other hand, authentic research studies indicate that certain type of warming-up increases both speed as well as endurance. Thompson found in his study that formal warming-up exercises improve swimming endurance. Mangel concluded that vigorous warming-up improved performance in the one mile run. So we can enhance the endurance if we do proper warming-up prior to training.

**xv) Increases Explosive Power.**

Some well-reputed psychologists connote that warming-up increases explosive power. It is well known fact that warm up increases speed and strength. Due to this fact it can be averred that warm up enhances explosive power because explosive power depends upon speed and strength.

**xvi) Improves Specific Skills.**

If specific warming-up is performed, then sportsperson or player gets warmed up through fundamental exercises. There are the basic skills of a specific game. Using such type of warming-up, skills can be improved a lot.

**xvii) Improves Neuro-muscular Co-ordination.**

Warming-up improves neuro-muscular co-ordination. If a basket ball player wants to shoot the ball in the ring without warming-up, there will be more chances of missing, but, after warming-up, his neuro-muscular coordination will be improved and will lead towards accuracy.

**xviii) Improves the Level of Performance.**

Owing to some physiological changes, the level of performance is improved. After a complete warming-up, it has been observed that it improves level of performance. All the involved muscles exert maximum force with highest speed. This is applicable only after a complete warming-up.

**xix) Warming-up Decreases Reaction Time.**

After a thorough warming-up, reaction time can be decreased upto some extent, because muscles contract with fast speed. Neuro-muscular co-ordination also plays an important role in decreasing reaction time.

**xx) Warming-up Brings Second Wind More Readily.**

Second wind results from adjustment of the body systems to the additional demands placed on them as a result of increased activity. When second wind is reached, the supply has caught up with increased demands. That is why, after proper warm-up second wind comes easily and promptly and sometimes athletes do not feel it.

**1 marks for the first part of the question. 1 marks for writing all the points in one place and 5 marks for explaining any 9 points if the content is small or 8 points if the content is little big.**

**6. What do you mean by cooling down/limbering down? Enumerate the advantages of cooling down in detail. [8]**

Cooling down/limbering down is also called warming down. To bring the body in normal state after any competition or training is called cooling down. Cooling down allows the body to transit gradually from an exertional state to a resting or near resting state. Infact cooling down is a necessary activity after training or competition. It involves a specific procedure to bring the body to a normal position. So, after any workout of training or competition we should not stop the movements of our body immediately. For appropriate cooling down, we should perform jogging as well as walking for 5 to 10 minutes. This will help in decreasing the body temperature and removing the waste products from the working muscles. After that static stretching exercises should be performed for 5 to 10 minutes. Static stretches are more appropriate to cool down as they help muscles to relax, re-align muscle fibres and re-establish their normal range of movement. You should stretch all the major muscle groups which you have used during the training or competition. The stretches should be held for 10 to 20 seconds. The repetition of stretch should be done at least 2 to 3 times.

### **Advantages of Cooling/Limbering Down**

As warming up is essential before training or competition, cooling down or limbering down is equally essential to bring the body back to the normal position after training or competition. In simple words, it can be said that cooling down is as important as the warming up, however, it is usually ignored by sportspersons. As a matter of fact, cooling down should not be underestimated at the end of workout. Its advantages are mentioned below:

- i) Body temperature becomes normal.
- ii) Proper removal of waste products.
- iii) Decrease in tension.
- iv) Reduces the chances of dizziness or fainting.
- v) Supply of oxygen.
- vi) Decrease in the level of adrenaline in the blood.
- vii) Muscles do not remain stiff.
- viii) Heart rate returns to initial stage.

**i) Body temperature becomes normal.**

During high intensity and strenuous training or competition the body temperature increases more than 160° fahrenheit. Appropriate cooling down helps in reducing the body temperature.

**ii) Proper removal of waste products.**

When a sportsperson performs training or takes part in competition the waste products such as lactic acid, uric acid, acid phosphate, sulphates, chlorides and carbon dioxide etc. are accumulated in his body. Due to more accumulation of these waste products in the body, muscles cannot work efficiently.

Proper cooling down reduces the accumulation of such waste products very quickly from the muscles appropriately.

**iii) Decrease in tension.**

During training or competition muscles remain under tension. Proper cooling down decreases the muscular tension. They tend to relax. Along this mental tension is also reduced upto some extent after performing an appropriate limber/cooling down.

**iv) Reduces the chances of dizziness or fainting.**

The most significant function of appropriate cooling down is to reduce the chances of dizziness or fainting. As a matter of fact, strenuous exercise causes die blood vessels in the legs to expand, bringing more blood into the legs and feet. When exercise is stopped spontaneously without taking time to cool down or limber down, the heart rate slows abruptly and that blood can pool in the lower body (legs and feet), causing dizziness or fainting. The risk is greater for serious athletes, sportspersons, whose heart rates slow down faster and whose veins can hold more blood. Proper cooling down reduces the heart rate slowly and blood does not pool in the legs and feet. It continues to flow back to the heart through veins and consequently such process reduces the chances of dizziness or fainting.

**v) Supply of oxygen.**

During strenuous training, there is a lack in amount of oxygen in comparison to resting position. Appropriate cooling down helps in supplying the blood and oxygen to muscles, restoring them to the position they were in before performing training. Along this, recovery becomes fast.

**vi) Decrease in the level of adrenaline in the blood.**

During warming up and training, the level of adrenaline in the blood is enhanced which increases the speed of blood flow. Proper cooling down decreases the level of adrenaline in the blood which ultimately normalizes the blood flow in the body.

**vii) Muscles do not remain stiff.**

By performing cooling down properly muscles do not remain stiff but get relaxed speedly. Muscle fibres become straight again and muscles come to normal position as they were prior to warming up and training. If proper cooling down is not performed, muscles become stiff.

**viii) Heart rate returns to initial stage.**

Performing cooling down after strenuous workout or competition, heart rate does not return to its initial stage immediately but it definitely takes some time. Infact, the heart rate must come to initial or normal stage approximately after 30 beats. However, the normalization of heart rate depends on the physical condition of the sportsperson and the sports activity in which he was involved. In such condition, the total duration of cooling down should be enhanced and more static stretching exercises should be included in cooling down process.

**1 marks for the first part of the question. 1 marks for writing all the points in one place and 6 marks for explaining all the points.**

**7. Write short notes on any two of the following:**

**[4+4=8]**

- (a) Interval Training      (b) Isotonic exercises      (c) Repetition Method**

**(a) Interval Training**

It is a training of heart, through endurance training. If you run, your heart beats at a faster rate. Bikila, the famous athletic coach of Finland, introduced this training method in 1920. He stressed the importance of rhythm between work and rest in the method, and called it Tarrace Training. He was the greatest coach and athlete of his time. He used to run 400 m race 10 to 20 times daily instead of running 10 to 20 miles daily. Jetopack also used the same pattern to run 60 times 400 m daily. Then this training method became the interval training method. Tonney, the German coach says, "When an athlete runs

at the speed of 80%, his pulse rate will be 150 to 180. In the rest, the pulse rate should come down 120 to 140. This is the best recovery time for speed endurance."

In fact, this training method is based upon "effort and recovery" principle. During interval training, recovery period is given to the athlete after each speedy workout. Recovery period can be adjusted according to the efficiency of athlete. The load can be increased by reducing the recovery period or by increasing the workout. For an athlete of 400 m

following examples can be applicable for his training:

- a) 400 m race with 80% speed.
- b) Walking or jogging until his heart rate comes down to 120 to 140 approximately.
- c) 400 m race with 80% speed.

The repetitions depend upon the experience or capability of an athlete. Recovery period and workout can be adjusted according to the level of athlete.

### **Advantages**

- i) More workout can be performed in short duration.
- ii) It is more beneficial for respiratory and circulatory systems and they can be trained both at the same time.
- iii) The progress of the athlete can be measured easily.
- iv) It gives a better result in a short time. It means an athlete achieves his peak performance in a short time.
- v) Athlete gets fair judgement easily.
- vi) Suggestions can be given by a coach to athlete during recovery phase regarding any fault.
- vii) Patience can be increased in athletes.

### **Disadvantages**

- i) Top performance comes before competition and cannot remain up to the competition
- ii) time.
- iii) There are more chances of injuries.
- iv) Regular training can lead to heart diseases.
- v) It can cause pain. So high motivation is required to perform this training.
- vi) It increases the risk of over training more than most of the exercises.

### **(b) Isotonic exercises**

The exercise in simple terms relates to muscle contractions. Any exercise in which your muscle contracts or there is a strain or tension on the muscle is called isotonic exercise, for example, weightlifting. Ninety per cent of gym workouts are isotonic exercises. The word 'isotonic' is derived from the Greek words 'iso'-which means equal and 'tonus'-which means tone; i.e., the word isotonic implies maintaining equal muscle tone. When you flex your biceps, it is isotonic contraction. It is said that in human beings, apart from the normal movements, like sitting, standing, etc. all other exercises are isotonic. Lifting barbells and other forms of weight training exercises in gymnasiums are the examples of isotonic exercises. In simple words, it can be concluded that isotonic exercises are those exercises in which movements can be seen directly.

### **Types of Isotonic Exercises**

There are following two types of isotonic exercises, based on contraction:

**Concentric Exercises.** Concentric exercises are those exercises in which the tension on the muscle is so high that it shortens. Lifting a weight is a concentric exercise.

**Eccentric Exercises.** In these type of exercises the force exerted is greater than muscle strength, hence the muscle lengthens. Eccentric contractions or exercises greatly improve muscle strength, it can also lead to muscle injury. Lowering of the weight is the best example of eccentric exercise.

### **Advantages**

There are following advantages of isotonic exercises:

- i) These exercises put more strain on a muscle, which it is not used to. These muscle contractions lead to the growth of proteins in each cell of the muscle.
- ii) The exercises are effective for the people who want to gain weight.
- iii) These exercises are extremely beneficial for patients suffering from arthritis.
- iv) These exercises are an important part of physiotherapy and rehabilitation.
- v) They help in improving the coordination and mobilising joints.
- vi) A very important benefit of exercises is having stronger, flexible muscles and stronger bones.
- vii) These exercises are beneficial in toning all muscle groups.
- viii) Apart from improving muscle mass and bone strength, it also helps to enhance metabolism of the body.
- ix) These exercises also help in maintaining body weight.
- x) These exercises help in developing a good physique which improves self-esteem.

### **(c) Repetition Method**

Repetition method is a form of training, similar to interval training, used by runners, swimmers, cyclists and other sportspersons. It differs from interval training in the length of the work interval and the amount of recovery between repetitions. For runners, it comprises of running a given distance in a predetermined time with almost complete rest and recovery in the form of walking after each run.

As a matter of fact, in repetition method, an activity is performed with pauses or intervals of complete recovery. There can be some variations of this method such as competitions and trials, playing or combating at very high intensity but with pauses of complete recovery, speed training and maximum strength training. The intensity of activity remains 90 and 100 per cent. Recovery period may be 3 to 45 minutes. Repetitions may be 1 to 6 per set. The repetitions of short duration at high intensity and with complete recovery, are suitable for the improvement of anaerobic capacity. The endurance athlete use the repetition method for improving specific endurance. The repetition runs of 300m to 400m for 400m, 800m and 1500m runners is a specific example of repetition method.

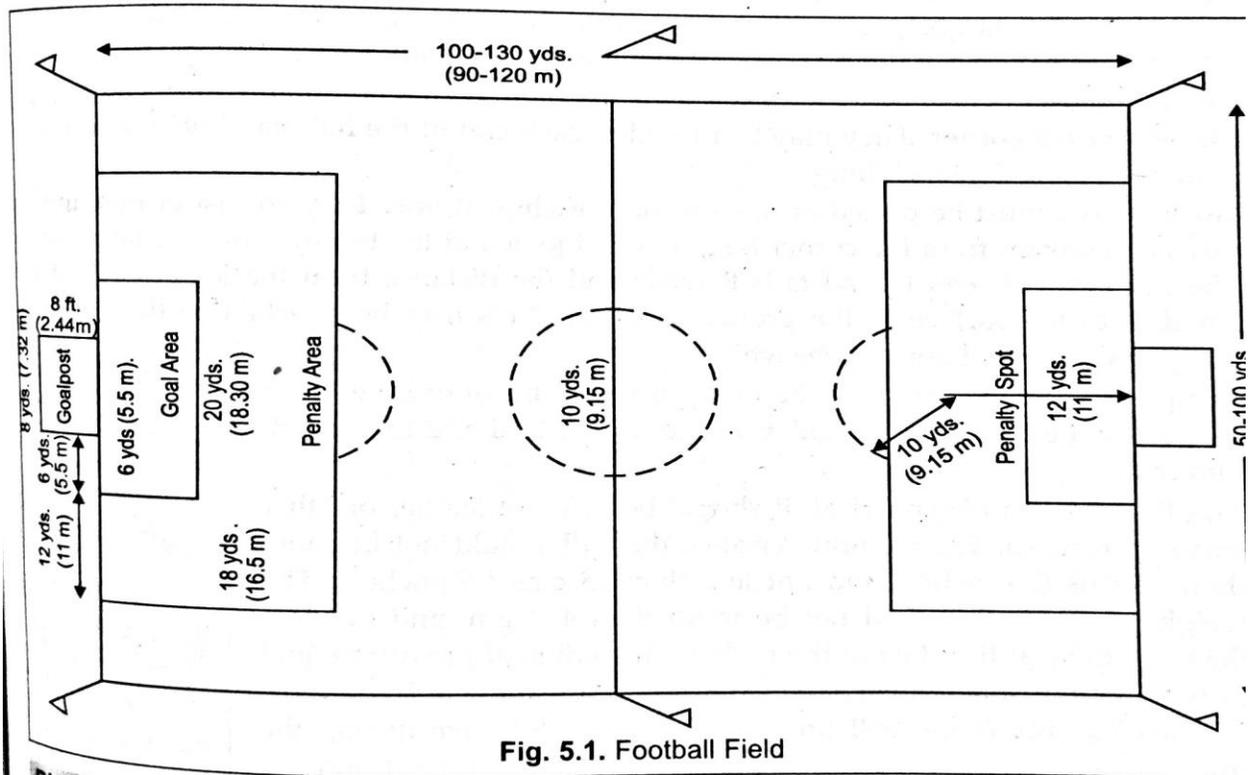
### **Advantages**

- i) This method of training helps in the development of neuro-muscular coordination.
- ii) It also helps in the development of muscle hypertrophy and lactic acid tolerance power.
- iii) It also helps in the improvement of speed abilities, maximum strength and explosive power.
- iv) It is most suitable method for the improvement of anaerobic capacity.
- v) It improves speed and speed endurance. In fact, endurance athletes require speed for the start and final phases of the competition as well as for the intermediate spurts.
- vi) It also improves phosphagen stores.
- vii) It also improves glycolytic processes.

**Content written should be appropriate enough to justify your answer.**

Q1.

a.



**ALL LABELLINGS AND DIMENSIONS ARE TO BE MARKED. IF ONLY OUTER LINING IS CORRECT, GIVE 2/5 MARKS. IF ALL DIMENSIONS ARE NOT MARKED GIVE 3/5 MARKS.**

- b. When the ball passes the touchline, the assistant referee signals a throw-in. In such a case the ball is awarded to a player of the team opposite to the one that caused the ball to go out of the bounds for a throw-in from the point from where the ball went out. Throw in is awarded:
- When the whole of the ball passes over the touch line, either on the ground or in the air.
  - From the point where it crossed the touchline.
  - To the opponents of the player who last touched the ball.

**DEFINITION+ALL THREE POINTS ARE TO BE MENTIONED**

c.

GOAL KICK	CORNER KICK
<p>A goal kick is awarded when:</p> <ol style="list-style-type: none"><li>1. The whole of the ball, having last touched the player of the attacking team, passes over the goal line, either on the ground or in the air and a goal is not scored according to the rule.</li></ol>	<p>A corner kick is awarded when:</p> <p>The whole of the ball, having last touched the player of the defending team, passes over the goal line, either on the ground or in the air, and a goal is not scored according to the goal.</p>
<p>PROCEDURE:</p> <ol style="list-style-type: none"><li>1. The ball is kicked from any point within the goal area by a player of the defending team.</li><li>2. The opponents remain outside the penalty area until the ball is in play.</li></ol>	<p>PROCEDURE:</p> <ol style="list-style-type: none"><li>1. The ball is placed inside the corner arc at the nearest corner flag post by a player of the attacking team,</li><li>2. Opponents remain at least ten yards from the ball until it is in play.</li></ol>
<ol style="list-style-type: none"><li>3. The ball is in play when it is kicked directly beyond the penalty area.</li></ol>	<ol style="list-style-type: none"><li>3. The ball is in play when it is kicked and it moves.</li></ol>

**ALL POINTS TO BE MENTIONED**

d.

1. He enforces the rules of the game.
2. He controls the match in cooperation with two assistant referees.
3. He ensures that the ball meets the requirements of the rule.
4. He ensures that the player's equipment is as per rule.
5. He acts as a time keeper and keeps the record of the match
6. He stops, suspends and terminates the match at his discretion for any infringement of the rules.
7. He allows play to continue until the ball is out of play if a player is, in his opinion, only slightly injured.
8. he punishes the more serious offence when a player commits more than one offence at the same time.
9. He acts on the advice of assistant referees regarding incidents which he has not seen.
10. He restarts the match after it has been stopped.

**ANY FIVE POINTS TO BE WRITTEN.**

e.

1. Kicking
  - In step kick. For execution of in step kick, the non-striking foot should be brought along side of the ball slightly away from it. the ball should be kicked with a relaxed forward swing of the

kicking leg. This is executed after taking a few steps towards the ball. The ball should be contacted with the inside of the kicking foot. At this time the body should be slightly in leaning forward position.

- Outstep kick. this kick is executed with the outside of the upper part of the toe. To do so, a slight twist of the foot to the right or left is required before striking the ball. Rest of the technique is same as described in step kick. This type of kicking is generally used in short distance passes.
- Toe kick. In toe kicking, the toe of the foot is used to strike the ball. Toe kick is used to clear the ball over the long distances. this type of kick is not very accurate because there may be some mistake in its execution.
- Drop kick. Drop kick is performed when the ball just rebounds after falling on the ground. For a drop kick, the ball should be kicked with an in step after judging the point of rebound of the ball and timing the kick perfectly. For executing the drop kick, the judgement of the rebound and timing of the kick are necessary.

## 2. Dribbling

For proper dribbling, a player should use light strokes of his feet to direct the ball in a desired direction. For dribbling, he may use inside or outside of his feet to control the ball. This can be done with one foot or change from one foot to another.

## 3. Heading

Heading is an important skill which is used by players. To head a ball accurately, a player should judge the flight of the ball and wait for the proper time to take jump. When the ball comes near to the player, he should take a proper jump into the air and by bending his body backwards from the waist, he should strike the ball with a foreword swing of his head.

## 4. Tackling

- Block Tackle- For block tackling, a defender should wait for a proper opportunity to strike the ball when it is slightly away from the feet of an opponent. at that time a defender should extend his leg to place his blocking foot and leg in front of the ball to stop it from moving on. At this juncture his body weight should be shifted on the blocking leg. Sachin action will upset the balance of the opponent and will provide an opportunity to the defendant to take the possession of the ball.
- Kicking the ball away- in order to keep the ball away from the opponent, a sliding tackle from the side is used. Such type of tackling is used when an attacker is heading towards the goal. At this moment it is the best thing for the defendant to kick the ball away from the opponent. For executing this type of tackling, the defender should run alongside an opponent and wait for the moment when the ball is slightly away from his feet. The defendant should lunge forward to reach out for the ball before sliding. While sliding, he should stretch out his tackling photo right across the movement of the ball and strike the ball to take it away from the feet of an opponent.

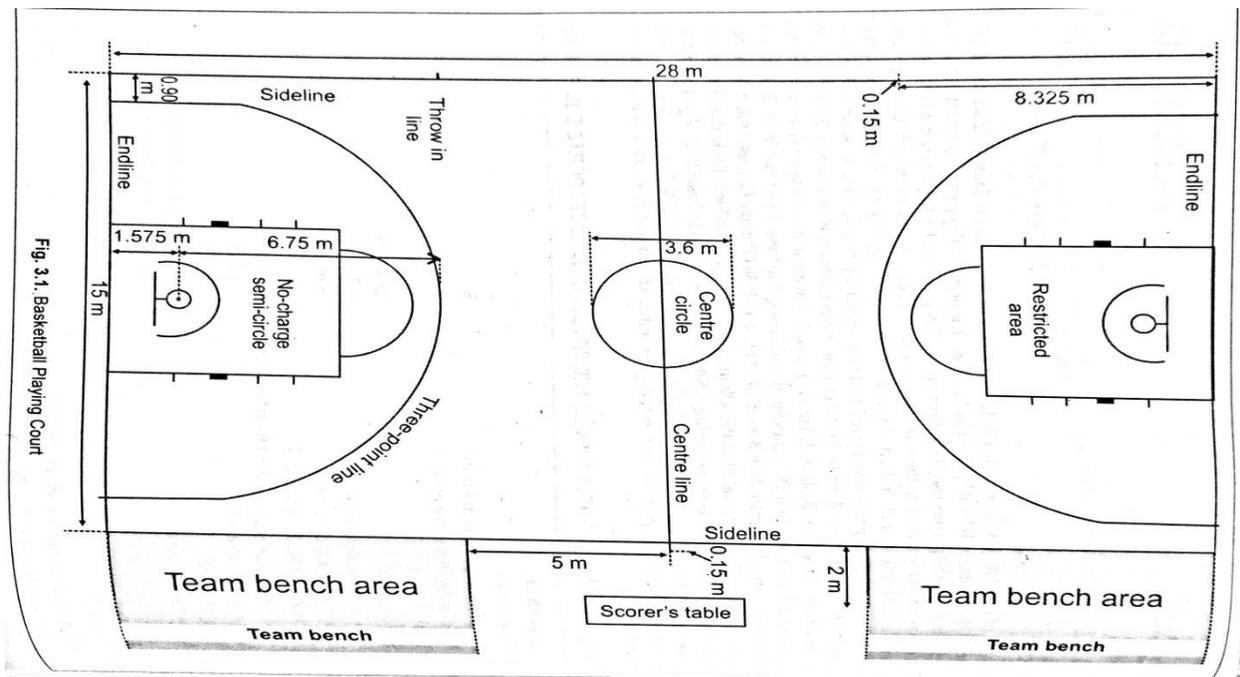
## 5. Passing

- Short pass- Short passes are usually given to the teammate who is very close. in such passes in step or out step kick is given to the ball gently so that team mate may collect the ball easily. Such passes are used to remove pressure of a charging opponent.
- Long pass- Long passes are used to save time and move the ball fast on the field. Such pass should be accurate and there should be good mutual understanding between the teammates.

**ALL POINTS TO BE MENTIONED ALONG WITH AT LEAST TWO LINES EXPLANATION.  
IF ONLY HEADINGS ARE MENTIONED, 2/5 SHOULD BE GIVEN ACCORDINGLY.**

Q2. a.

**ALL LABELLINGS AND DIMENSIONS ARE TO BE MARKED. IF ONLY OUTER LINING IS CORRECT, GIVE 2/5 MARKS. IF ALL DIMENSIONS ARE NOT MARKED GIVE 3/5 MARKS.**



b.

- Teams, by entering the names and numbers of the players who are to start the game and of all substitute to end the game. When there is an infraction of the rules regarding the five players to start the game, substitutions for number of players he shall notify the nearest official as soon as possible.
- Running summary of points scored, by entering the field goals and the free throws made.
- Fouls charged against each player. the scorer must notify and official immediately when a fifth foul is charged against any player. He shall record the fouls charged against each coach and must notify and official immediately when a coach should be disqualified. Similarly, he must notify an official immediately when a player has committed to unsportsman-like fouls and should be disqualified.
- Time-outs. he must notify the officials of the next time out opportunity when a team has requested a time-out and notify the coach through an official when the coach has no more timeouts left in a half or extra period.

- The next alternating possession, by operating the alternating possession arrow.
- Indicate the number of fouls committed by each player by raising, in a manner visible to both coaches, the marker with the number of fouls committed by that player.
- Position the team foul marker on the scorer's table, at the end nearest to the bench of the team in a team foul penalty situation, when the ball becomes live following the fourth team foul in a period.
- Effect substitutions
- Sound his signal only when the ball becomes dead and before the ball becomes live again.

**ANY FIVE POINTS TO BE MENTIONED.**

C.

1. Holding the ball- holding the ball is very significant for passing, throwing, shooting and dribbling in basketball game. So, the ball should be held in hands with fingers red and the thumb tilted in words.
2. Chest pass- For performing chest pass, the ball should be held properly in front of the chest. The arm should be relaxed and elbow should be close to the body. At this juncture the knee should be slightly bent and the body weight should be on the heels of both the feet. The ball should be passed by extending the arms completely. The legs should also be extended at this time.
3. Bounce pass- In bounce pass, the holding of the ball, body position and passing action is approximately the same as in two hand chest passes. however, inbounds pass the ball is thrown in such a way that the ball should bounce at a specific place so that it may bounce up to the waist level of the receiver easily.
4. Baseball pass- In this type of pass, the ball should be taken just behind the head on right or left direction with the support of upper portion of palm and fingers. One foot should be kept in front of the other and the ball should be thrown with the swing with fingers.
5. Pivoting- pivoting means turning the body to either side by using any one leg as a support. In pivoting one foot must be fixed on the floor and the other foot on leg may be moved in any direction.
6. Jump Shot- To set up for the shot hold the ball with your strong hand and stand in triple threat position. Keep your head up looking at the rim and your knees bent. In one motion bring your arm near your forehead so that your strong hand is underneath the ball and your other hand on the side. By now your elbow should be at a right angle. you should start straightening out your ne so that your body rises. Once you get on your tippy toes push off floor and jump. Now you should allow your week hand to leave the ball just before flicking your wrist.
7. Rebounding- Follow the ball with your eyes right after the short and determine where it might go. get into position and make sure you are not too close to the rim and not too far away. Box out your opponent. When the ball bounces off the rim get ready to jump for it. Once it reaches the maximum height at which you can reach, jump with your arms extended. Grab the ball and protect it on your way down.

**ANY FIVE POINTS ALONG WITH EXPLANATION TO BE WRITTEN**



**MARKING SCHEME**  
**SELF ASSESSMENT TEST – 2020**  
**ACCOUNTANCY**

PART I

Question: 1

- a. Bank A/c .....Dr  
To premium of Goodwill A/c  
(Being the amount of premium of goodwill brought in cash) (2)
- b. The items which are not transferred to realisation accounts are:  
Cash, Bank, Profit and loss account (Cr.) Deferred revenue expenditures (Advertisement suspense account) (½X 4 = 2)
- c. On admission of new partner the profit/loss on revaluation is distributed among the old partners and in case of retirement it is distributed among all the partners including the retiring partner (2)
- d. Maximum number of partners in a partnership firm may not exceed 50. It is prescribed by Indian Partnership Act 1932. (2)
- e. Workmen’s compensation Reserves A/c ....Dr 60,000  
To workmen’s compensation claim A/c 40,000  
To X’s capital A/c 10,000  
To y’s capital A/c 10,000 (½X 4 = 2)
- f. It is the interest allowed on partner’s capital contributed to the firm. In case the profit sharing ratio differs from the capital ratio, the provision for interest on capitals compensates those partners who have contributed more capital than the other partner. (2)

**PART II (48 Marks)**

**Answer any four questions**

Q2: (a) Solution:

Profit and Loss Appropriation Account

Particulars	Amount	Particulars	Amount
To interest on capital A/c:		By profit & loss A/c	1,05,000
Ram: (3,00,000 X 5/100 X 6/12): 7500 (½)		(10,35,000 + 15,000) (1)	
Shyam: (2,00,000 X 5/100 X 6/12) : 5000 (½)		By interest on Drawings A/c	
Mohan: (1,50,000 X 5/100 X 6/12): 3750 (½)	16250	Ram: 105 (½)	
To mohan’s salary A/c (½)	15000	Shyam: 135 (½)	
To Ram’s Commission A/c (5% of 10,35,000 + 15,000) (1)	52,500	Mohan: 150 (½)	390
To shyam’s commission A/c (5/105 of 10,35,000 + 15,000) (1)	50000		
To Profit (Transferred to capital ac/)	916640		
Ram’s capital a/c : 3,66,656 (½)			
Shyam’s Capital A/c : 3,66,656 (½)			
Mohan’s Capital A/c : 1,83,328 (½)	1050,390		10,50,390

(B) Average Profit = 75000

Adjusted Average Profit = 75000 + 5000 (undervaluation of stock) = 80,000 (1)

Capital employed = 7,00,000

Normal profit = capital employed X normal rate of return /100 (½)

= 7,00,000 X 7/100 = 49000 (½)

Super profit = Average Profit – Super Profit (½)

$$= 80,000 - 49,000 = 31,000 \quad (\frac{1}{2})$$

$$\text{Goodwill} = \text{super profit} \times \text{no of years' purchased} \quad (\frac{1}{2})$$

$$= 31000 \times 5 = 1,55000 \quad (\frac{1}{2})$$

Question 3: Solution

Revaluation A/c

Particulars	Amount	Particulars	Amount
To land & Building A/c	12000 ( $\frac{1}{2}$ )	By sundry creditors	3000 ( $\frac{1}{2}$ )
		By loss (Transferred to capital A/c)	9000 ( $\frac{1}{2}$ )
		Pihu's Capital A/c – 4500 ( $\frac{1}{2}$ )	
		Geeta's Capital A/c – 3000 ( $\frac{1}{2}$ )	
		Nita's Capital A/c – 1500 ( $\frac{1}{2}$ )	
	12000		12000

Partners' Capital A/c

Particulars	Pihu	Geeta	Nita	Particulars	Pihu	Geeta	Nita
To Revaluation A/c (1)	4500	3000	1500	By Balance B/d (1)	79000	70,000	61,000
To Nita's Capita A/c (Goodwill) (1)	3000	6000		By general Reserve (9000-1200) (1)	3900	2600	1300
To bank A/c (1)			29800	By pihu's capital A/c (1)			3000
To Nita's Loan A/c (1)			40,000	By Geeta's capital A/c (1)			6000
To balance b/d	75400	63600					
	82900	72600	71300		82900	72600	71300

Question 4:

Revaluation A/c (2)

Particulars	Amount	Particulars	amount
To provision for doubtful debts A/c	15000 ( $\frac{1}{2}$ )	By land and building A/c	30,000 ( $\frac{1}{2}$ )
To Profit (Transferred to capital A/c)	40,000 ( $\frac{1}{2}$ )	By Stock A/c	25,000 ( $\frac{1}{2}$ )
Subhash' capital : 24000			
Asha's capital: 16000			
	55000		55000

Partner's capital A/c (6)

Particulars	Subhash	Asha	Tanya	Particulars	Subhash	Asha	Tanya
To advertisement expenditure A/c	30,000( $\frac{1}{2}$ )	20,000( $\frac{1}{2}$ )		By balance b/d	1,50,000( $\frac{1}{2}$ )	1,00,000( $\frac{1}{2}$ )	
To balance c/d	4,02,000	2,68,000	1,50,000	By general reserves A/c	1,80,000( $\frac{1}{2}$ )	1,20,000( $\frac{1}{2}$ )	
				By revaluation A/c	24,000( $\frac{1}{2}$ )	16,000( $\frac{1}{2}$ )	
				By workmen compensation reserves A/c	18,000( $\frac{1}{2}$ )	12,000( $\frac{1}{2}$ )	
				By bank A/c	....	.....	1,50,000
				By premium of goodwill A/c	60,000( $\frac{1}{2}$ )	40,000( $\frac{1}{2}$ )	
	4,32,000	2,88,000	1,50,000		4,32,000	2,88,000	1,50,000

Balance sheet (4)

Liabilities	Amount	Assets	Amount
Creditors	1,00,000	Debtors	2,20,000
Employees' provident fund( $\frac{1}{2}$ )	80,000	Less: provision for doubtful debts:	25000
			1,95,000( $\frac{1}{2}$ )

Workmen compensation claim(½) Capital A/c(½) Subhash: 402,000 Asha: 2,68,000 Tanya: 1,50,000	1,20,000     8,20,000  11,20,000	Stock Bank Land and building Plant and machinery	1,35,000(½) 4,60,000(½) 2,10,000(½) 1,20,000(½)  11,20,000
--	---	---	---

Question 5:

Realisation Account

Particulars	Amount	Particulars	Amount
<b>To Sundry Assets A/c</b>		<b>By sundry liabilities</b>	
Plant : 2,20,000		Creditors - 75000	
Investment: 70,000		Bills payable – 40,000	
Stock: 50,000		Outstanding salary – 35000	150,000
Debtors: 60,000	4,00,000	<b>By bank A/c (Assets Realised):</b>	
<b>To bank A/c (liabilities paid)</b>		Plant : 85000 (½)	
Creditors – 75000 (½)		Stock: 33000 (½)(½)	
Bills payable – 40,000 (½)		Debtors : 47000	
Out standing repairs bill – 7500 (½)		Investment : (70,000X 95/100) 66500 (½)	231500
Contingent liability - 15000 (½)(½)		<b>By loss transferred to ;</b>	
Out standing liability – 35000	1,72,000	Srijan’s capital a/c: 81030 (½)	
To srijan’s capital A/c (½)	11,575	Raman’s capital A/c : 81030 (½)	
		Manan’s capital A/c: 40514 (½)	2,02,575
	584075		584075

Partners capital Account

(4)

Particulars	Srijan	Raman	Manan	Particulars	Srijan	Raman	Manan
To balance b/d			10,000 (½)	By balance B/d	2,00,000	1,50,000	
To realisation A/c	81030	81030	40515	By realisation A/c (½)	11575		
To p/l A/c	32000 (½)	32000 (½)	16000 (½)				
To bank A/c (Final Payment)	98545 (½)	36970 (½)		By bank A/c (½)			66515
	211575	1,50,00	66515		211575	150,000	66515

Bank A/c

(2)

Particulars	Amount	Particulars	amount
To balance B/d	10,000	By realisation	172500
To realisation A/c	231500(½)	By srijan’s capital A/c	98545(½)
To mana’s capital A/c	66515(½)	By raman’s capital A/c	36970(½)
	308015		308015

Question 6: (a)

Statement showing the adjustments

Particulars	X	Y	Z
I. Amount already recorded:			
Interest on capital (Cr.) (1)	50000	100000	150000
Interst on drwings (Dr) (1)	(30000)	(50000)	(80000)
Commission (Cr.) (1)		40000	

Salary (Cr.) (1)	120000		
Share of profit (3,00,000 in the ratio 1:2:3) (Cr.) (1)	50000	100000	150000
	190000	190000	220000
II. share of profit (6,00,000 in 1:1:1) (1)	200000	200000	200000
Difference or net effect	10000	10000	20000
	(cr.)	(Cr.)	(Dr.)

Adjustment journal entry (2)

Z's current A/c.....Dr	20000	
To x's current A/c		10000
To Y's current A/c		10000

(b) calculation of interest on A's Drawings

Date	Amount	Number of months to 31 <sup>st</sup> march	Product
1 <sup>st</sup> april	20000	12	240000
1 <sup>st</sup> June	18000	10	180000
1 <sup>st</sup> November	28000	5	140000
1 <sup>st</sup> December	10000	4	40000
			6,00,000

Interest on A's Drawings:

$$600000 \times 6 / 100 \times 1 / 12 = 3000$$

Calculation of interest on B's capital

$$\text{Total drawings during the year} = 3000 \times 4 = 120000$$

$$120000 \times 6 / 100 \times 7.5 / 12 = 4500$$

(4)

Question 7:

(6X2 = 12)

Date	Particulars	l.f	Dr.	Cr.
	General reserves A/c ....Dr		10000	
	To workmen compensation reserves A/c			2000
	To nimrat capital A/c			5000
	To kriti's capital A/c			2400
	Revaluation A/c ....Dr		40000	
	To stock in trade			20000
	To furniture A/c			18000
	To provision for doubtful debts A/c			2000
	Nimrat's capital A/c		28000	
	Kriti's capital A/c		12000	
	To revaluation a/c			40000
	Bank overdraft A/c....Dr		20000	
	To nimrat's capital A/c			20000
	Cash A/c...Dr		40000	
	To anaya's capital A/c			30000
	To premium of goodwill A/c			10000
	Premium of goodwill A/c		10000	
	To Nimrat's capital A/c			7000
	To kriti's capital A/c			3000

Question 8:

(a)

Date	Particulars	L.f	Dr.	Cr.
	Bank A/c ....Dr To X's capital A/c To Y's Capital A/c To premium of goodwill A/c		110000	40000 (½) 40000 (½) 30000 (½)
	Z's capital A/c....Dr B's capital A/c...Dr To premium of goodwill A/c To X's capital a/c To Y's Capital A/c		12000 (½) 15000 (½) 30000 (½)	45000 (½) 12000 (½)

(b)

Date	Particulars	L.f	Dr.	Cr.
	General Reserve A/c...Dr To vishal's capital A/c To satya's capital A/c		105000	60000 40000 (2)
	Vishal's capital A/c Satya's capital A/c To Profit/loss A/c		12000 9000	21000 (2)

(C) calculation of NPSR:

Old profit sharing ratio of Priyanka and kajal = 7:5

Alia acquires her share as  $\frac{1}{12}$ th from Priyanka and  $\frac{1}{6}$ th from kajal

Her total share =  $\frac{1}{12} + \frac{1}{6} = \frac{3}{12}$

Priyanka's share =  $\frac{7}{12} - \frac{1}{12} = \frac{6}{12}$

Kajal's share =  $\frac{5}{12} - \frac{1}{6} = \frac{3}{12}$

NPSR =  $\frac{6}{12} : \frac{3}{12} : \frac{3}{12} = 2:1:1$

Sacrificing ratio:

Priyanka =  $\frac{7}{12} - \frac{6}{12} = \frac{1}{12}$

Kajal =  $\frac{5}{12} - \frac{3}{12} = \frac{2}{12}$

Sacrificing ratio = 1:2

$\frac{1}{2} \times 8 = 4$  (1/2 marks for every step)

**SECTION B (20 Marks)**  
**Answer any two questions**

Question 9

Cash flow statement for the year ended 31<sup>st</sup> march 2020

Particulars	Amount	Amount
A. Cash flow from operating activities		
Net profit before tax	6,80,000 (1)	
Add: non cash- non operating items		
Goodwill amortised	20000 (½)	
Loss on sale of machinery	48000 (½)	
Depreciation on machinery	278000 (½)	
Interest on debentures	120000 (½)	
Operating profit before working capital changes		1146000
Decrease in current investments	20000 (½)	
Increase in stock in trade	(124000) (½)	

Cash generated from operations		1042000
Less: tax paid		(140000) (½)
Cash flow from operating activities		902000 (½)
<b>B. cash flow from investing activities</b>		
Purchase of machinery	(964000) (½)	
Purchase of non current investment	(50000) (½)	
Proceeds from sale of machinery	72000 (½)	
Cash used in investing activities		(942000)
<b>C. cash flow from financing activities</b>		
Receipts from issue of share capital	200000 (½)	
Redemption of 12% debentures	(100000) (½)	
Payment of interest on debentures	(120000) (½)	
Dividend paid	(80000) (½)	
Increase in bank overdraft	200000 (½)	
Cash flow from financing activities		100000
<b>D. Net increase in cash and cash equivalents(A+B+C)</b>		60000 (½)
Add: opening cash and cash equivalents		120000 (½)
<b>E. Closing cash and bank balances</b>		1,80,000

#### Question 10

(A)

- goodwill written off : no flow
- cash withdrawn from bank : no flow
- bills receivable endorsed to creditors : no flow
- old vehicles written off: no flow 1x4 = 4

(B) the objectives of common size income statement

To analyse change in individual items of statement of p/l account

To study the trend in different items of Revenue and expenditure (2)

(c)

bank overdraft	: financing activities	
Purchases of Marketable securities	: cash and cash equivalents	
Cash paid to creditors	: operating activities	
sale of patents	: investing activities	
issue of share capital	: financing activities	
commission received	: operating activities	(1 x 6 = 6)

#### Question 11.

Particulars	Note no	31 <sup>st</sup> march 2020	31 <sup>st</sup> march 2019	Absolute Change	% Change
<b>I. Income</b>					
Revenue from operations (Net sales)		20,00,000	17,50,000	250000	14.28 (½)
Other income		75,000	50,000	25000	50 (½)
Total (½)		20,75,000	18,00,000	275000	15.2 (½)
<b>II. Expenses</b>					
Purchases of stock in trade		11,60,000	10,00,000	160000	16 (½)
Change in inventories of stock in trade		10,000	(25,000)	(15000)	60 (½)
Employees benefit expenses (wages)		3,00,000	3,00,000	----	---

Depreciation and Amortisation expenses	50,000	50,000	----	---
Other expenses.	90,000	75,000	15000	20 (½)
Total (½)	16,10,000	14,00,000	210000	15 (½)
III. profit before tax (I – II)	4,65,000	4,00,000	65000	16.25 (½)

(B)

Cash flow from operating activities (1/2 marks for the proforma)

Net profit before tax		130000
Increase in out standing expenses:	200 (½)	
Decrease in debtors	10000 (½)	140200
Increase in bills receivable	2500 (½)	
Increase in accrued income	1000 (½)	
Decrease in creditors	5000 (½)	
Decrease in bills payable	15000 (½)	(23500)
Cash flow from operating activities		116700 (½)

**MARKING SCHEME**  
**SELF ASSESSMENT TEST- 2020**  
**ECONOMICS**

**Question 1**

a. Money is **generally acceptable** as a medium of exchange, it is a **measuring unit** and **store of value**, hence it acts as a standard of deferred payments.

**(1+1)**

b. High Powered Money refers to the **currency money with the public** and the **Government and Commercial Banks Deposits with the Reserve Bank of India.**

**(1+1)**

c.

<b>Time Deposit</b>	<b>Demand Deposit</b>
1. It can be withdrawn only after the expiry of a certain fixed time period.	1. It can be withdrawn at any time without notice.
2. It is not withdrawable through cheque.	2. It is withdrawable through cheque.
3. High rate of interest is paid on this deposit.	3. No interest is paid on this deposit.
4. It is less liquid form of assets.	4. It is highly liquid form of assets.

**(any two 1+1=2)**

d. Appreciation refers to an **increase in the value of domestic currency in terms of foreign currency under Flexible Exchange Rate System.**

Example: **1 \$ = ₹ 60 to 1 \$ = ₹ 55** **(1+1)**

e. Zero cross elasticity of demand between two goods imply that **they are not related to each other**, i.e., a **change in the price of one good does not bring about any change in the quantity demanded of the other good.** **(2)**

f. Sometimes the **consumers assume that high priced goods are of higher quality than low priced goods.** In such cases, **more of the goods may be demanded at a higher price.** This is known as Veblen effect. **(1+1)**

g. The cost-saving technical progress **will reduce the cost of production** and **increase the profit margin** thereby, **Increased profitability will induce the producers to produce more and supply more.** **(1+1)**

- h. The effect of change in the price of tea will be as follows;
- **Coffee:** the demand for coffee will increase as tea and coffee are substitutes.
  - **Sugar:** the demand for sugar will fall as tea and sugar are complementary goods. (1+1)

- i. **Less than unitary elastic** **More than unitary elastic**  
 Curve will be parallel to Curve will be parallel to  
**Y-intercept** **X-intercept** (1+1)

- j. Total Utility refers to **total satisfaction** derived by the consumer from the consumption of a specific quantity of a commodity.

$$MU (nth) = TU(n) - TU(n-1) \quad (1+1)$$

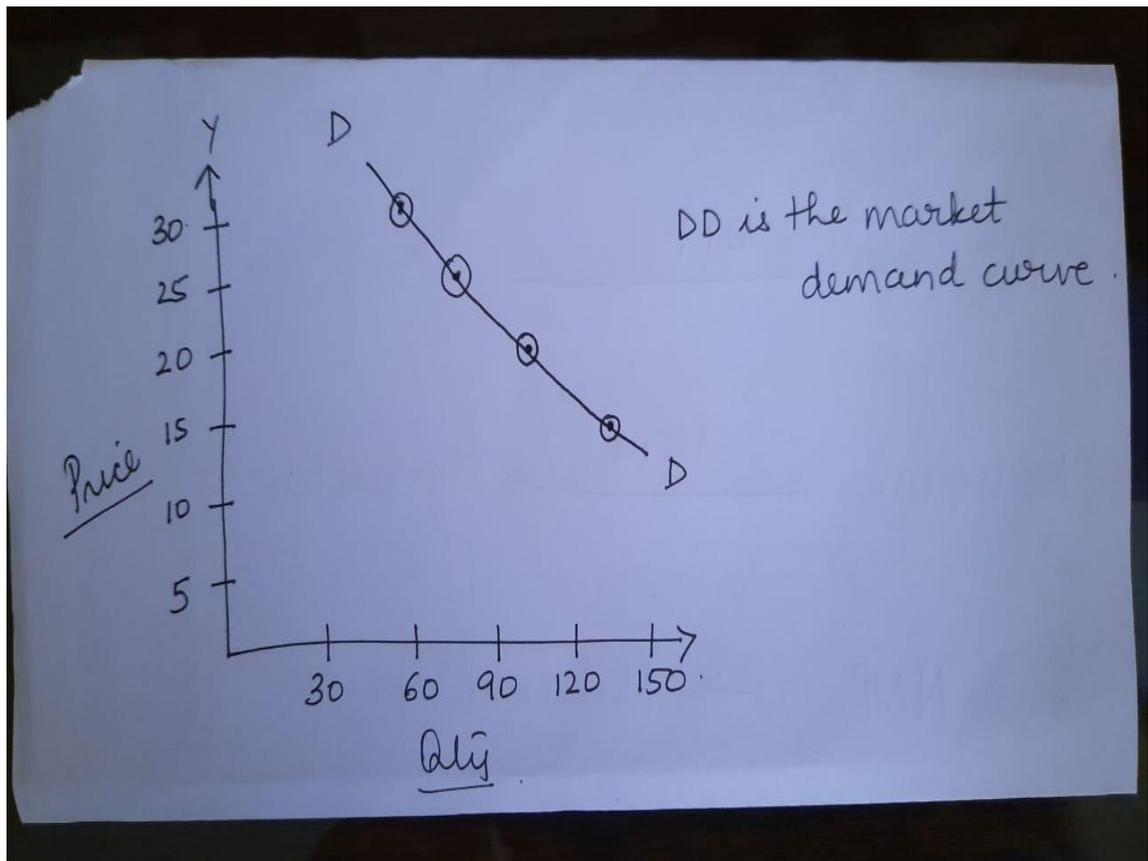
**PART II (60 marks)**

**Answer any five questions (5 x 12 = 60)**

**Question 2**

a.

Price	Quantity demanded by 'A'	Quantity demanded by 'B'	Market Demand
15	50	85	<b><u>135</u></b>
20	45	<b><u>60</u></b>	105
25	<b><u>40</u></b>	45	85
30	35	35	70



(1.5 + 1.5)

- b. Law of Equimarginal Utility states that, “**the utility maximizing consumer must allocate his/her income on various commodities in such a way that the last unit of money spent on each commodity gives him/her same (equal) marginal utility.**”

Suppose, a consumer spends his/her income on the purchase of only 2 commodities. The marginal utility of a rupee spent on commodity X is equal to marginal utility of commodity X divided by price of X ( $MU_x/P_x$ ). Similarly,  $MU_y/P_y$  will indicate the marginal utility per rupee spent on Y.

In other words, the consumer will be in equilibrium while purchasing X and Y, when

$$MU_x/P_x = MU_y/P_y = MU \text{ per unit of money.} \quad (2)$$

Let us illustrate the Law of Equi-marginal Utility by taking a numerical example.

It is assumed that a consumer wants to spend Rs.40/- on the purchase of 2 commodities X & Y, the prices of which are Rs.5/- and Rs.10/- respectively.

Utility Schedule for X and Y:

Units	MU <sub>x</sub>	MU <sub>y</sub>	MU <sub>x</sub> /P <sub>x</sub>	MU <sub>y</sub> /P <sub>y</sub>
1	50	80	10	8
2	45	70	9	7
3	40	60	8	6
4	35	50	7	5
5	30	40	6	4
6	25	30	5	3

From the table, it is clear that  $MU_x/P_x = MU_y/P_y$  at following points:

- A- 3 units of X + 1 unit of Y
- B- 4 units of X + 2 units of Y
- C- 5 units of X + 3 units of Y
- D- 6 units of X + 4 units of Y

Expenditure table for purchasing various combinations of X and Y

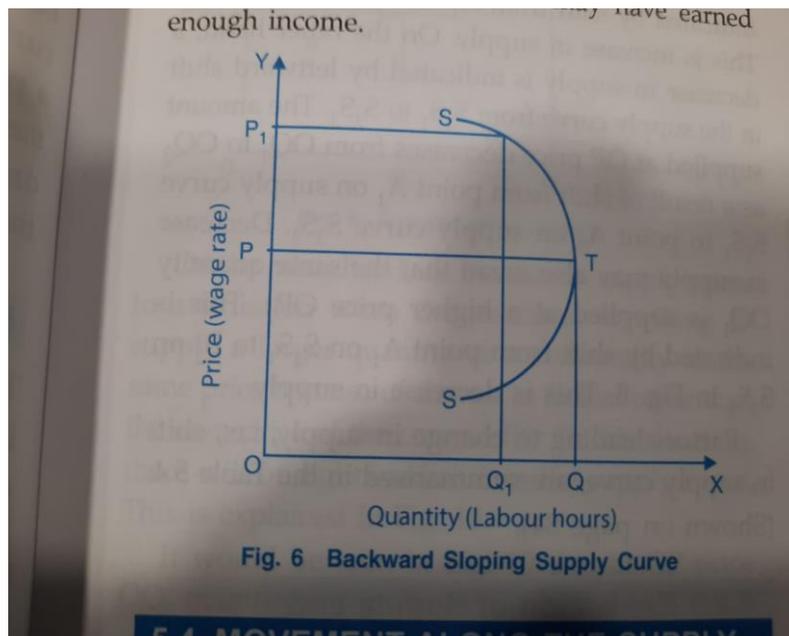
	Combinations	Total Expenditure
A	3 units of X + 1 unit of Y	Rs.25/- (3 *5 +1*10)
B	4 units of X + 2 units of Y	Rs.40/- (4*5 +2*10)
C	5 units of X + 3 units of Y	Rs.55/- (5*5 +3*10)
D	6 units of X + 4 units of Y	Rs.70/- (6*5 + 4*10)

The consumer has Rs.40/- to spend on commodity X and Y. If he/she purchases combination A, then, he/she will spend only Rs.25/-. If he/she purchases combination C or D, he/she will have to spend Rs.55/- or Rs.70/- which are out of his budget. Thus, the consumer will be in equilibrium when he/she buys combination B (4 units of X + 2 units of Y) and thereby spends a total sum of Rs.40/-. Thus, no other combination, apart from combination B, can give the consumer maximum utility when his/her income is RS.40/-. **(4)**

c.

Supply curve has a positive slope. It means higher quantity is offered at higher price and lesser quantity is offered at lower price. In certain cases, a part of supply curve may have a backward slope. This would mean a smaller quantity would be offered at a higher price than at lower price. This type of backward sloping supply curve may occur in case of labour supply (supply being expressed in terms of number of hours worked). As wage rate(price) increases, the worker works for more hours initially so as to earn more income. He prefers labour to leisure. At a very high wage rate, the worker may be willing to work for fewer hours so as to enjoy more leisure.

At a very high wage rate, the worker prefers leisure to work as he may have earned enough income.



(2 + 1)

### Question 3

a. i.) **Existence of substitutes**: If a commodity has many close substitutes, its demand is likely to be elastic. Even a small fall in the price will induce more people to buy this commodity rather than its substitutes. For instance, if price of Pepsi falls, a large number of consumers will switch over from Coke to Pepsi, leading to a large increase in the demand for Pepsi. On the other hand, if a good has no or weak substitutes, the demand for it would be inelastic. The consumers will have to buy it whether the price is high or low. This is the case with milk, sugar and salt which do not have good substitutes. Thus, when the price of milk increases, the quantity demanded will not decrease much. (2)

(ii) **Nature of a commodity**: Nature of the commodity, i.e., whether it is a 'necessity' or a 'luxury' also determines its price elasticity. Demand for necessities like food items is generally inelastic because these goods are essential for existence. They will be purchased in more or less fixed quantities, whether the price is high or low. On the other hand, luxuries are not essential for existence. Their consumption can be postponed.

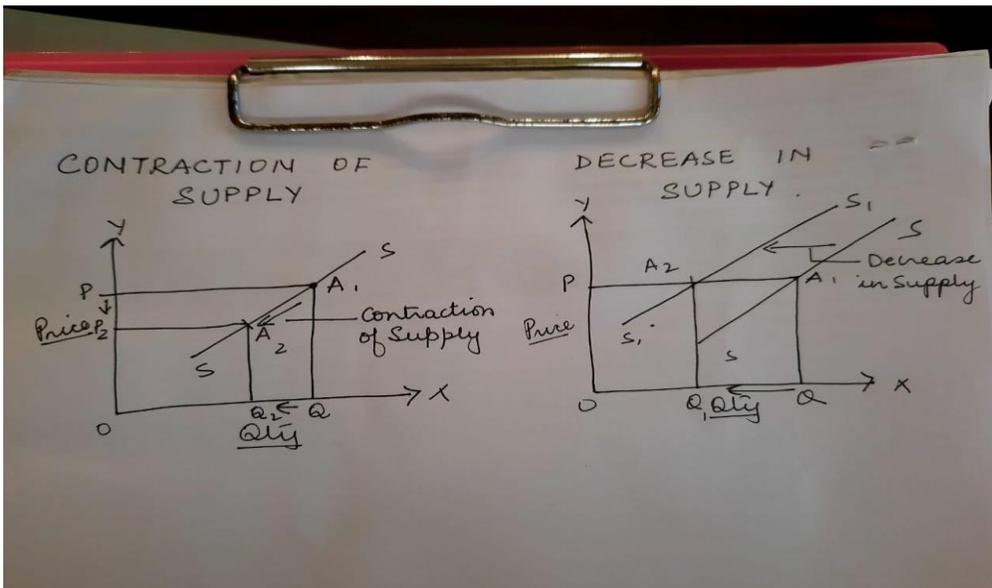
Thus, their demand changes by a large amount due to a small change in their price. For example, a fall in the prices of air conditioners, microwaves, etc. may bring about a large increase in the quantities demanded of these goods. **(2)**

**(iii) Amount of income spent on a commodity:** The smaller the proportion of income spent on a commodity, the smaller will be the elasticity of demand and vice-versa. The demand for salt, newspaper etc., is highly inelastic since the consumer spends a very small proportion of his/her income on them. When the prices of such commodities rise, it will not make much difference in consumer's budget and therefore he/she will continue to buy the same quantity. On the other hand, the demand for clothes, furniture etc., is likely to be elastic since a consumer spends a large proportion of his/her income on buying these goods. A change in their price will bring a considerable change in the consumer's budget and therefore will affect his/her demand to a great extent.

**(2)**

B.

Contraction of Supply	Decrease in Supply
1. It means a fall in the amount supplied at a lower price of the commodity.	It means a smaller amount being supplied at the same price.
2. It is due to fall in the own price of the commodity.	It results from change in the factors other than the own price of the commodity.
3. It involves a downward movement along the same supply curve.	It leads to a leftward shift of the supply curve.



(any 3) (1+1+1)

c.

Total Utility refers to total satisfaction derived by the consumer from the consumption of specific quantity of a commodity.

Marginal Utility refers to the additional utility derived from the consumption of an additional unit of a commodity.

Relationship between Total utility and Marginal Utility:

- When Total utility increases at a decreasing rate, Marginal Utility is decreasing but remains positive.
- When Total Utility is at its maximum, Marginal Utility is zero.
- When Total Utility starts decreasing, Marginal Utility becomes negative.

(1+1+1)

#### Question 4

a. An inverse relationship between the price of the commodity and the quantity demanded of it states that when the price of the commodity increases, quantity demanded falls and when price decreases, quantity demanded rises. This is due to the following reasons:

1. **Law of Diminishing Marginal Utility:** The law states that with an increase in the units of a commodity consumed, every additional unit of the commodity

will give lesser satisfaction to the consumer. A consumer will attain maximum satisfaction when

Marginal Utility of the commodity = Price of the commodity.

From this equilibrium condition, a consumer would purchase a larger quantity of the commodity only when the price of the commodity falls because the consumer knows that marginal utility from additional units will fall.

2. **Income effect**: A change in the demand on account of change in the real income resulting from a change in the price of a commodity is known as the Income effect.

In other words, when the price of the commodity falls, it results in an increase in the real income, i.e., purchasing power of the consumer with the given money income increases. Suppose a consumer spends Rs.200/- on purchase of 2kgs of apples. If the price of apple falls from Rs.100/- per kg to Rs.80/- per kg, the consumer will have to spend only Rs.160/- to buy 2 kgs of apples and will be able to save Rs.40/-. This real income can be utilized to buy more apples. Thus, a fall in the price of the apples causes an increase in real income and thereby increases the quantity demanded of apples.

3. **Substitution effect**: The substitution effect is the effect that a change in relative prices of substitute goods has on the quantity demanded. For instance, if the price of coffee falls, the price of the tea remaining the same, coffee will become relatively cheaper. Consumers will naturally shift from the consumption of tea to coffee. This increase in quantity demanded on account of a commodity becoming relatively cheaper is known as substitution effect. Thus, when the price of a commodity falls and the price of its substitute remains unchanged, the commodity becomes relatively cheaper than its substitute and its quantity demanded increases.

4. **Increase in number of consumers**: A fall in the price of the commodity leads to an increase in the quantity demanded by the existing consumers. At the same time, new consumers also start purchasing the commodity. At still lower prices, poor people will also be able to purchase that commodity. Thus, when the price of the commodity falls, the number of consumer increases and this leads to increase in the quantity demanded of the commodity.

5. **Several uses of a commodity:** There are some commodities like milk, steel, electricity etc., which can be put to multiple uses. Some of these uses are more important while some are less important. When the prices of such commodities are high, they will be used only for more important uses and thus will be demanded less. On the other hand, when the prices of such commodities fall, they will be used for less important uses also and therefore will be demanded more. For example, electricity will be used only for lighting purposes when it is expensive and will be used for cooking also when its price falls. **(6)**

b.  $P_1 = 4$        $P_2 = 6$

$Q_1 = 40$        $Q_2 = ?$

Price elasticity (ep) = 0.5 (will be taken as -0.5 as price elasticity is a negative figure mathematically)

$$E_p = \frac{(\Delta) Q}{(\Delta) P} \times \frac{P}{Q}$$

$$-0.5 = \frac{x-40}{2} \times \frac{4}{40}$$

$$-0.5 = \frac{x-40}{2}$$

$$\dots\dots\dots$$

$$20$$

$$-0.5 \times 20 = x-40$$

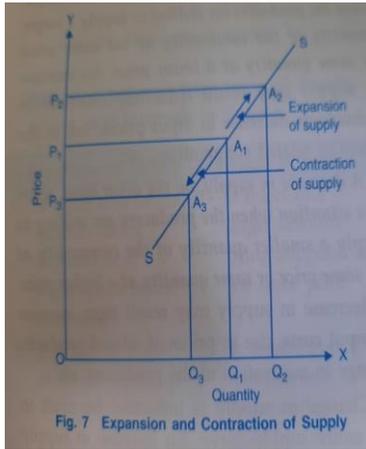
$$-10 = x-40$$

$$-10+40 = x$$

$$30 = x$$

**(3)**

c. When the quantity supplied changes as a result of change in the price of the commodity, all other factors remaining constant, it causes a movement along the supply curve. The movement along the supply curve can be an upward movement and downward movement. This can be explained with the help of the following graph:



From the above figure it is clear that when the price is  $P_1$ , quantity supplied is  $Q_1$ . When the price increases to  $P_2$ , quantity supplied also rises and becomes  $Q_2$ . This is indicated by an upward movement from point  $A_1$  to point  $A_2$ . This upward movement is known as Expansion of supply.

When price falls to  $P_3$ , quantity supplied also falls to  $Q_3$ . This is indicated by a downward movement from point  $A_1$  to point  $A_3$ . This downward movement is known as Contraction of supply. **(3)**

#### Question 5

Pens (units)	1	2	3	4	5
MU	25	20	15	10	5

a. The law underlying the above schedule is Law of Diminishing Marginal Utility.

**(1)**

Statement of the Law: The law states that as the amount consumed of a commodity increases, other things being equal, the utility derived by the consumer from the additional units, i.e., marginal utility goes on decreasing.

**(2)**

#### Assumptions:

- All the units of the commodity must be identical.
- The unit of the good must be standard. The units of the commodity should not be too large or too small.
- There should be no change in the taste during the process of consumption.
- There must be continuity in the consumption and if a break is necessary, the time interval between the consumption of two units must be short.
- There should be no change in the prices of substitute goods.
- The utility should be measurable.
- The consumer is rational while taking consumption decisions.

- Marginal utility of money is assumed to be constant. (2)

The above schedule clearly shows that as the consumption of pen increases, the utility derived by the consumer from every additional pen goes on decreasing. In other words, marginal utility of every additional pen goes on decreasing.

Thus, the generalization of human behavior regarding diminishing marginal utility is so certain that the law is applicable universally. (1)

b.

**i.) Depreciation & Devaluation:** Depreciation refers to a **fall in the value of the domestic currency in terms of foreign currency under Flexible Exchange Rate System.**

Devaluation refers to a **fall in the value of domestic currency in terms of foreign currency under Fixed Exchange Rate System.**

**1 \$ = ₹ 60                      to                      1 \$ = ₹ 65**

Both depreciation and Devaluation causes **fall in Exchange Rate making exports cheaper and imports costlier.** As a result, exports will increase and imports will decrease, thereby helping in correcting the adverse Balance of Payment. (1+1)

**ii.) Export Promotion:** The Government undertakes following measures for export promotion because increase in exports enables the Government to correct the disequilibrium in Balance of Payment. These measures are as follows:

- The Government may reduce export duties.
- The Government may provide cash assistance and subsidies to the exporters.
- Exportable goods shall be exempted from taxes.
- Export-oriented industries should be encouraged by providing them loans at concessional rates, tax benefits, subsidized raw materials so that exports become cheaper.
- Foreign tourism shall be encouraged to increase foreign exchange earnings.

**(any two, 0.5 x 2 = 1)**

c.

**i.) Bank Rate:** Bank Rate refers to the rate at which the Central Bank gives loans to the Commercial Banks and re-discounts the approved first-class bills of exchange and government securities held by the commercial banks.

During inflation, the Central Bank increases the bank rate, consequently the market rate also increases. So, taking loans from commercial banks becomes expensive. This discourages people to take loans thus controlling the amount of Credit Creation.

During deflation, the Central Bank decreases the bank rate, consequently the market rate also decreases. So, taking loans from commercial banks becomes cheaper. This will encourage people to take more loans thus more Credit Creation.

(1)

ii.) **Cash Reserve Ratio:** Cash Reserve Ratio (CRR) refers to that percentage of total deposits of a commercial bank which it has to keep with The Reserve Bank of India in the form of cash reserves.

During inflation, the Central Bank increases the CRR, and hence the commercial banks have to deposit more money with RBI so they will be left with less reserves and will be giving less loans, so less credit creation.

During deflation, the Central Bank decreases the CRR, and hence the commercial banks have to deposit less money with RBI, so they will be left with more reserves and will be giving more loans, so more credit creation.

(1)

iii.) **Open Market Operations:** It refers to the sale and purchase of government and other approved securities by the Central Bank in the money market and capital market.

During inflation, the Central Bank sells the securities. The buyers of the securities withdraw their deposits from the commercial banks to purchase the securities. Thus, the total primary deposits with the commercial banks decreases and hence their ability to advance loans also decreases. So, credit creation decreases.

During recession, the Central Bank purchases the securities which increases the flow of money into the commercial banks. This increases the cash holdings of commercial banks and hence they are able to give more loans, so credit creation increases.

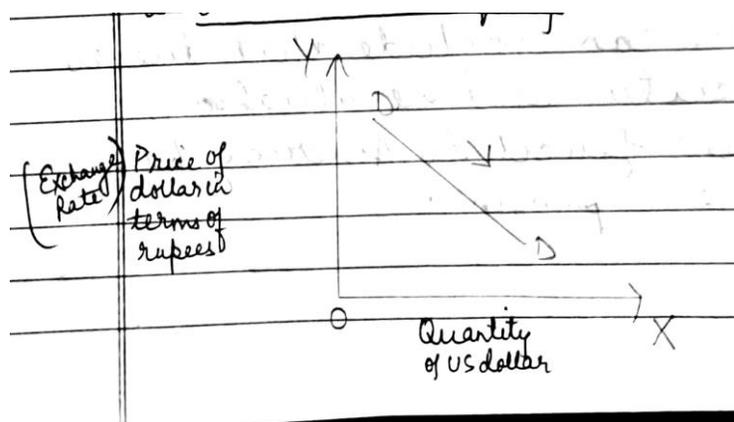
(1)

## **Question 6**

- a. Flexible rate of Exchange is determined by the forces of demand and supply of domestic currency in the foreign exchange market.

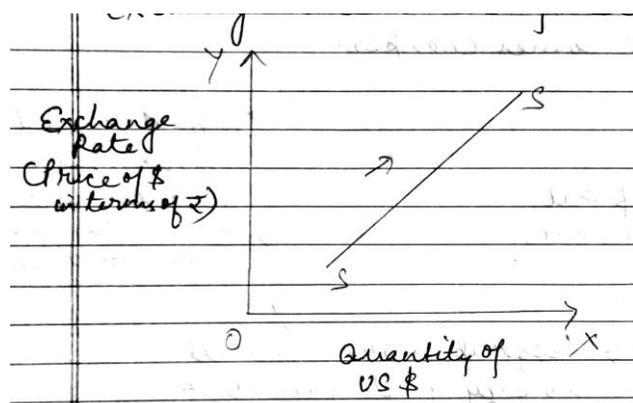
**Demand for Foreign Exchange:**

Demand for foreign exchange is inversely related to its exchange rate so the demand curve of foreign exchange is downward sloping.

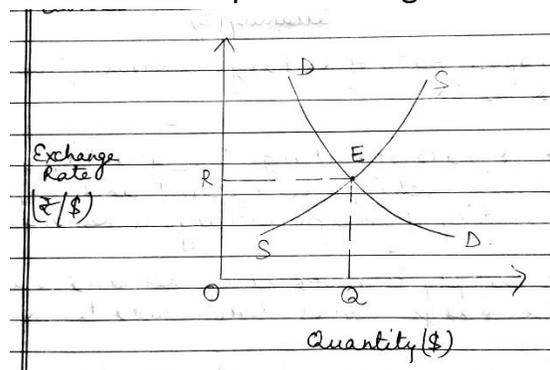


When foreign exchange rate falls or appreciates, import of goods and services from that country becomes cheaper. **(1)**

**Supply of Foreign Exchange:** Supply of foreign exchange and rate of exchange are directly related.



With the rise in rate of exchange, supply of foreign exchange increases and vice-versa. Rise in foreign exchange or depreciation makes goods of domestic countries cheaper to foreigners. **(1)**

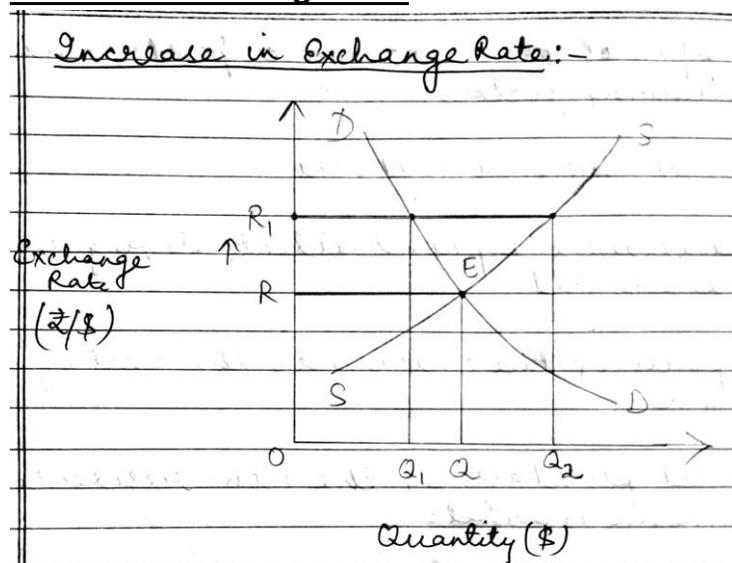


In the above diagram DD is the demand curve. SS is the supply curve. E is the equilibrium point where supply and demand for foreign currency is equal. OR is

the equilibrium rate of exchange.  $OQ$  is the equilibrium amount of foreign currency demanded and supplied. **(1)**

Let us discuss how equilibrium is determined in case of increase and decrease in exchange rate.

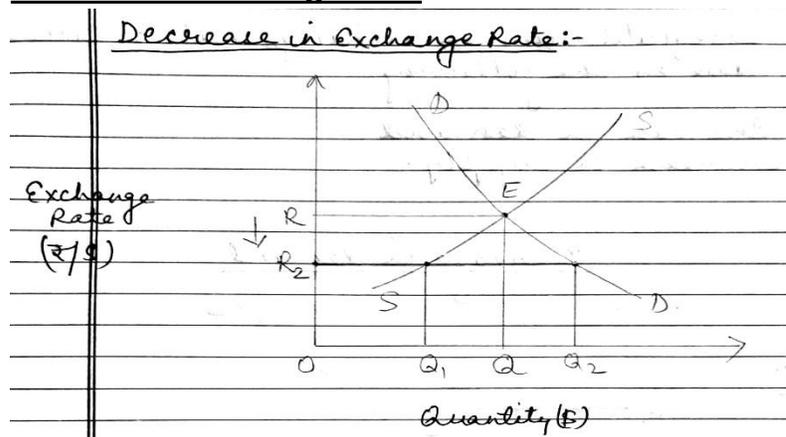
**Increase in Exchange Rate:**



Suppose, rate of exchange increases from  $OR$  to  $OR_1$ . At  $OR_1$  rate of exchange  $OQ_2$  quantity of foreign exchange is supplied and  $OQ_1$  quantity of foreign exchange is demanded. As supply is more than demand, rate of exchange moves downward to  $OR$ . Thus, automatically equilibrium of exchange rate is regained.

**(1.5)**

**Decrease in Exchange Rate:**



Suppose, rate of exchange decreases from  $OR$  to  $OR_2$ . At  $OR_2$  rate of exchange,  $OQ_1$  quantity of foreign exchange is supplied and  $OQ_2$  quantity of foreign exchange is demanded. As demand is more than the supply, rate of exchange moves towards  $OR$ . Thus, equilibrium of exchange rate is automatically regained. **(1.5)**

- b. Based upon the income of the consumer, there are 3 types of goods:
- (i) **Normal goods**: Normal goods are those goods the demand for which increases with the increase in the income of the consumer and decreases with the fall in the income of the consumer. As a matter of fact, articles of comforts and luxuries belong to this category of goods. **(1)**
  - (ii) **Inferior goods**: Inferior goods are those goods the demand for which falls with the increase in the income of the consumer. For example, coarse cereals and coarse cloth are inferior goods. Consumers will purchase more of these goods at lower levels of income. However, once a certain level of income is achieved, further increase in the income is accompanied by a fall in the demands for these goods as the consumer shifts to superior goods. **(1)**
  - (iii) **Inexpensive necessities**: In case of inexpensive necessities of life, such as salt and matchbox, the quantity purchased increases with the increase in income up to a certain level and thereafter it remains constant irrespective of the level of income. **(1)**
- c. One of the properties of indifference curve is that it is convex to the origin. In other words, the slope of the indifference curve decreases as we move down the indifference curve. This follows from the assumption of diminishing marginal rate of substitution. This assumption implies that lesser is the amount of one commodity consumed by a household, the lesser willing the household will be to give up a unit of that commodity to obtain an additional unit of another commodity. The consumer gives more significance to a unit of a commodity the amount of which is decreasing and therefore is less willing to sacrifice that commodity with other commodity. Thus, the slope of the indifference curve must be decreasing from left to right implying diminishing marginal rate of substitution. In other words, an indifference curve must be convex to the origin. **(3)**

**Question 7:**

- a. **Credit Creation** is a process of **multiplication of bank deposits** through **expansion of loans and advances**. Commercial Banks can bring about a change in the total money supply through the process of credit creation.

**Bank deposits form the basis for credit creation.** These deposits are as follows:

- **Primary Deposits**: Banks accept cash from the customer and opens a deposit account in his name. This is primary deposit which forms the basis of credit creation.
- **Secondary/Derivative Deposits**: Commercial Banks grant loans and advances to the public. But instead of giving cash to the borrower, the bank opens a loan account in the name of the borrower and credits the loan amount into that account. The borrower can withdraw the required amount by cheque. These deposits are derivative deposits. Creation of these deposits means credit creation.

The bank's credit creation process is based on the assumption that not all of the customers would turn up for withdrawal of cash from the banks at the same time.

Out of the total primary deposits, banks keep a fraction with the Reserve Bank of India as **Cash Reserve Ratio** and some portion for **meeting the cash demand of the depositors**. The **excess reserves (ER)** are then used for advancing loans and credit creation. Every bank loan creates an equivalent deposit in the bank. Therefore, credit creation means expansion of bank deposits. **(2)**

Let us now understand the mechanism of credit creation with the help of an example:

Suppose Punjab National Bank receives a cash deposit of ₹1000. Given the Cash Reserve Ratio ₹200 in reserves and lends ₹800 to a borrower Mr. Ram. The bank does not lend the borrower in cash but opens a loan account in his name and credits his loan account by ₹800, which is called derivative deposit.

The Balance Sheet of Punjab National Bank will be as follows:

Liabilities	Amount (₹)	Assets	Amount (₹)
Primary Deposit	1000	Cash	1000
Derivative Deposit	800	Loans (given)	800
	1800		1800

Suppose the borrower, Mr. Ram pays a cheque of ₹800 to Mr. Shyam who has an account with Canara Bank. Then Canara Bank receives ₹800 as primary deposit and keeps 20% of it (₹160) as cash reserves. The excess reserves of  $(800-160) = ₹640$  is given as loan to Mohan.

The Balance Sheet of Canara Bank will be as follows:

Liabilities	Amount (₹)	Assets	Amount (₹)
Primary Deposit	800	Cash	800
Derivative Deposit	640	Loans (given)	640
	1440		1440

Suppose Mohan pays a cheque of ₹640 to Sohan to meet his business obligations. Sohan has an account with The Bank of Maharashtra and hence it deposits ₹640 in his bank. The bank keeps 20% of ₹640 = ₹128 as reserves and the remaining (640-128) = ₹512 is given as loan to Gaurav.

The Balance Sheet of Bank of Maharashtra will be as follows:

Liabilities	Amount (₹)	Assets	Amount (₹)
Primary Deposit	640	Cash	640
Derivative Deposit	512	Loans (given)	512
	1152		1152

Thus, this process repeats itself till the lending amount becomes negligible to be given as loans. From the above example, we can conclude that initial deposit of ₹1000 leads to a creation of more money in every stage when loans are given.

$$₹ 1000 + ₹ 800 + ₹ 640 + \dots \quad (3)$$

The potential of the banks to create derivative demand deposits through loans is determined by the credit multiplier which is denoted by m.

$$m = 1 / \text{CRR}$$

$$m \text{ in this example} = 1 / 20\% = 1 \times (100 / 20) = 5$$

In the above example, the credit expansion ( $\Delta D$ ) is five times the initial excess reserves (ER) of ₹ 800. Thus, the total magnitude of credit creation is  $5 \times 800 = ₹ 4000/-$

$$\begin{aligned} \Delta D &= m \times \text{ER} \\ &= 5 \times ₹ 800 \\ &= ₹ 4000 \end{aligned}$$

(1)

b. Given:

$$\text{CRR} = 5\%$$

$$\text{Total Deposits } (\Delta D) = ₹ 30,000$$

$$m = 1/\text{CRR} = 1/5\% = 1 \times (100/5) = 20 \quad (1)$$

$$\text{Initial Deposit (ER)} = ?$$

$$\Delta D = m \times \text{ER}$$

$$\text{ER} = \Delta D/m$$

$$= 30,000/20$$

$$= ₹ 1500 \quad (1)$$

Money multiplier refers to the ratio of deposits to reserves in the banking system. It is the reciprocal of Cash Reserve Ratio. It is denoted by letter 'm', whereby  $m = 1/\text{CRR}$  (1)

c. Dis-equilibrium in Balance of Payment arises when there is either **surplus** or **deficit** in Balance of Payment. Deficit is **Unfavourable BOP** when the payments exceeds receipts of a country. Surplus is the **Favourable BOP** when the receipts exceeds the payments of a country.

(1)

**Causes of Dis-equilibrium in Balance of Payment:**

- **Fall in Foreign Demand:** A deficit in BOP may arise when there is a fall in the foreign demand for the domestically produced goods. This may be due to:
  - i. A change in the taste and fashion of the foreign consumers.
  - ii. The prices of the goods produced by other countries are lower.
  - iii. A fall in the income level of people in the foreign country.

The above factors may lead to a drastic decline in the exports of the domestic country. This will reduce revenue and cause deficit in BOP.

- **Inflationary Pressure in the economy:** A high rate of inflation in the home country encourages imports as they become relatively cheaper. On the other hand, it leads to decrease in the country's competitiveness in the world market as its goods become expensive and hence the exports fall, leading to reduced earnings and deficit in BOP.

- **Developmental Expenditure**: In the initial stages of development, the developing countries indulge themselves in developmental efforts. So, they are dependent on the developed countries for importing technical know-how, machinery, raw materials etc. This increases their import bill. Moreover, these countries are not in the position to step-up or increase their exports to finance their increased import bill. Due to this the receipts decreases and payments increases causing deficit in BOP.
- **Increase in Cost Structure of Export Industries**: Increase in cost structure of domestic goods increases the price of such goods making them expensive in the world market. Therefore, the domestic country loses competitiveness. This cost structure increases due to increase in wages, price of raw materials and high rate of inflation. Therefore, the exports in the domestic country reduces leading to reduced earnings which causes deficit in BOP.
- **Decrease in Supply**: There are various factors that causes a decrease in the supply of domestic goods. These are as follows:
  - i. Failure of crops leading to fall in agricultural production.
  - ii. Labour strike, shortage of raw materials, causes fall in industrial production.

Therefore, the domestic country is not in a position to export goods due to fall in production or shortage of goods. This leads to fall in exports and increase in imports causing deficit in BOP.

- **Appreciation in Exchange Rate**: Exchange Rate refers to the rate at which the currencies of different countries are traded. Appreciation in the value of the domestic currency against foreign currency makes exports expensive and imports cheaper. This leads to increase in imports and decrease in exports which causes deficit in BOP.
- **Demonstration Effect**: People of developing countries imitate the consumption pattern of the developed countries particularly with regards to luxury goods like cars etc. This leads to increase in imports of consumer durable goods leading to deficit in BOP.
- **Population Pressure**: A rapid increase in population increases the demand for consumer goods. Therefore, exports get reduced because the developing countries themselves are huge in population to meet the needs of the rising population. Sometimes, the domestic demand

is left unsatisfied so there is increase in imports. This causes adverse effect on BOP.

- **Political Factors:** Political instability may lead to large capital outflows and reduce the inflows of foreign funds, thus, creating dis-equilibrium in the BOP. Frequent changes in the Government policies discourage inflows of capital. This leads to deficit due to higher outflows than inflows. **(any 2= 2 marks)**

### Question 8:

- a. The Balance of Payment is a **systematic record or statement** of all **monetary and economic transactions** made **between a country and the rest of the world** within a **definite period**. These records include transactions made by individuals, companies and the government. **(2)**

The transactions recorded in the Current Account of Balance of Payment are as follows:

- i.) **Export of visible items** recorded in the credit side and **import of visible items** in the debit side.
  - ii.) **Export of invisible items** recorded in the credit side and **import of invisible items** in the debit side.
  - iii.) **Unilateral Transfer Receipts** (Receipts from abroad, gifts, donations) recorded in the credit side and **Unilateral Transfer Payments** (Gifts and donations given, payments made to abroad) recorded in the debit side.
  - iv.) **Income receipts** (Income from investments, interest, dividend and profits) recorded in the credit side and **Income Payments** (Payments for interest, dividend and profits) recorded in the debit side. **(4)**
- b.
- i.) **Fiat Money:** Inconvertible Paper Money that is issued on the order of the Government and is called the Legal Tender Money. **(1)**
  - ii.) **Deposit Money:** Money that is deposited into the Commercial Banks as Savings, Current, Recurring and Fixed Deposit Accounts are known as deposit money. **(1)**
  - iii.) **Token Money:** Money whose face value is more than the intrinsic value is called token money. Examples- Coins, Paper Notes. **(1)**

c. Following are the functions of the Reserve Bank of India:

i.) **Banker to the Government**: As a banker to the Government, The Central Bank performs the following functions:

- It receives deposits from the Government and collects cheques and drafts deposited in the government account.
- It makes purchases and sales of government securities.
- It provides cash to the government as required for payment of salaries and wages to their staff and other cash disbursements.
- It makes payments on behalf of the government.
- It also advances short-term loans to the government to meet deficit in its budget.
- It supplies foreign exchange to the government for repaying external debt.

**(any 3, 0.5 x 1 = 1.5)**

ii.) **Issue of Currency Notes**: The Central Bank enjoys the **monopoly right** of issuing currency. The currency issued by the Central Bank is called legal tender money.

**(0.5)**

The Central Bank has to follow certain principles before issuing the currency:

- There is uniformity in the notes issued and hence it reduces the chances of counterfeit money.
- It enables the Central Bank to have supervision and effective control over the money supply in the economy.
- It instills public faith and confidence in the currency system.
- It enables the Central Bank to exercise the control over the creation of credit by the Commercial Banks.

**(any 2, 0.5 x 2 = 1)**

**MARKING SCHEME**  
**SELF ASSESSMENT TEST – 2020**  
**COMMERCE**

Question 1:

1. According to classical concept: “Management is what management does. It is the task of planning, executing and controlling.”

According to Productivity concept: “ Management is the art of knowing exactly what you want people to do and seeing that they do it in the best and cheapest way”

(Any one – 2)

2. Unity of command: According to this principle an employee should **receive orders from one superior** only and be accountable to him. If a subordinate has more than one boss, **dual command will undermine authority, weaken discipline, divide loyalty and create confusion.**

(2)

3. The various dimensions of Macro Business Environment are:

- a) Economic environment
- b) Social environment
- c) Technological environment
- d) Political environment
- e) Legal environment.

(2)

4. PODSCORB: it stands for the initials of the functions – Planning, Organising, Directing, Staffing, Coordination , Reporting and Budgeting.

(2)

5. A proper environmental understanding and awareness can help business managers to recognize various threats on time and serve as a warning signal.

The manager will be able to handle the threat proactively well ahead of competitor and can adopt various measures like improving the quality of their product, identifying areas where cost of production can be reduced, engage in aggressive advertisement, publicity and sales promotion

(2)

6. Branding may be defined as the process of giving a **distinctive brand name** to a product with the purpose of **differentiating it from competitive products.**

(2)

7. a) District Forum.

b) State Commission

c) National Commission.

(2)

8. Physical Distribution: It is concerned with **making goods available at the right place and time** so that people can purchase the same. It includes all the activities involved in **handling and physical movement of goods from manufacturer to consumers.** (2)

9. a) Right to safety

b) Right to be informed

c) Right to choose

d) Right to be heard

e) Right to seek redressal

- f) Right to healthy environment. (2)
10. As a discipline, management implies a **specialised branch of knowledge** which involves the study of **principles and practices of administration**. It refers to the systematised body of knowledge and separate fields of study. (2)

## PART II

### Question 2:

- (a) As an activity, management means the art of getting things done through the efforts of other people. **According to B.O. Wheeler, "Business management is a human activity which directs and controls the organisation and operations of business enterprises.** Management is centred in the administrators or managers of the firm who **integrates men, material and money into an effective operating unit"**. (3)
- (b) Scalar chain refers to the **chain of superiors ranging from the ultimate authority (top) to the lowest rank (bottom)**. Normally, the prescribed **chain of command should be followed** and **communications should flow through the established chain of command.** (4)
- (c) Consumers have a number of right. At the same time, they have some responsibilities also to protect their interests. There can't be any rights without responsibilities. Following are the main responsibilities on the part of the consumers:
- Consumer Awareness: Before the purchase, the consumers must check the quantity, product information on the packet/label, date of manufacture, expiry date or best before date and Maximum retail price. Consumer must discourage malpractices like hoarding, black marketing, etc.
  - Quality conscious: While making purchases, the consumers should be cautious and look for various quality certification marks like AGMARK on food products, HALLMARK on jewellery, etc.
  - Cash Memo: The consumers must insist on cash memo as it acts as a proof of purchase and sellers must issue cash memo even if the buyer does not ask for it. It will serve as a vital document in case of seeking redressal and claiming compensation.
  - File complaint: Consumers must not ignore the deception of the trader. Complain must be made on plain paper or through electronic mode., with the sample, cash memo, and other valid evidences to the appropriate authority. The complaint filed must be for redressal of genuine grievances only.
  - Consumer Associations: Consumers must form voluntary associations to educate and awaken the other consumers. They can take organized actions and pressurize traders or businessmen to adopt fair trade practices.
  - Proper use of product: It is observed that during the guarantee or warranty period, consumers recklessly use the product thinking that the product will be replaced or repaired. This practice must be avoided. (any 5points 1x5 = 5)

### Question 3:

- A. Factors determining price:
- Objective of the firm.
  - Cost of the product
  - Customer demand
  - Competition in the market
  - Quality and service
  - Buying motives
  - Promotional strategy
  - Risks
  - Government control (Any 6)  $\frac{1}{2} \times 6 = 3$
- B. Some of the internal factors that influence the business organization are as follows:
- Corporate culture: An organization is always based on some ideologies, beliefs and values. Such values, beliefs and attitudes must be shared with people connected with the enterprise in order to achieve success.
  - Corporate Image: The image of a company plays a vital role in many issues raising of business finance, forming tie ups with other enterprises or strategic alliances, exploring foreign markets, selecting suppliers, etc.
  - Human resources: Some attributes of the employees like dedication, sincerity, loyalty, punctuality with competence are vital for the success of an enterprise. Human resources must be handled with care and they must be given respect. Harmonious employer-employee relationships prevent resistance from the subordinates and bring a congenial working environment (1x4 = 4)
- C. Marketing Mix refers to the combination of four basic elements which constitutes the core of a company's marketing system. The elements of marketing mix are
- Product mix:** involves planning, developing and producing the right type of products and services to be marketed by the firm.
  - Price mix:** Price mix refers to the decisions relating to the strategy, policy and method of pricing.
  - Promotion:** deals with informing and persuading the customers, regarding the firm's products.
  - Physical distribution:** includes all those activities in moving products or services from producer to consumer. (1mark for definition and +4 for points = 5)

### Question 4:

- A. Major aspects of economic environment are:
- Economic system: The role of public and private sectors in the existing structure of the economy.
  - Various rates: Interest rates, inflation rates, employment rates, tax rates, rate of savings and investments. Amount of export and import of different products.
  - Industrial Infrastructures: Power, transportation and communication.
  - Trends in agricultural and industrial production.

- Economic policies like monetary policy, foreign investment policy and industrial policy.

(3)

B. Marketing Philosophies:

- Production concept
- Product concept
- Selling concept
- Marketing concept
- Societal concept

(2 ½ + 1 ½ )

C. Coordination is the essence of management as:

- It is inherent in all management functions.
- It maintains the functional harmony towards the achievements of desired goals
- It runs through the entire process of management like thread in garland.
- It maintains internal and external harmony of the organisation.
- It combines material, machinery, manpower, money and methods. (1x5 = 5)

Question 5:

A. Management is considered as an art because:

- The process of management involve the use of know-how and skill.
- The process of management is directed towards the accomplishment of concrete results.
- Management is creative in the sense that management creates new situations neede for further improvement
- Management is personalised. (any 3) 3x 1 = 3

B. Objectives of marketing:

- Customer satisfaction
- Profitability
- Coordination and integration
- Service to society

4x1 = 4

C.

- Lok Adalat:It is an effective ,quick and economical redressal system where an aggrieved consumer can directly approach Lok Adalats with his /her grievances and the issues are discussed on the spot and decisions are taken immediately. Thus, time and money are saved .Grievances arising out of Electricity and Telephone Billings, road accidents ,etc. can be taken up in lok Adalats at regular intervals for spot settlements.
- PIL:It is a scheme/system under which any person ,though not a party to the grievances ,can move to court of law to file petition in the interests of the society .It involves efforts to provide legal remedy to people or group who may not be able to make a strong movement on their own. Minorities ,poor and environmentalists ,etc. are people/group on whose behalf petitions are filed for remedial actions. 2 ½ X 2 = 5

Question 6:

- c. Authority and Responsibility: Authority is the **right to get work done from others** and responsibility is the **obligation to perform the assigned task**. Anyone who exercise the **authority must accept responsibility for his work**. One who held responsible should be **given the necessary authority**. (3)
- d. Management is all pervading:
- i. management is required in all types of organisations.
  - ii. It is necessary in both small and large organisations.
  - iii. It is found in all countries and at all points of time.
  - iv. The basic functions of management is performed at every level of authority – top , middle and operating level. 1 x 4 = 4

c. Difference between Marketing and selling. (any 5) 1X5 = 5

Basis of distinction	Marketing	Selling
Nature	A philosophy which aims at achieving organisational goals through satisfaction of customers	An operational approach that aims at increasing sales volume through promotional efforts.
Focus	Needs of buyers	Needs of sellers
Object	Profit through customer satisfaction	Profits through sales volume.
Orientation	Consumer oriented	Product oriented
Perspective	Long term	Short term
Approach	Systematic	Fragmented
Beginning	Begins before the production	Begins after the production

Question 7:

- A. Following are the main reasons in favour of consumer protection:
1. Principle of Social Justice: Directive principles of State policy as laid down in the Constitution of India is against the exploitation of consumers. So it is expected that the producers, traders and service providers will refrain from malpractices and take care of consumers' interest.
  2. Customer satisfaction: The main of a business enterprise is to create satisfying consumers. So business enterprises should provide quality goods and services at reasonable prices.
  3. Self interest-survival and growth of business: Business enterprises have to serve the interest of consumers for their own survival and growth. Due to economic liberalization, globalization business enterprises are exposed to increased competition. Any business enterprises which indulges in malpractices or fails to provide improved services shall find it difficult to continue In their own long- term interest, business enterprises should be consumer oriented. 3X 1= 3
- B. SWOT Analysis is a tool, used in management and strategy formulation. It helps to identify the Strengths, Weaknesses, Opportunities and Treats of a particular business enterprise. In fact, it is a systematic approach to monitor and comprehend the external and internal environment of a business enterprise.

1. Strength: It is the inherent capacity of the business enterprise and this allows the enterprise to take strategic advantage and perform over its competitors. For instance ,countrywide distribution system are their strengths of the multinational companies in India ,like Hindustan unilever Limited, Procter and Gamble, etc. Strong brand reputation, business location, cost advantage are considered as strengths.
2. Weaknesses : It is the inherent constraint of the business enterprise and this may keep the enterprise at its back foot. The competitors will always try to exploit this weakness of the enterprise. Lack of expertise and shortage of funds may be looked upon as weakness. Lack of marketing expertise and improper busine location are considered as weaknesses.
3. Opportunity: It is a favourable situation in the external environment of the business enterprise. Increase in demand may be considered as an opportunity. For instance, Manufacturer of Campa-Cola got the opportunity to trade when Coke was asked to leave India .Increase in demand for herbal based products is looked upon as an opportunity by the enterprise making herbal products. strategic alliances , loosening of trade regulations, weak competition ,etc .are also considered as opportunities.
4. Threats: It is an unfavourable situation in the external environment of the business enterprise which may affect its position .Instead of taking such situation as 'threats', it would be better to take it as 'challenges'. Price wars, Increased trade barriers, strong competition, , etc. are considered as 'threats'. (4x1 =4)

C. Features of Services:

1. Intangibility
2. Perishability
3. Inseparability
4. Variability
5. Heterogeneous

5 X1= 5

Question 8:

- A. A complaint can be filed by the consumer or claimant or any registered voluntary consumer association /organization of the consumer or parent /legal guardian in case of a minor consumer) or central government or one/more consumer having same interest.

(3)

B. Features of consumer protection Act:

- a. The act applies to all goods and services unless specifically exempted by the Government of India.
- b. It covers all sectors whether private, Public or cooperative.
- c. The act provided remedy in addition to those available under other laws.
- d. The acts prescribe consumer rights relating to safety, information, choice, representation, redressal and education. 4X1 = 4

- C. A detailed understanding of the environment by the business managers enables them not only to identify and evaluate, but also to react to these changing external forces in order to survive and grow.

- a. Getting the first mover advantage. early identification of environmental opportunities will help the enterprise to exploit the opportunities as being the first to exploit instead of losing the opportunities to the competitors.
- b. Early warning signals :Besides opportunities business environment is also a source of varied threats or crisis .A proper environmental awareness can help business managers to recognize various threats on time and that serve as warning signal.
- c. Building Corporate image: An understanding of the business environment can help the managers to make realistic plans or policies and also ensure their effective implementation .As a result the reputation of the business gets enhanced.
- d. Improving performance: All types of business enterprises are facing increasingly dynamic business environment where changes are taking place at a fast pace .So the business enterprises that continuously monitor their environment and adopt suitable courses of action based on their environment learning experience will be the one who not only improve their present performance but also continue to succeed in the market for a longer period of time.
- e. Customer focus: Business enterprises should be sensitive to the need ,requirement and expectation of all target groups of customers. 1x 5 = 5

Question 9:

- a. Gang plank: It refers to the quick communications done between the links of scalar chain in case of an emergency. It helps the communication to be done faster. It should not be a normal practice because it undermines the established lines of authority. The idea of gang plank indicates that principle of management are general and flexible guidelines rather than hard and fast laws. (4)
- b. Labelling: The term labelling means **designing a label to be put on the package**. A label is a small slip placed on the product to denote its **nature, contents, ownership, destination etc**. A label plays an important role in marking the **packaging and branding functions meaningful**. It is medium through which the manufacturer gives necessary information to the user or consumer. (4)
- c. Promotion Mix: Promotion refers to all those activities which a business enterprise performs to inform, persuade and motivate people to buy its product or service. Promotion mix is the combination of various promotional tools used by an enterprise to achieve its marketing objective. The elements of promotion mix are
  - a. Advertising
  - b. Personal selling
  - c. Sales promotion
  - d. Publicity. (4)