

**RADIANT CENTRAL CHILDREN ACADEMY  
SUMMER VACATION ASSIGNMENT (2023-24)  
ENGLISH CORE – XII**

**GENERAL INSTRUCTIONS:**

- Questions 1 to 4 are based on **PROJECT** for **INTERNAL ASSESSMENT**. Students are to attempt them in a **Project file** on **A4 size pages**.
- Questions 5 to 10 – students are to answer on **notebook**.

**DAY – 1**

**1 ENGLISH PROJECTS**

10

**Inter-disciplinary:** The ideas/issues highlighted in the chapters/ poems/ drama

**Choose ANYONE question and write the answer in 120-150 words.**

1. How does "Lost Spring" by Anees Jung serve as a catalyst for interdisciplinary exploration of social issues, human rights, and the marginalized communities in India?
2. How does "The Rattrap" by Selma Lagerlöf offer an interdisciplinary lens to explore themes of identity, compassion, and societal perceptions through the intersection of literature, psychology, and social sciences?
3. How can the satirical novella "The Tiger King" by Kalki provide a platform for an interdisciplinary exploration of power dynamics, political satire, and environmental conservation, drawing insights from literature, political science, and ecology?

**The Project-Portfolio may include the following:**

- Cover page, with title of project, school details/details of students.
- Statement of purpose/objectives/goals
- Certificate of completion under the guidance of the teacher.
- Students Action Plan for the completion of assigned tasks.
- Materials such as scripts for the theatre/role play, questionnaires for interview, written assignments, essays, survey-reports and other material evidence of learning progress and academic accomplishment.
- The 800-1000 words essay/Script/Report.
- Student/group reflections.
- If possible, Photographs that capture the positive learning experiences of the student(s).
- List of resources/bibliography.

**Parameters for the assessment of Project**

- Quality of content of the project
- Accuracy of information
- Adherence to the specified timeline
- Content in respect of (spellings, grammar, punctuation)
- Clarity of thoughts and ideas
- Creativity
- Contributions by group members
- Knowledge and experience gained

**DAY – 2&3**

**2 Interview-Based research:**

***“Evolving food tastes in my neighbourhood” or “Corona pandemic and the fallout on families.”***

- Read the available literature.
- frame questions based on the preliminary research/background.
- write an essay/ write up / report etc. up to 1000 words
- a viva on the research project

**Write an essay/ write up / report etc. up to 1000 words including following points:**

- Objectives
- Action Plan for the Project
- Questionnaire for Survey/Interview
- General report on the topic/theme
- Conclusion

10  
5  
(Viva)

**DAY – 4&5**

**3 Listen to podcasts/ interviews/radio or TV documentary on a topic and prepare a report countering or agreeing with the speakers. Write a report in 800 - 1000 words and submit.**

10

**DAY – 6&7**

4 **Create their own video/ Audio, after writing a script.** 10

Students write, direct and present a theatrical production, /One act play. This will be a project which will be done as a team. It will involve planning, preparation and presentation. In short, various language skills will be utilised. There will be researching, discussion, writing the script, auditioning and ultimately producing the play.

**DAY – 8**

5 **Read the passage given below:** Study on Fake News 10

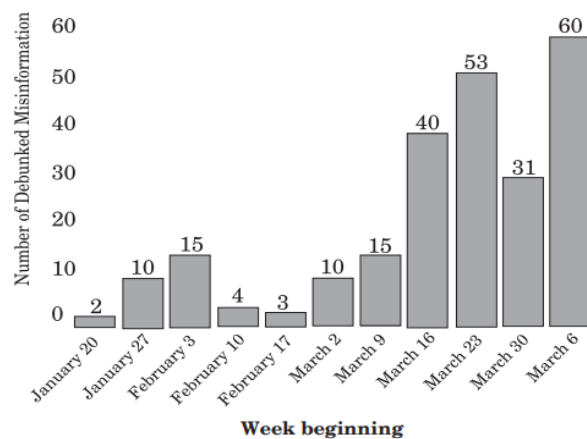
1. A 2020 study on misinformation in India by the University of Michigan has noted a rise in the number of inaccurate stories being circulated.

2. The study used 243 unique instances of misinformation from an archive maintained by Tattle Civic Technology (a Delhi-based news project that aims to make accurate information more accessible to mobile-first users). The archive represents all the stories that have been debunked by different fact-checkers.

3. The misinformation that was circulating on social-media apps was classified into several categories — culture, government, doctored statistics, etc. “There are many reasons; one is pure mischief, people who enjoy seeing falsehoods — they create, propagate,” said Joyojeet Pal, one of the authors of the study, while talking about why misinformation is spread. “Another reason is political; driven by those who want a certain agenda to triumph. And then, there is pure economics. Platforms often use misinformation to make money by **click-baiting** people. The more extreme and controversial a piece of news sounds, the more likely it is that someone will click on it.”

**Increase in the Number of (Debunked) Misinformation**

January to April 2020



Sources: Study of Mis information (Released on April 18, 2020)

4. Different modes of media are used to relay different kinds of misinformation, shows the study. For example, misinformation in the ‘casualty’ category relies heavily on visuals, such as video clips, since the goal is to evoke a physical reaction, often fear or disgust. Misleading statistics use a lot of text to sound legitimate by offering specifics.

5. Several mainstream media houses, including newspapers and news channels, have put out widely circulated misinformation, showed the study. Even public figures, by not removing the debunked misinformation from their social media pages, have contributed to the propagation of false information.

6. The study could not cite clear reasons why mainstream media was sharing misinformation. It hinted that some may simply be out of poor editorial standards in a competitive media ecosystem. “One thing that remains clear, however, is that misinformation travels fast,” the authors wrote, “and that news sources may increase footfalls through deliberate misinformation or click-bait headlines.”

- Prachi Salve

**On the basis of your understanding of the above passage, answer ANY TEN of the questions given below:**

1. The researchers from Michigan gathered the data for their study from a/an:

- (a) news channel
- (b) social media app
- (c) classified document
- (d) repository of news data

2. Select the information that can be added before paragraph 1 in the passage.

- (a) the methods by which fake news is spread
- (b) the different ways in which one can identify fake news
- (c) a definition and a clear description of what fake news is
- (d) a list of notable studies done by scholars at the University of Michigan

3. Which of these CANNOT be a reason behind the conduction of a study on misinformation?

- (a) People easily believe in misinformation without checking for facts.
- (b) The use of billboards to spread misinformation needs to be banned.
- (c) There is an increasing urgency to identify the sources of misinformation.
- (d) Spread of misinformation often disrupts the communal peace in the society.

4. Read the two statements given below and select the option that suitably explains them.

(1) An archive of circulated misinformation is maintained by Tattle Civic Technology.

(2) Tattle Civic Technology wants to make accurate news more accessible.

(a) (2) led to (1). (b) (1) is the cause of (2).

(c) (2) is the source of (1). (d) (1) and (2) are independent of each other.

5. Select the option that lists what we can conclude from the text.

(1) Making money by spreading misinformation is rampant.

(2) Newspapers are the main source of spreading misinformation.

(3) Misinformation can be spread in audio, video and textual forms.

(4) The circulation of misinformation has seen a significant increase.

(a) (1) and (4) are true. (b) (2) and (3) are true.

(c) (1), (3) and (4) are true. (d) (2), (3) and (4) are true.

6. Which quote summarises the essence of the given passage?

(a) "Bad news travels at the speed of light; good news travels like molasses."

(b) "It's amazing that the amount of news that happens in the world every day always just exactly fits the newspaper."

(c) "All the papers that matter live off their advertisements, and the advertisers exercise an indirect censorship over news."

(d) "The social media platforms have taken over the distribution of news globally. They treat a lie the same way you would treat a fact."

7. Which of these sentences uses 'relay' in the same manner as it is used in paragraph 4 of the passage?

(a) Peter used a relay of horses to pull the wagon up the hill.

(b) Malcolm and John set up a relay of buckets to fill the kid's pool quickly.

(c) Rhythm intended to relay everything she had learnt to her peers before she resigned.

(d) New television transmitters and relay stations have been set up in the neighbourhood.

8. From the bar graph given in the passage, we can infer that the spread of misinformation is showing signs of slowing down. (True/False)

9. Public figures sharing misinformation on their social media platforms often leads to people blindly believing in \_\_\_\_\_.

10. According to the given graph, on which date was the maximum number of fake news circulated on social-media apps from January 2020 to March, 2020?

11. What sort of news has been referred to as 'casualty category'?

12. Which word in para 6 is the synonym of 'established/popular'?

#### DAY – 9

6 A. You are the Secretary of your School Literary Association. Write a notice in not more than 50 words for your school notice board, giving details of the proposed inauguration of the Literary Association of your school. You are 'XYZ' of Jain Vidyashram, Cuddalore. 5X4=20

B. You lost your wristwatch in your school auditorium. Write a notice in not more than 50 words for your school notice board giving a detailed description of the watch. You are Anirudh/Arundhati of class XII of Springfield School, Pune.

C. You are the President, Literary Society of Sunshine International School. Draft an invitation to author, Ms Manjul Bajaj requesting her to conduct a workshop on creative writing in your school. You are Romi/Rohit of Zenith Public School. (50 words)

D. Write a formal reply accepting an invitation to be present in the birthday celebrations of your friend, Suresh's daughter, who lives at 1231, Chattarpur, Delhi. You are Abhishek Khanna. (50 words).

#### DAY – 10

7 **Article Writing** (write ANY TWO articles in 120 -150 words) 5x2=10

A. Education Reforms: In light of the pandemic-induced disruption, how can India revitalize its education system, bridge the digital divide, and promote quality education for all?

B. Digital Transformation: What strategies should India adopt to harness the potential of digital technologies, promote digital literacy, and bridge the digital divide across its vast population?

C. Socioeconomic Disparities: How can India effectively address the growing wealth gap and uplift marginalized communities to ensure inclusive and equitable development?

D. Environmental Sustainability: With rapid industrialization and increasing urbanization, how can India strike a balance between economic growth and environmental conservation, while mitigating the effects of climate change?

# हिंदी

## DAY -1

1. विद्यालयी पत्रिका हेतु स्वरचित कोई कविता , कहानी , अनुभव या किसी यात्रा पर लेख तैयार करें
2. अपने किसी एक महत्वपूर्ण दिवस या अवसर का उल्लेख करते हुए डायरी लिखिए ।

## DAY -2

3. हाल ही में पढ़ी गई किसी पुस्तक की समीक्षा तैयार कीजिए । .

## DAY -3

4. आसपास हो रहे उन बदलावों के बारे में लिखिए जो सुविधाजनक और आधुनिक होते हुए भी बुजुर्गों को अच्छे नहीं लगते । वर्तमान में युवा पीढ़ी में किन - किन सामाजिक मूल्यों का अभाव देखा जा रहा है ?
5. बाजार दर्शन निबंध में लेखक ने बाजार और मन से संबंधित जो विचार प्रकट किए हैं , उन्हें क्रमबद्ध करके लिखिए ।
6. पहलवान की ढोलक नामक कहानी का केन्द्रीय भाव / प्रतिपाद्य / संदेश स्पष्ट कीजिए ।

## DAY -4,5,6,7,8,9,10

7. अधोलिखित विषयों में से अपने निर्धारित विषय पर परियोजना कार्य हेतु सचित्र फाइल तैयार कीजिए-
  1. भारत में समावेशी विकास की प्रेरक योजनाएँ ।
  2. आरक्षण , राजनीति और लोकतंत्र ।
  3. भारतीय सभ्यता के अग्रदूत महात्मा गाँधी / गौतम बुद्ध / स्वामी विवेकानन्द ।
  4. अन्तरिक्ष क्षेत्र में भारत की संभावनाएँ ।
  5. रक्षा उपकरणों में भारत की आत्मनिर्भरता ।
  6. सामाजिक / राजनैतिक / आर्थिक / सिनेमा जगत में योगदान करने वाले किसी प्रतिष्ठित व्यक्ति का साक्षात्कार लिखिए ।
  7. नस्लवाद अतीत और वर्तमान के परिप्रेक्ष्य में ।
  8. भारत की षडऋतुओं की विशेषताएँ ।
  9. ओलम्पिक खेलों में भारत की उपलब्धि ।
  10. विकास के प्रेरक भारतीय पर्यटन उद्योग ।
  11. युवाओं के प्रेरक नेताजी सुभाष चन्द्र बोस ।
  12. शिक्षा में मूल्यों की प्रतिस्थापना जरूरी है ।
  13. हिन्दी साहित्य को नारियों की देन ।
  14. छायावादी युग की प्रवृत्तियों , विशेषताएँ और मुख्य रचनाकार ।
  15. पूँजीवाद बनाम समाजवादी विचारधारा ।
  16. प्रगतिवाद युग के मुख्य साहित्यकार , उनकी रचनाएँ और मूल प्रवृत्तियाँ ।
  17. जीवन में निरंतर साहित्य का अध्ययन जरूरी है ।
  18. महिला सशक्तीकरण चुनौतियाँ और समाधान
  19. आर्थिक विकास और पर्यावरण संरक्षण ।
  20. विज्ञान और साहित्य की जिम्मेदारी ।
  21. प्रगतिशील भारत के समक्ष समस्याएँ ।
  22. किसी ऐतिहासिक , धार्मिक यात्रा का वर्णन ।
  23. आदिकालीन साहित्य परम्परा खुसरो , चंदबरदायी , विद्यापति एवं रहीम के योगदान ।
  24. आदिकालीन साहित्य परम्परा जैन , सिद्ध एवं नाथ साहित्य , रासो साहित्य ।
  25. आदिकालीन साहित्य की विशेषतायें प्रमुख साहित्यकारों एवं परवर्ती काव्यों पर उसके प्रभाव ।
  26. भक्तिकालीन साहित्य की पृष्ठभूमि , विशेषताएँ प्रमुख संत कवि एवं उनके योगदान ।
  27. हिन्दी सूफी काव्य परंपरा प्रमुख कवि एवं काव्य प्रवृत्तियों का उल्लेख ।

28. रीतिकाल प्रमुख प्रवृत्तियाँ , प्रमुख कवि - रचनाएँ , ग्रंथ काव्यगत विशेषताएँ ।
29. आधुनिक काल की प्रमुख विशेषताएँ , कवि / लेखक परिचय एवं उनकी रचनाएँ ।
30. भारतेन्दु युग प्रमुख कवि एवं काव्य प्रवृत्तियाँ ।
31. द्विवेदी - युग प्रमुख कवि / लेखक रचनाएँ एवं प्रमुख विशेषताएँ ।
32. छायावाद तथा उत्तर छायावादी काव्य प्रवृत्तियाँ , कवि रचनाएँ एवं प्रमुख विशेषताएँ ।
33. आधुनिक काल ( गद्य विकास ) हिन्दी गद्य का उद्भव एवं विकास ।
34. हिन्दी उपन्यास - विकास प्रमुख चरण एवं विशेषताएँ , प्रमुख उपन्यासकार ।
35. हिन्दी कहानी - विकास के प्रमुख चरण एवं विशेषताएँ , प्रमुख कहानीकार ।
36. हिन्दी नाटक का विकास एवं प्रमुख नाटककार ।
37. हिन्दी निबन्ध का विकास एवं प्रमुख निबंधकार ।
38. हिन्दी आलोचना का विकास एवं प्रमुख आलोचक ।
39. रेखाचित्र , जीवनी , संस्मरण का विकास एवं प्रमुख साहित्यकार ।
40. आत्मकथा एवं रिपोर्ताज का विकास एवं मुख्य साहित्यकार ।
41. साक्षात्कार एवं फीचर लेखन का विकास ।
42. स्वातंत्र्योत्तर गद्य साहित्य का क्रमिक विकास ।
43. हिन्दी साहित्य का इतिहास काल विभाजन , सीमा निर्धारण एवं नामकरण का सविस्तार वर्णन करें ।
44. प्रगतिवाद , प्रयोगवाद - काव्य प्रवृत्तियों एवं प्रमुख कवियों का योगदान ।
45. नई कविता , समकालीन कविता प्रमुख प्रवृत्तियों एवं कवियों का योगदान ।
46. भारत में समान नागरिक संहिता जरूरी क्यों ?
47. विवेकानन्द का दर्शन और भारतीय समाज ।
48. भारतीय फिल्मों का इतिहास ।
49. न्यायपालिका और मीडिया की भूमिका ।
50. धर्मनिरपेक्षता का भारतीय एवं पश्चिमी प्रारूप ।
51. वर्तमान संदर्भों में हिन्दी और विश्व ।
52. स्वतंत्रता आंदोलन में हिन्दी कवियों एवं लेखकों की ।
53. लोकतंत्र में सिविल सेवाओं की भूमिका ।
54. साइबर स्पेस और इण्टरनेट ।
55. हिन्दी सिनेमा के विकास यात्रा का वर्णन ।
56. भारतीय सीमा विवाद व उनका का प्रबन्धन ।
57. एक आदर्श विश्व व्यवस्था की कल्पना ।
58. डायरी लेखन विधा , किन्हीं पाँच कार्य दिवसों पर डायरी लेखन ।

मूल्यांकन का आधार -

विषयवस्तु - 5 अंक

भाषा एवं प्रस्तुति - 3 अंक

शोध एवं मौलिकता - 2 अंक

## MATHEMATICS

### Day-1

- Let R be the relation in the set  $\{1, 2, 3, 4\}$  given by  $R = \{(1, 2), (2, 2), (1, 1), (4,4), (1, 3), (3, 3), (3, 2)\}$ . Choose the correct answer. 1
  - R is reflexive and symmetric but not transitive.
  - R is reflexive and transitive but not symmetric.
  - R is symmetric and transitive but not reflexive.
  - R is an equivalence relation.
- Find the maximum number of equivalence relations on the set  $\{1,2,3\}$ ? 1
- Find the number of equivalence relations on the set  $\{1,2,3\}$  containing  $(1, 2)$  1
- Let  $A=\{1,2,3\}$ . Then find the number of relations containing  $(1,2)$  and  $(1,3)$  which are reflexive and symmetric but not transitive? 1
- State the reason for the relation R in the set  $\{1, 2, 3\}$  given by  $R = \{(1, 2), (2,1)\}$  not to be transitive. 1
- For real numbers x and y, a relation R is defined as  $xRy$  if  $x-y+\sqrt{2}$  is an irrational number, Write whether R is reflexive symmetric or transitive. 3
- If N denotes the set of all natural numbers and R be the relation on  $N \times N$  defined by  $(a, b) R (c, d)$ , if  $ad (b + c) = bc (a + d)$ . Show that R is an equivalence relation. 4

### Day-2

- If set A contains 5 elements and the set B contains 6 elements , then find the number of one-one and onto mappings from A to B ? 1
- Set A has 3 elements and set B has 4 elements . Then find the number of injective mappings from A to B ? 1
- Let  $f:R \rightarrow R$  defined by  $f(x)=[x]$ . Show that f is neither one-one nor onto. 1
- Let  $f:R \rightarrow R$  defined by  $f(x)=|x|$ . Show that f is neither one-one nor onto. 1
- Let  $f : N \rightarrow N$  be defined by  $f(x) = \begin{cases} \frac{n+1}{2}, & \text{if } n \text{ is odd,} \\ \frac{n}{2}, & \text{if } n \text{ is even} \end{cases}$ . Check whether f is one-one or onto. 2
- Let  $f:R \rightarrow R$  defined by  $f(x)=4^x + 4^{|x|}$ . Show that f is one-one and into. 4
- Consider  $f : R - \{-\frac{4}{3}\} \rightarrow R - \{\frac{4}{3}\}$  given by  $f(x) = \frac{4x+3}{3x+4}$ . Show that f is bijective. 4

### Day-3

- CASE STUDY-1:** An organization conducted bike race under 2 different categories-boys and girls. Totally there were 250 participants. Among all of them finally three from Category 1 and two from Category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college project. Let  $B = \{b_1, b_2, b_3\}$   $G = \{g_1, g_2\}$  where B represents the set of boys selected and G the set of girls who were selected for the final race. 4



1- Ravi decides to explore these sets for various types of relations and functions

1. Ravi wishes to form all the relations possible from B to G. How many such relations are possible?

- a.  $2^6$
- b.  $2^5$
- c. 0
- d.  $2^3$

2- Let  $R: B \rightarrow B$  be defined by  $R = \{(x, y): x \text{ and } y \text{ are students of same sex}\}$ , Then this relation R is\_\_\_\_\_

- a. Equivalence
- b. Reflexive only
- c. Reflexive and symmetric but not transitive
- d. Reflexive and transitive but not symmetric

3. Ravi wants to know among those relations, how many functions can be formed from B to G?

- a.  $2^2$
- b.  $2^{12}$
- c.  $3^2$
- d.  $2^3$

4. Let  $R: B \rightarrow G$  be defined by  $R = \{(b_1, g_1), (b_2, g_2), (b_3, g_1)\}$ , then R is\_\_\_\_\_

- a. Injective
- b. Surjective
- c. Neither Surjective nor Injective
- d. Surjective and Injective

5. Ravi wants to find the number of injective functions from B to G. How many numbers of injective functions are possible?

- a. 0
- b.  $2!$
- c.  $3!$
- d.  $0!$

ANSWERS

- 1. (a)  $2^6$
- 2. (a) Equivalence
- 3. (d)  $2^3$
- 4. (b) Surjective
- 5. (a) 0

**19. Case study -2:** Sherlin and Danju are playing Ludo at home during Covid-19. While rolling the dice, Sherlin's sister Raji observed and noted the possible outcomes of the throw every time belongs to set  $\{1,2,3,4,5,6\}$ . Let A be the set of players while B be the set of all possible outcomes.



.  $A = \{S, D\}$ ,  $B = \{1,2,3,4,5,6\}$

1. Let  $R: B \rightarrow B$  be defined by  $R = \{(x, y): y \text{ is divisible by } x\}$  is

a. Reflexive and transitive but not symmetric    b. Reflexive and symmetric and not transitive

c. Not reflexive but symmetric and transitive    d. Equivalence

2. Raji wants to know the number of functions from A to B. How many number of functions are possible?

a.  $6^2$                       b.  $2^6$                       c.  $6!$                       d.  $2^{12}$

3. Let R be a relation on B defined by  $R = \{(1,2), (2,2), (1,3), (3,4), (3,1), (4,3), (5,5)\}$ . Then R is a. Symmetric

b. Reflexive                      c. Transitive                      d. None of these three

4. Raji wants to know the number of relations possible from A to B. How many numbers of relations are possible?

a.  $6^2$                       b.  $2^6$                       c.  $6!$                       d.  $2^{12}$

5. Let  $R: B \rightarrow B$  be defined by  $R = \{(1,1), (1,2), (2,2), (3,3), (4,4), (5,5), (6,6)\}$ , then R is

a. Symmetric    b. Reflexive and Transitive    c. Transitive and symmetric    d. Equivalence .

ANSWERS

1. (a) Reflexive and transitive but not symmetric

2. (a)  $6^2$

3. (d) None of these three

4. (d)  $2^{12}$

5. (b) Reflexive and Transitive.

## Chapter-2

### Day-4

1- Find the domain of the following function: 1

(i)  $\cos^{-1}(2x - 1)$  (ii)  $\sin^{-1} \sqrt{x - 1}$  (iii)  $\cos^{-1}(2x^2 - 1)$  (iv)  $\sin^{-1} \sqrt{x + 1}$   
 (v)  $\sin^{-1} x^2$

2- Evaluate  $\tan(\tan^{-1}(-4))$ . 1

3- Find  $\sin(\cos^{-1} 3/5)$  1

4- Find the principal value of 1  
 (i)  $\cos^{-1}(-\frac{1}{2}) + 2 \sin^{-1}(\frac{1}{2})$ . (ii)  $\tan^{-1}[\sin(-\frac{\pi}{2})]$ .

(iii)  $\cos^{-1}(\cos \frac{7\pi}{6})$ . (iv)  $\cos^{-1}[\cos(-680)^\circ]$ . (v)  $\cos^{-1}(\cos \frac{2\pi}{3}) + \sin^{-1}(\sin \frac{2\pi}{3})$

(vi)  $\tan^{-1}(\tan \frac{2\pi}{3})$

5- Prove that  $\cot^{-1}(\frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}}) = \frac{x}{2}$ ,  $0 < x < \frac{\pi}{2}$ . or  $x \in \frac{\pi}{4}$ . 2

6- Solve the following equation for x. 2

$\tan^{-1}(\frac{1-x}{1+x}) = \frac{1}{2} \tan^{-1} x$ ,  $x > 0$

7- Prove that:  $\tan^{-1}(\frac{\sqrt{1+\cos x} + \sqrt{1-\cos x}}{\sqrt{1+\cos x} - \sqrt{1-\cos x}}) = \frac{\pi}{4} - \frac{x}{2}$ , where  $\pi < x < \frac{3\pi}{2}$ . 2

8- Evaluate: (i)  $\sin^{-1}(\cos(\frac{43\pi}{5}))$  1



(ii)  $\sin^{-1} \left( \cos \left( \sin^{-1} \left( \frac{\sqrt{3}}{2} \right) \right) \right)$  (iii)  $\sin^{-1} \left( \sin \left( -\frac{17\pi}{8} \right) \right)$ . 1

9- If  $\cos^{-1} \alpha + \cos^{-1} \beta + \cos^{-1} \gamma = 3\pi$ , then find the value of  $\alpha(\beta + \gamma) + \beta(\gamma + \alpha) + \gamma(\alpha + \beta)$ .  
2

### Day-5

10- Prove the following

$$\cos(\tan^{-1}(\sin(\cot^{-1} x))) = \sqrt{\frac{1+x^2}{2+x^2}} \quad 2$$

11- The value of  $\sin(\tan^{-1} x)$  is-

(i)  $\frac{x}{\sqrt{1+x^2}}$  (ii)  $\frac{x}{\sqrt{1-x^2}}$  (iii)  $\frac{1}{\sqrt{1+x^2}}$  (iv)  $\frac{1}{\sqrt{1-x^2}}$  2

12- The value of  $\cot(\sin^{-1} x)$  is 2

(i)  $\frac{\sqrt{1+x^2}}{x}$  (ii)  $\frac{x}{\sqrt{1+x^2}}$  (iii)  $\frac{1}{x}$  (iv)  $\frac{\sqrt{1-x^2}}{x}$

13- Write the following in the simplest form:(1 marks each)

- (i)  $\tan^{-1} \left( \sqrt{\frac{1-\cos x}{1+\cos x}} \right), 0 < x < \pi$   
 (ii)  $\tan^{-1} \left( \frac{\cos x - \sin x}{\cos x + \sin x} \right), -\frac{\pi}{4} < x < \frac{3\pi}{4}$   
 (iii)  $\tan^{-1} \left( \frac{\sqrt{1+x^2} - 1}{x} \right), x \neq 0$   
 (iv)  $\tan^{-1} \frac{1}{\sqrt{x^2-1}}, |x| > 1.$   
 (v)  $\sin^{-1} \left( \frac{\sin x + \cos x}{\sqrt{2}} \right), -\frac{\pi}{4} < x < \frac{\pi}{4}$   
 (vi)  $\cot^{-1} \left( \frac{1}{\sqrt{x^2-1}} \right), |x| > 1.$

### Day-6

#### Types of Matrices –

1. If a matrix has 18 elements, what are the possible orders it can have? What, if it has 5 elements?  
1
2. Write the number of all possible matrices of order  $2 \times 2$  with each entry 1, 2 or 3. 1
3. Write the element  $a_{ij}$  of a  $3 \times 3$  matrix  $A = [a_{ij}]$ , whose elements are given by  $a_{ij} = \frac{|i-j|}{2}$ . 1
4. The elements of a  $3 \times 3$  matrix are given by  $a_{ij} = \frac{|-3i+j|}{2}$ . Write the value of element  $a_{32}$ .  
1

#### Equality of matrices-

1. if  $2 \begin{bmatrix} 3 & 4 \\ 5 & x \end{bmatrix} + \begin{bmatrix} 1 & y \\ -0 & 1 \end{bmatrix} = \begin{bmatrix} 7 & 0 \\ 10 & 5 \end{bmatrix}$ , then find (x-y). 1
2. If  $\begin{bmatrix} a+4 & 3b \\ 8 & -6 \end{bmatrix} = \begin{bmatrix} 2a+2 & b+2 \\ 8 & a-8b \end{bmatrix}$ , then write the value of  $a - 2b$ . 1
3. If matrix  $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$  and  $A^2 = kA$ . then write the value of k. 1
4. Find a matrix A such that  $2A - 3B + 5C = 0$ , where  $B = \begin{bmatrix} -2 & 2 & 0 \\ 3 & 1 & 4 \end{bmatrix}$  and  $C = \begin{bmatrix} 2 & 0 & -2 \\ 7 & 1 & 6 \end{bmatrix}$ .

### Multiplication of matrices –

1. If  $[2 \ 1 \ 3] \begin{bmatrix} -1 & 0 & -1 \\ -1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} = A$ , then write the order of matrix A. 1
2. If  $[2x \ 3] \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix} \begin{bmatrix} x \\ 3 \end{bmatrix} = 0$ . find x 2
3. The product of two non- zero matrices can be a zero ? If yes give an example. 2
4. Assume X, Y, Z, W and P are matrices of order  $2 \times n$ ,  $3 \times k$ ,  $2 \times p$ ,  $n \times 3$  and  $p \times k$ , respectively.
  - I. The restriction on n, k and p so that  $PY+WY$  will be defined are 1  
(a)  $k=3$ ,  $p=n$  (b)  $k$  is arbitrary,  $p=2$  (c)  $p$  is arbitrary,  $k=3$ . (d)  $k=2$ ,  $p=3$
  - II. If  $n=p$ , then the order of the matrix  $7X-5Z$  1  
(a)  $p \times 2$  (b)  $2 \times n$  (c)  $n \times 3$  (d)  $p \times 3$
5. If  $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ , show that  $(A - 2I) (A - 3I) = 0$ . 2
6. If  $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 3 & 1 \\ 2 & 5 \end{bmatrix} = \begin{bmatrix} 7 & 11 \\ k & 23 \end{bmatrix}$ , then write the value of k. 2
7. If A is a square matrix such that  $A^2 = A$ , then write the value of  $7A - (I + A)^3$ , where I is an identity matrix. 3
8. If A is a square matrix such that  $A^2 = I$ , then find the simplified value of  $7A \cdot (A - I)^3 + (A + I)^3 - 7A$ . 3
9. Find matrix A such that  $\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix} A = \begin{bmatrix} -1 & -8 \\ 1 & -2 \\ 9 & 22 \end{bmatrix}$  3
10. Let  $A = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix}$ ,  $C = \begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix}$ , find a matrix D such that  $CD - AB = 0$ . 3
11.  $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$ , then find  $A^2 - 5A + 4I$  and hence find a matrix X such that  $A^2 - 5A + 4I + X = 0$ . 3
12. If  $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$ ,  $B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$  and  $(A + B)^2 = A^2 + B^2$ , then find the values of a and b. 3

### **Day-7**

### Transpose of a Matrix , Symmetric and Skew Symmetric Matrices –

- 1- If  $A = \begin{bmatrix} \cos \alpha & -\sin \alpha \\ \sin \alpha & \cos \alpha \end{bmatrix}$ , then  $A + A^T = I$ , Find  $\alpha$ . 1
- 2- If the matrix  $\begin{bmatrix} 0 & 6 - 5x \\ x^2 & x + 3 \end{bmatrix}$  is symmetric, find the value of x. 1
- 3- If  $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$  and  $A^3 - 6A^2 + 7A + KI_3 = 0$  Find K. 4
- 4- If  $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ , then verify that  $A^3 - 6A^2 + 9A - 4I = 0$  Find  $A^{-1}$ .
- 5- Write a square matrix of order 2 which is both symmetric as well as skew symmetric. 1
- 6- If A and B are symmetric matrices, prove that  $AB - BA$  is a skew symmetric matrix. 2

- 7- Show that the matrix  $B'AB$  is symmetric or skew symmetric according as  $A$  is symmetric or skew symmetric. 2
- 8- Let  $A$  and  $B$  are two symmetric matrices then prove that  $AB$  is symmetric if and only if  $AB=BA$  2
- 9- Check whether  $(AB'-BA')$  is symmetric or skew symmetric. 2
- 10- For the matrix  $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$ , verify that (i)  $(A + A')$  is a symmetric matrix 1  
(ii)  $(A - A')$  is a skew symmetric matrix. 1
- 11- If  $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$  and  $A^3 - 6A^2 + 7A + kI_3 = 0$ , find the value of  $k$ . 3
- 12- If  $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & x \\ -2 & 2 & -1 \end{bmatrix}$  is a matrix satisfying  $AA^T = 9I$ , find  $x$ . 2
- 13- If the matrix  $A = \begin{bmatrix} 0 & a & -3 \\ 2 & 0 & -1 \\ b & 1 & 0 \end{bmatrix}$  is skew-symmetric, find the values of 'a' and 'b'. 1
- 14- Express the matrix  $A = \begin{bmatrix} -1 & -2 & -2 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$  as the sum of a symmetric and skew symmetric matrix. 4
- 15- Show that elements along the main diagonal of a skew symmetric matrix are all 0. 2

### Day-8

## Case-Study Questions(4 marks each)

CASE STUDY1: A manufacture produces three stationery products Pencil, Eraser and Sharpener which he sells in two markets. Annual sales are indicated below



Market	Products (in numbers)		
	Pencil	Eraser	Sharpener
A	10,000	2000	18,000
B	6000	20,000	8,000

If the unit Sale price of Pencil, Eraser and Sharpener are Rs. 2.50, Rs. 1.50 and Rs. 1.00 respectively, and unit cost of the above three commodities are Rs. 2.00, Rs. 1.00 and Rs. 0.50 respectively, then, Based on the above information answer the following:

1. Total revenue of market A

- a. Rs. 64,000
- b. Rs. 60,400
- c. Rs. 46,000
- d. Rs. 40600

2. Total revenue of market B

- a. Rs. 35,000

- b. Rs. 53,000
  - c. Rs. 50,300
  - d. Rs. 30,500
3. Cost incurred in market A
- a. Rs. 13,000
  - b. Rs.30,100
  - c. Rs. 10,300
  - d. Rs. 31,000
4. Profit in market A and B respectively are
- a. (Rs. 15,000, Rs. 17,000)
  - b. (Rs. 17,000, Rs. 15,000)
  - c. (Rs. 51,000, Rs. 71,000)
  - d. ( Rs. 10,000, Rs. 20,000)
5. Gross profit in both market
- a. Rs.23,000
  - b. Rs. 20,300
  - c. Rs. 32,000
  - d. Rs. 30,200

**ANSWERS**

- 1. Rs. 46,000
- 2. Rs. 53,000
- 3. RS.31,000
- 4. (Rs.15, 000, Rs.17, 000)
- 5. Rs. 32,000

**CASE STUDY 2:** Three schools DPS, CVC and KVS decided to organize a fair for collecting money for helping the flood victims. They sold handmade fans, mats and plates from recycled material at a cost of Rs. 25, Rs.100 and Rs. 50 each respectively. The numbers of articles sold are given as



School /Article	DPS	CVC	KVS
Handmade fans	40	25	35
Mats	50	40	50
Plates	20	30	40

Based on the information given above, answer the following questions:

- 1. What is the total money (in Rupees) collected by the school DPS?
  - a. 700
  - b. 7,000
  - c. 6125
  - d. 7875
- 2. What is the total amount of money (in Rs.) collected by schools CVC and KVS?
  - a. 14,000
  - b. 15,725
  - c. 21,000
  - d. 13,125

3. What is the total amount of money collected by all three schools DPS, CVC and KVS?
- Rs. 15,775
  - Rs. 14,000
  - Rs. 21,000
  - Rs. 17,125
4. If the number of handmade fans and plates are interchanged for all the schools, then what is the total money collected by all schools?
- Rs. 18,000
  - Rs. 6,750
  - Rs. 5,000
  - Rs. 21,250
5. How many articles (in total) are sold by three schools?
- 230
  - 130
  - 430
  - 330

#### ANSWERS

- (b) 7000
- (a) 14000
- (c) Rs.21000
- (d) 21250
- (d) 330

**CASE STUDY 3:** On her birth day, Seema decided to donate some money to children of an orphanage home. If there were 8 children less, everyone would have got Rs.10 more. However, if there were 16 children more, everyone would have got Rs. 10 less. Let the number of children be  $x$  and the amount distributed by Seema for one child be  $y$  (in Rs.).



Based on the information given above, answer the following questions: 1. The equations in terms  $x$  and  $y$  are

- $5x-4y = 40$   $5x-8y = -80$
- $5x-4y = 40$   $5x-8y = 80$
- $5x-4y = 40$   $5x+8y = -80$
- $5x+4y = 40$   $5x-8y = -80$

2. Which of the following matrix equations represent the information given above?

- $\begin{bmatrix} 5 & 4 \\ 5 & 8 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ -80 \end{bmatrix}$
- $\begin{bmatrix} 5 & -4 \\ 5 & -8 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ 80 \end{bmatrix}$
- $\begin{bmatrix} 5 & -4 \\ 5 & -8 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ -80 \end{bmatrix}$
- $\begin{bmatrix} 5 & 4 \\ 5 & -8 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ -80 \end{bmatrix}$

3. The number of children who were given some money by Seema, is

- 30
- 40
- 23
- 32

4. How much amount is given to each child by Seema?

- Rs. 32

b. Rs. 30

c. Rs. 62

d. Rs. 26

5. How much amount Seema spends in distributing the money to all the students of the Orphanage?

a. Rs. 609

b. Rs. 960

c. Rs. 906

d. Rs. 690

ANSWERS

1. (a)  $5x-4y = 40$   $5x-8y = -80$

2. (c)  $\begin{bmatrix} 5 & -4 \\ 5 & -8 \end{bmatrix} [xy] = [40 \ -80]$

3. (d) 32

4. (b) Rs.30

5. (b) Rs.960

CASE STUDY 4: Two farmers Ramakishan and Gurucharan Singh cultivate only three varieties of rice namely Basmati, Permal and Naura. The sale (in rupees) of these varieties of rice by both the farmers in the month of September and October are given by the following matrices A and B



September sales (in Rupees)

$A = \begin{bmatrix} 10,000 & 20,000 & 30,000 \\ 50,000 & 30,000 & 10,000 \end{bmatrix}$  Ramakishan  
Gurucharan

October sales (in Rupees)

$B = \begin{bmatrix} 5,000 & 10,000 & 6,000 \\ 20,000 & 10,000 & 10,000 \end{bmatrix}$  Ramakishan  
Gurucharan

1. The total sales in September and October for each farmer in each variety can be represented as \_\_\_\_\_.

a.  $A+B$

b.  $A-B$

c.  $A>B$

d.  $A<B$

2. What is the value of  $A_{23}$ ?

a. 10000

b. 20000

c. 30000

d. 40000

3. The decrease in sales from September to October is given by \_\_\_\_\_ a.  $A+B$

b.  $A-B$

c.  $A>B$

d.  $A<B$

4. If Ramkishan receives 2% profit on gross sales, compute his profit for each variety sold in October.

a. Rs. 100, Rs. 200 and Rs. 120

b. Rs. 100, Rs. 200 and Rs. 130

c. Rs. 100, Rs. 220 and Rs. 120

d. Rs. 110, Rs. 200 and Rs. 120

5. If Gurucharan receives 2% profit on gross sales, compute his profit for each variety sold in September.

- a. Rs. 100, Rs. 200, Rs. 120
- b. Rs. 1000 , Rs. 600, Rs. 200
- c. Rs. 400, Rs. 200, Rs. 120
- d. Rs. 1200, Rs. 200, Rs. 120

### ANSWERS

- 1. (a) A+B
- 2. (a) 10000
- 3. (b) A-B
- 4. (a) Rs. 100, Rs. 200 and Rs. 120
- 5. (b) Rs. 1000, Rs. 600, Rs. 200

### Case Study Question – 6

Two schools P and Q want to award their selected students on the values of Tolerance, Kindness, and Leadership. The school P wants to award Rs x each, Rs y each and Rs z each for the three respective values to 3, 2 and 1 students respectively with total award money of Rs. 2200.

School Q wants to spend Rs 3100 to award its 4, 1 and 3 students on the respective values (by giving the same award money to the three values as school P). If the total amount of award for one prize on each value is Rs1200, using matrices, find the following:



- 1. What is award money for Tolerance?
  - 1. 350
  - 2. 300
  - 3. 500
  - 4. 400
- 2. What is the award money for Leadership?
  - 1. 300
  - 2. 280
  - 3. 450
  - 4. 500
- 3. What is the award money for Kindness?
  - 1. 500
  - 2. 400
  - 3. 300
  - 4. 550
- 4. If a matrix A is both symmetric and skew-symmetric, then
  - 1. A is a diagonal matrix
  - 2. A is a scalar matrix
  - 3. A is a zero matrix
  - 4. A is a square matrix
- 5. If A and B are two matrices such that  $AB = B$  and  $BA = A$ , then  $B^2$  is equal to 1.
  - 1. B
  - 2. A
  - 3. 1
  - 4. 0

### Case Study Question – 6

Three friends Ravi, Raju and Rohit were buying and selling stationery items in a market. The price of per dozen of Pen, notebooks and toys are Rupees x, y and z respectively.

Ravi purchases 4 dozen of notebooks and sells 2 dozen pens and 5 dozen toys. Raju purchases 2 dozen toys and sells 3 dozen pens and 1 dozen of notebooks. Rohit purchases one dozen of pens and sells 3 dozen notebooks and one dozen toys.

In the process, Ravi, Raju and Rohit earn ₹ 1500, ₹ 100 and ₹400 respectively.



Answer the following questions using the matrix method:

1. What is the price of one dozen of pens?
  1. ₹ 100
  2. ₹ 200
  3. ₹ 300
  4. ₹ 400
2. What is the total price of one dozen of pens and one dozen of notebooks?
  1. ₹ 100
  2. ₹ 200
  3. ₹ 300
  4. ₹ 400
3. What is the sale amount of Ravi?
  1. ₹ 1000
  2. ₹ 1100
  3. ₹ 1300
  4. ₹ 1200
4. What is the amount of purchases made by all three friends?
  1. ₹ 1200
  2. ₹ 1500
  3. ₹ 1300
  4. ₹ 1400
5. What is the price of sales made by all three friends?
  1. ₹ 3000
  2. ₹ 2500
  3. ₹ 2700
  4. ₹ 2400

**Answer Key:**

1. (a) ₹ 100
2. (c) ₹ 300
3. (d) ₹ 1200
4. (b) ₹ 1500
5. (c) ₹ 2700

## Chapter- 4, Determinants

### Day-9

1. Evaluate  $\begin{vmatrix} \cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ \end{vmatrix}$ .



2. If  $\begin{vmatrix} x+1 & x-1 \\ x-3 & x+2 \end{vmatrix} = \begin{vmatrix} 4 & -1 \\ 1 & 3 \end{vmatrix}$ , then write the value of x. 1
3. If  $\begin{vmatrix} x & x \\ 1 & x \end{vmatrix} = \begin{vmatrix} 3 & 4 \\ 1 & 2 \end{vmatrix}$ , then write the positive value of x. 1
4. Find the maximum value of  $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 + \sin\theta & 1 \\ 1 & 1 & 1 + \cos\theta \end{vmatrix}$ . 1

### Area of triangle Using determinants(2 marks)

- Find the area of the triangle whose vertices are (2,7),(1,1) and (10,8).
- Find the equation of the line joining A(1,3) and B(0,0) using determinants.
- Find the value of k, if the area of a triangle is 35 square units whose vertices are (2,-6),(5,4) and (k,4).

### Properties of determinants(1 marks each)

- Let A be a square matrix of order  $3 \times 3$ . Write the value of  $|2A|$ , where  $|A| = 4$ .
- If A is a square matrix of order 3 and  $|3A| = k|A|$ , then write the value of k.
- If A is a square matrix satisfying  $A'A = I$ , write the value of  $|A|$ .
- Find  $|AB|$ , if  $A = \begin{bmatrix} 0 & -1 \\ 0 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 3 & 5 \\ 0 & 0 \end{bmatrix}$
- If  $A = \begin{bmatrix} p & 2 \\ 2 & p \end{bmatrix}$  and  $|A^3| = 125$ , then, find the value of p.
- If A and B are square matrices of the same order 3, such that  $|A| = 2$  and  $AB = 2I$ . Write the value of  $|B|$ .
- If  $A = \begin{bmatrix} 4 & 2 & 5 \\ 2 & 0 & 3 \\ -1 & 1 & 0 \end{bmatrix}$ , write the value of  $|2AA^{-1}|$

### Singular Matrix(1 marks each)

- For what value of x, the matrix  $\begin{bmatrix} 2x & 4 \\ x+2 & 3 \end{bmatrix}$  is a singular matrix?
- In the interval  $\pi/2 < x < \pi$ , find the value of x for which the matrix  $\begin{bmatrix} 2\sin x & 3 \\ 1 & 2\sin x \end{bmatrix}$  is singular.

### Minors and Cofactors(1 marks each)s

- If  $A = \begin{bmatrix} 5 & 6 & -3 \\ -4 & 3 & 2 \\ -4 & -7 & 3 \end{bmatrix}$  then write the cofactor of the element  $a_{21}$ .
- If  $A_{ij}$  is the cofactor of the element  $a_{ij}$  of the determinant  $\begin{bmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{bmatrix}$ , then write the value of  $a_{32} \cdot A_{32}$ .
- Given determinant is  $\begin{vmatrix} -3 & 4 & 1 \\ 2 & 7 & 0 \\ 5 & 6 & -8 \end{vmatrix}$ . Find the value of  $a_{11}A_{21} + a_{12}A_{22} + a_{13}A_{23}$ , where  $A_{ij}$  is the co-factor of element  $a_{ij}$ .

### **Day-10**

### Adjoint and Inverse of a Matrix.(2 marks questions)

- If for any  $2 \times 2$  square matrix A,  $A(\text{adj } A) = \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$ , then write the value of  $|A|$ .
- Find  $|\text{adj } A|$ , if  $A = \begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}$ .
- If A is a square matrix of order 3 such that  $|\text{adj } A| = 64$ , then find  $|A|$ .

4. Write  $A^{-1}$  for  $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$
5. Write the adjoint of the following matrix:  $\begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$
6. If  $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ , then find  $|\text{adj}A|$ .
7. . If  $|A| = 2$  where  $A$  is a  $2 \times 2$  matrix, then ,find  $|\text{adj} A|$ .
8. Given  $A = \begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$ , compute  $|A|$  and show that  $2A^{-1} = 9I - A$
9. If  $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$  be such that  $A^{-1} = kA$ , then, find the value of  $k$ .
10. If  $A = \begin{bmatrix} 1 & -2 & 3 \\ 0 & -1 & 4 \\ -2 & 2 & 1 \end{bmatrix}$ , then find  $(A')^{-1}$ .
11. If  $A = \begin{bmatrix} -3 & -1 & 2 \\ 1 & 1 & -3 \\ 2 & 1 & 4 \end{bmatrix}$ , then find  $A \text{adj}A$  without finding  $\text{adj}A$ .
12. If  $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$ , verify that  $(AB)^{-1} = B^{-1}A^{-1}$ .
13. Show that for the matrix  $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$ ,  $A^3 - 6A^2 + 5A + 11I = O$ . Hence, find  $A^{-1}$ .
14. If  $A = \begin{bmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$ , find  $\text{adj} A$  and verify that  $A(\text{adj} A) = (\text{adj} A) A = |A|I_3$ .

### System of Equations (4 marks questions)

1. For what values of  $k$  the system of linear equations  
 $x + y + z = 2$   
 $2x + y - z = 3$   
 $3x + 2y + kz = 4$  has a unique solutions?
2. If  $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \\ 5 & 1 & 1 \end{bmatrix}$ , find  $A^{-1}$ . Hence solve the system of equations  
 $x + 3y + 4z = 8$   
 $2x + y + 2z = 5$   
and  $5x + y + z = 7$ .
3. Given  $A = \begin{bmatrix} 5 & 0 & 4 \\ 2 & 3 & 2 \\ 1 & 2 & 1 \end{bmatrix}$ ,  $B^{-1} = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$ , compute  $(AB)^{-1}$ .

4. If  $A = \begin{bmatrix} 2 & 3 & 10 \\ 4 & -6 & 5 \\ 6 & 9 & -20 \end{bmatrix}$ , find  $A^{-1}$ . Using  $A^{-1}$  solve the system of equations

$$\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4$$

$$\frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1 \text{ and}$$

$$\frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2, \quad x, y, z \neq 0.$$

5. If  $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix} \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix} = I$ . Solve the system of equation  $x-y+2z=1$ ,  $2y-3z=1$ ,  $3x-2y+4z=2$ .

6. Using matrices, solve the following system of equations.

$$x - y + 2z = 7$$

$$3x + 4y - 5z = -5$$

$$\text{and } 2x - y + 3z = 12$$

7. Using matrices, solve the following system of linear equations.

$$x + y - z = 3, \quad 2x + 3y + z = 10 \text{ and } 3x - y - 7z = 1.$$

8. If  $A = \begin{bmatrix} 3 & 2 & 1 \\ 4 & -1 & 2 \\ 7 & 3 & -3 \end{bmatrix}$ , then find  $A^{-1}$ . Hence solve the following system of equations  $3x + 2y + z = 6$ ,  $4x - y +$

$$2z = 5 \text{ and } 7x + 3y - 3z = 7..$$

9. If  $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 22 & -1 & 5 \end{bmatrix}$  then find  $AB$ . Use this to solve the system of equations  $x - y = 3$ ,  $2x + 3y + 4z = 17$  and  $y + 2z = 7$ .

**All the case studies carry 4 marks**

## Case Study Questions Determinants – 01

**DETERMINANTS:** Three shopkeepers Ram Lal, Shyam Lal, and Ghansham are using polythene bags, handmade bags (prepared by prisoners), and newspaper envelopes as carrying bags. It is found that the shopkeepers Ram Lal, Shyam Lal, and Ghansham are using (20,30,40), (30,40,20), and (40,20,30) polythene bags, handmade bags, and newspapers envelopes respectively. The shopkeeper's Ram Lal, Shyam Lal, and Ghansham spent ₹250, ₹270, and ₹200 on these carry bags respectively.

1. What is the cost of one polythene bag?

1. ₹ 1
2. ₹ 2
3. ₹ 3
4. ₹ 5

2. What is the cost of one handmade bag?

1. ₹ 1
2. ₹ 2
3. ₹ 3
4. ₹ 5

3. What is the cost of one newspaper bag?

1. ₹ 1
2. ₹ 2
3. ₹ 3
4. ₹ 5

4. Keeping in mind the social conditions, which shopkeeper is better?

1. Ram Lal
  2. Shyam Lal
  3. Ghansham
  4. None of these
5. Keeping in mind the environmental conditions, which shopkeeper is better?
1. Ram Lal
  2. Shyam Lal
  3. Ghansham
  4. None of these

**Answer Key:**

1. (a) ₹1
2. (b) ₹ 2
3. (d) ₹ 5
4. (b) Shyam Lal
5. (a) Ram Lal

**Case Study Questions Determinants – 02**

Ram purchases 3 pens, 2 bags, and 1 instrument box and pays ₹ 41. From the same shop, Dheeraj purchases 2 pens, 1 bag, and 2 instrument boxes and pays ₹29, while Ankur purchases 2 pens, 2 bags, and 2 instrument boxes and pays ₹44.

Read the above information and answer the following questions:

1. Find the cost of one pen.
  1. ₹ 2
  2. ₹ 5
  3. ₹ 10
  4. ₹15
2. What are the cost of one pen and one bag?
  1. ₹ 12
  2. ₹ 15
  3. ₹ 17
  4. ₹25
3. What is the cost of one pen & one instrument box?
  1. ₹ 7
  2. ₹ 12
  3. ₹ 17
  4. ₹25
4. What is the cost of one bag & one instrument box?
  1. ₹ 20
  2. ₹ 25
  3. ₹ 10
  4. ₹15
5. Find the cost of one pen, one bag, and one instrument box.
  1. ₹ 22
  2. ₹ 25
  3. ₹ 20
  4. ₹24

**Answer Key:**

1. (a) ₹ 2
2. (c) ₹17
3. (a) ₹7
4. (a) ₹20
5. (a) ₹22



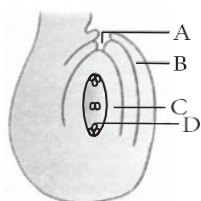
# BIOLOGY-XII

## Chapter 1: Sexual Reproduction in Flowering Plants

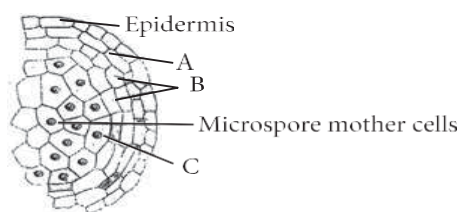
### DAY-1

#### Topic: Pre-Fertilisation: Structures and Events

1. The following statements (a), (b) and (c) seem to describe the water-pollinated submerged plants. Which one of these statements is incorrect? 1
  - (a) The flowers do not produce nectar.
  - (b) The pollen grain has mucilaginous covering.
  - (c) The brightly coloured female flowers have long stalk to reach the surface.
2. Angiosperms bearing unisexual flowers are said to be either monoecious or dioecious. Explain with the help of one example of each. 2
3. Identify and label the parts in the given anatropous ovule. 2



4. Draw a diagram of a male gametophyte of an angiosperm. Label any four parts. Why is sporopollenin considered the most resistant organic material? 3
5. Given below is an enlarged view of one microsporangium of a mature anther. 3



- (a) Name 'A', 'B' and 'C' wall layers.
  - (b) Mention the characteristics and function of the cells forming wall layer 'C'.
6. (a) Describe the process of megasporogenesis in angiosperms until 8 nucleate stage. 5
  - (b) Draw the labelled structure of mature embryo sac.

### DAY-2

#### Topic: Double Fertilisation

1. Mention the exact location or the site in a flowering plant where the following developments take place. 1
  - (a) Triple fusion
  - (b) Release of male gametes
2. Explain the process of double fertilisation in angiosperms. 2
3. Mention the reasons for difference in ploidy of zygote and primary endosperm nucleus in an angiosperm. 2
4. Draw a diagram of a fertilised embryo sac of a dicot flower. Label all its cellular components. 3
5. In angiosperms, zygote is diploid while primary endosperm cell is triploid. Explain. 3
6. In an angiosperm, the embryo sac is haploid, zygote is diploid and endosperm is triploid. Justify giving reasons for each stage. 3
7. Why does a pollen grain possess two male gametes? Explain. 3

### DAY-3

#### Topic: Post-Fertilisation: Structures and Events

1. The meiocyte of rice has 24 chromosomes. Write the number of chromosomes in its endosperm. 1
2. A non-biology person is quite shocked to know that apple is a false fruit, mango is a true fruit and banana is a seedless fruit. As a biology student how would you satisfy this person? 2
3. Differentiate between albuminous and non-albuminous seeds, giving one example of each. 2
4. Explain the development of fertilised egg cell up to a mature embryo in a dicot plant. Draw a labelled diagram of a mature dicot embryo. 3

5. Describe the development of endosperm after double fertilisation in an angiosperm. Why does endosperm development precede that of zygote? 3
6. A flower of tomato plant following the process of sexual reproduction produces 200 viable seeds. Answer the following questions giving reasons. 5
  - (a) What would have been the minimum number of ovules present in per pollinated pistil?
  - (b) How many microspore mother cells would minimally be required to produce requisite number of pollen grains?
  - (c) How many pollen grains must have minimally pollinated the carpel?
  - (d) How many male gametes would have used to produce these 200 viable seeds?
  - (e) How many megaspore mother cells were required in this process?

#### DAY-4

#### Topic: Apomixis and Polyembryony

1. Normally one embryo develops in one seed but when an orange seed is squeezed many embryos of different shapes and sizes are seen. Mention how it has happened. 1
2. What is apomixis? How is the phenomenon useful to the farmer? 2
3. Fertilisation is essential for production of seed, but in some angiosperms, seeds develop without fertilisation. 2
  - (a) Give an example of an angiosperm that produces seeds without fertilisation. Name the process.
  - (b) Explain the two ways by which seeds develop without fertilisation
4. 2
  - (a) Why are seeds of some grasses called apomictic? Explain.
  - (b) State two reasons to convince a farmer to use an apomictic crop.
5. 3
  - (a) How is apomixis different from parthenocarpy?
  - (b) Describe any two modes by which apomictic seeds can be produced
6. With the help of an example of each explain the following: Apomixis, Polyembryony 3

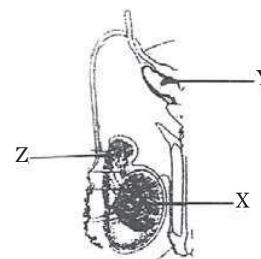
### Chapter 2: Sexual Reproduction in Flowering Plants

#### DAY-5

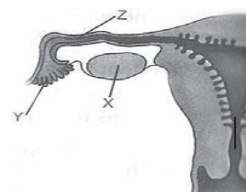
#### Topic: The Male & Female Reproductive System

1. Name the cells that nourish the germ cells in the testes. Where are these cells located in the testes? 1
2. Why are the human testes located outside the abdominal cavity? Name the pouch in which they are present. 2
3. Write the location and functions of the following in human testes: 2
  - (a) Sertoli cells
  - (b) Leydig's cells
4. The above diagram shows human male reproductive system (one side only). 3

- (a) Identify 'X' and write its location in the body.
- (b) Name the accessory gland 'Y' and its secretion.
- (c) Name and state the function of 'Z'



5. Draw a labelled diagram of the sectional view of the seminiferous tubule of a human 3
6. The diagram above shows a part of the human female reproductive system. 3
  - (a) Name the gamete cells that would be present in 'X' if taken from a newborn baby.
  - (b) Name 'Y' and write its function.
  - (c) Name 'Z' and write the events that take place here.

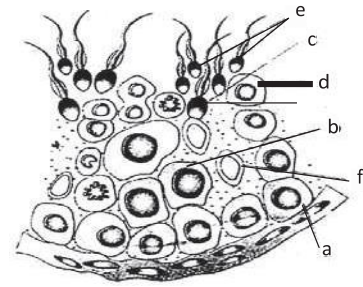


- (a) Draw a labelled diagrammatic view of human male reproductive system. 5
- (b) Differentiate between:
  - i. Vas deferens and vasa efferentia.
  - ii. Spermatogenesis and spermiogenesis.

#### DAY-6

#### Topic: Gametogenesis

- 1 When do the oogenesis and the spermatogenesis initiate in human females and males respectively? 1
- 2 Explain the hormonal regulation of the process of spermatogenesis in humans. 2
- 3 Differentiate between gametogenesis in human males and females on the basis of 2
  - (a) time of initiation of the process.
  - (b) Products formed at the end of the process
- 4 Name the labels a, b, c, d, e, f in the diagram of seminiferous tubule 3

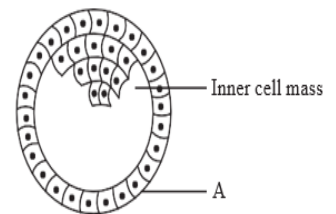


- 5 Draw a diagram of human sperm. Label only those parts along with their functions, that assist the sperm to reach and enter the female gamete. 3
- 6 Draw a sectional view of human ovary. Label the following parts: 3
  - (i) Primary follicle
  - (ii) Ovum
  - (iii) Graafian follicle
  - (iv) Corpus luteum
- 7 (a) How is 'oogenesis' markedly different from 'spermatogenesis' with respect to the growth till puberty in the humans? 5
- (b) Draw a sectional view of human ovary and label the different follicular stages, ovum and corpus luteum

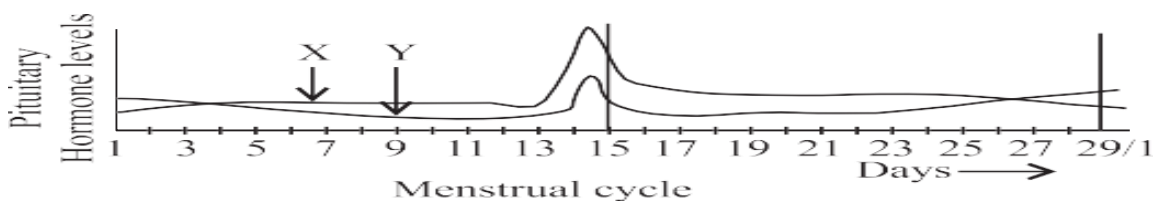
### DAY-7

#### Topic: Menstrual Cycle, Fertilisation and Implantation

1. Write the physiological reason, why a woman generally cannot conceive a child after 50 years of age? 1
2. When does the corpus luteum degenerate? Explain the immediate consequences of its degeneration in human female. 2
3. Enumerate the events in the ovary of a human female during: 2
  - (a) Follicular phase,
  - (b) Luteal phase of menstrual cycle.
4. Explain the role of pituitary and the ovarian hormones in menstrual cycle in human females 3
5. Study the figure given below and answer the questions that follow: 3



- (a) Name the stage of human embryo the figure represents.
- (b) Identify 'A' in the figure and mention its functions.
- (c) Mention the fate of the inner cell mass after implantation in uterus.
- (d) Where are the stem cells located in this embryo?
6. Study the graph given below and answer the questions that follow: 5



- (a) Name the hormones 'X' and 'Y'.
- (b) Identify the ovarian phases during menstrual cycle
  - (i) 5<sup>th</sup> day to 12<sup>th</sup> day of the cycle
  - (ii) 14<sup>th</sup> day of the cycle
  - (iii) 16<sup>th</sup> day to 25<sup>th</sup> day of the cycle
- (c) Explain the ovarian events (i), (ii) and (iii) under the influence of hormones 'X' and 'Y'.

## DAY-8

### Topic: Pregnancy and Embryonic Development

1. Write the function of oxytocin 1
2. Comment on the role of placenta as an endocrine gland. 2
3. When and where do chorionic villi appear in humans? State their function 2
4. Explain the function of umbilical cord 2
5. (a) How is placenta formed in the human female? 3  
(b) Name any two hormones which are secreted by it and are also present in a non-pregnant woman
6. (a) When and how does placenta develop in human female? 5  
(b) How is the placenta connected to the embryo?  
(c) Placenta acts as an endocrine gland. Explain

## DAY-9

### Topic: Parturition and Lactation

1. What stimulates pituitary to release the hormone responsible for parturition? Name the hormone 1
2. (a) Where do the signals for parturition originate from in humans? 2  
(b) Why is it important to feed the newborn babies on colostrum?
3. Why is parturition called a neuroendocrine mechanism? 2
4. How is the milk production regulated by hormones in human female? Explain. 3
5. Why is breast feeding recommended during the initial period of an infant's growth? Give reason. 3
6. Describe the process of parturition in humans 3

## Chapter 3: Reproductive Health

## DAY-10

### Topic: Reproductive Health-Problems and Strategies Population Explosion and Birth Control

1. Name an IUD that you would recommend to promote the cervix hostility to the sperms. 1
2. What is amniocentesis? How is it misused? 2
3. Why are copper containing intrauterine devices considered an ideal contraceptive for human females? 2
4. (a) Mention the problems that are taken care of by Reproduction and Child Health Care Programme. 3  
(b) What is amniocentesis and why there is a statutory ban on it?
5. (a) List any four characteristics of an ideal contraceptive. 3  
(b) Name two intrauterine contraceptive devices that affect the motility of sperms.
6. A woman has certain queries as listed below, before starting with contraceptive pills. Answer them: 3  
(a) What do contraceptive pills contain and how do they act as contraceptives?  
(b) What schedule should be followed for taking these pills?
7. "Intra-Cytoplasmic Sperm Injection" and 'Gamete Intra Fallopian Transfer' are two assisted reproductive technologies. How is one different from other? 3
8. Why is ZIFT a boon to childless couples? Explain the procedure. 3
9. Reproductive and Child Health Care (RCH) Programmes are currently in operation. One of the major tasks of these programmes is to create awareness amongst people about the wide range of reproduction related aspects as this is important and essential for building a reproductively healthy society. 4  
(a) "Providing sex education in schools is one of the ways to meet this goal." Give four points in support of your opinion regarding this statement.  
(b) List any two 'indicators' that indicate a reproductively healthy society.

## DAY-11

### Topic: Infertility

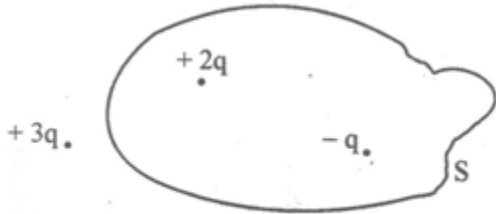
1. Name any two assisted reproductive technologies that help infertile couples to have children 1
2. Expand: GIFT and ICSI. 1
3. After a brief medical examination, a healthy couple came to know that both of them are unable to produce functional gametes and should look for an 'ART' (Assisted Reproductive Technique). 2



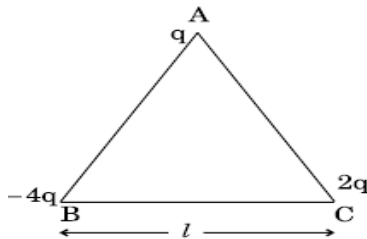
- Name the 'ART' and the procedures involved that you can suggest to them to help them bear a child.
4. An infertile couple is advised to adopt test- tube baby programme. Describe two principle procedures adopted for such technologies 2
  5. Suggest and explain any three Assisted Reproductive Technologies (ART) to an infertile couple. 3
  6. A large number of married couples over the world are childless. It is shocking to know that in India the female partner is often blamed for the couple being childless. 4
    - (a) Why in your opinion the female partner is often blamed for such situations in India? Mention any two values that you as a biology student can promote to check this social evil.
    - (b) State any two reasons responsible for the cause of infertility.
    - (c) Suggest a technique that can help the couple to have a child where the problem is with male partner
  7. Your school has been selected by the Department of Education to Organise and host an interschool seminar on "Reproductive Health-Problems and Practices". However, many parents are reluctant to permit their wards to attend it. Their argument is that the topic is "too embarrassing". Put forth four arguments with appropriate reasons and explanation to justify the topic to be very essential and timely. 4

**PHYSICS**  
**Electric charges and field**  
**DAY-1**

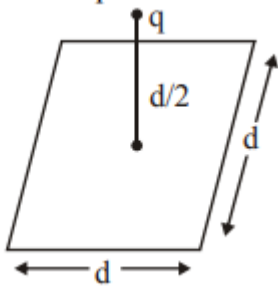
- 1 What do you mean by quantization of charge? 1
- 2 Figure shows three point charges,  $+2q$ ,  $-q$  and  $+3q$ . Two charges  $+2q$  and  $-q$  are enclosed within a surface  $S$ . What is the electric flux due to this configuration through the surface  $S$ ? 1



- 3 Three point charges  $q$ ,  $-4q$  and  $2q$  are placed at the vertices of an equilateral triangle ABC of side 'l' as shown in the figure. Obtain the expression for the magnitude of the resultant electric force acting on the charge  $q$ . 2



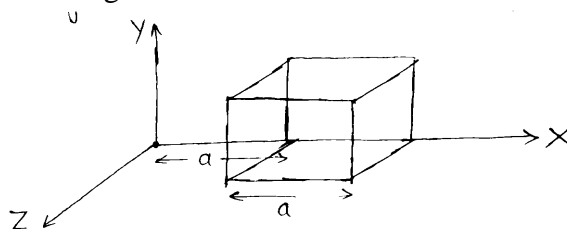
- 5 Write the properties of electric field lines. 1
- 6 (a) Define electric flux. Is it a scalar or a vector quantity? A point charge  $q$  is at a distance of  $d/2$  directly above the centre of a square of side  $d$ , as shown in the figure. Use Gauss' law to obtain the expression for the electric flux through the square. 3



(b) If the point charge is now moved to a distance 'd' from the centre of the square and the side of the square is doubled, explain how the electric flux will be affected.

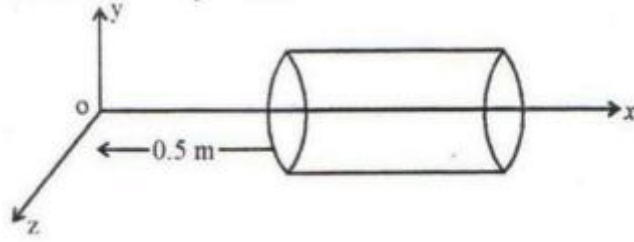
**DAY-2**

- 7 The electric field components are  $E_x = \alpha x^{\frac{1}{2}}$ ,  $E_y = 0$ ,  $E_z = 0$  in which  $\alpha = 800 \text{ N/cm}^{\frac{1}{2}}$ . Calculate (a) the flux through the cube & (b) the charge within the cube. Here  $a = 0.1 \text{ m}$ . 3



- 8 A hollow cylindrical box of length 0.5 m and area of cross-section  $20 \text{ cm}^2$  is placed in a three 3

dimensional coordinate system as shown in the figure. The electric field in the region is given by  $E_x = 20i$ , where  $E$  is  $\text{NC}^{-1}$  and  $x$  is in metres. Find (i) Net flux through the cylinder. (ii) Charge

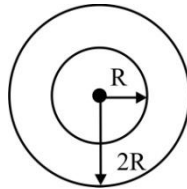


enclosed in the cylinder.

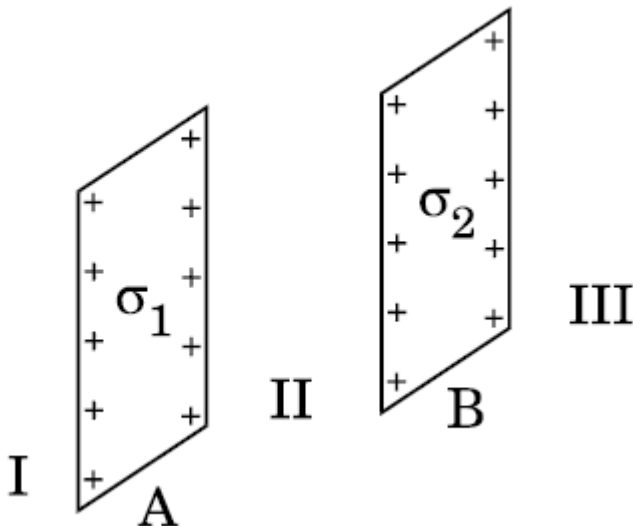
- 9 Define electric dipole moment . Write it's S. I. Unit. 3  
 Derive an expression for net electric field, due to an electric dipole at –  
 (i) Axial point (ii) Equatorial point
- 10 A system has two charges  $q_A = 2.5 \times 10^{-7} \text{ C}$  &  $q_B = -2.5 \times 10^{-7} \text{ C}$  located at points A (0,0,-15) cm & B (0, 0,+15)cm respectively. What are the total charge & electric dipole moment of the system? 2

**DAY-3**

- 11 Two concentric metallic spherical shells of radius  $R$  &  $2R$  are given charges  $Q_1$  &  $Q_2$  respectively. The surface charge densities on the outer surfaces of shells are equal. Determine the ration  $Q_1 : Q_2$ . 2



- 12 (a) Use Gauss' law to derive the expression for the electric field ( $E$ ) due to a straight uniformly charged infinite line of charge density  $\lambda \text{ C/m}$ . 3  
 (b) Draw a graph to show the variation of  $E$  with perpendicular distance  $r$  from the line of charge.
- 13 (a) A point charge ( $+Q$ ) is kept in the vicinity of uncharged conducting plate. Sketch electric field lines between the charge and the plate. 3  
 (b) Two infinitely large plane thin parallel sheets having surface charge densities  $\sigma_1$  and  $\sigma_2$  ( $\sigma_1 > \sigma_2$ ) are shown in the figure. Write the magnitudes and directions of the net fields in the regions marked I, II and III.

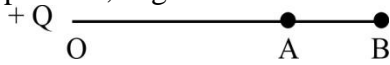


**DAY-4**

- 14 Using Gauss's law, derive an expression for electric field intensity at inside and outside of a uniformly charged thin spherical shell of radius  $R$  & charge density  $\sigma \text{ C/m}^2$ . 2
- 15 Derive an expression for torque experienced by an electric dipole kept in uniform external electric field. 3  
 An electric dipole with dipole moment  $4 \times 10^{-9} \text{ C-m}$  is aligned at  $30^\circ$  with the direction of a uniform electric field of magnitude  $5 \times 10^4 \text{ N/C}$ . Calculate the magnitude of the torque.

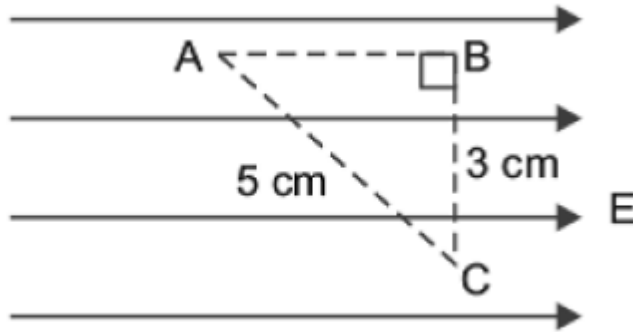
## ELECTROSTATIC POTENTIAL AND CAPACITANCE

- 1 Derive an expression for electrostatic potential due to a point charge at distance  $r$ . 1
- 2 Draw a plot showing the variation of (i) electric field ( $E$ ) & (ii) electric potential ( $V$ ) with distance  $r$  due to a point charge. 1
- 3 A point charge  $+Q$  is placed at point  $O$  as shown in figure. Is the potential difference  $V_A - V_B$  positive, negative or zero? 2



### DAY-5

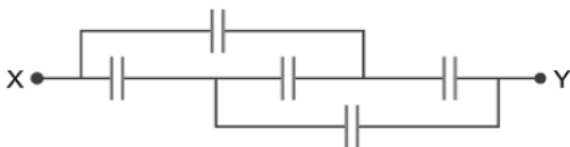
- 4 Three points A, B and C lie in a uniform electric field ( $E$ ) of  $5 \times 10^3 \text{ NC}^{-1}$  as shown in the figure. Find the potential difference between A and C. 2



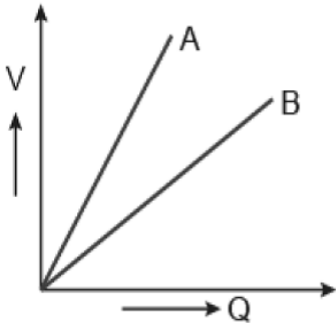
- 5 Draw equipotential surface due to
  - (i) an electric dipole 3
  - (ii) Two identical positive charge
  - (iii) In the case of a single point charge and
  - (iv) In a constant electric field in Z-direction.
- 6 Derive an expression for potential energy of an electric dipole placed in uniform external electric field. Hence find out the amount of work done in rotating it from the position of unstable equilibrium to the stable equilibrium 3
- 7 Explain the following- 3
  - (i) Inside a conductor, electrostatic field is zero
  - (ii) At the surface of a charged conductor, electrostatic field must be normal to the surface at every point
  - (iii) Show that electric field at the surface of a charged conductor  $E = \frac{\sigma}{\epsilon_0} \hat{n}$  where  $\sigma$  is the surface charge density and  $\hat{n}$  is a unit vector normal to the surface in the outward direction

### DAY-6

- 8 Define capacitance of a capacitor, write its S.I. unit. Derive an expression for the capacitance of a parallel plate capacitor, whose plates are separated by a dielectric medium 3
- 9 A metal plate is introduced between the plates of a charged parallel plate capacitor. What is its effect on the capacitance of the capacitor? 2
- 10 Find the equivalent capacitance of the network shown in the figure, when each capacitor is of  $1 \mu\text{F}$ . When the ends X and Y are connected to a 6 V battery, find out (i) The charge and (ii) The energy stored in the network. 2

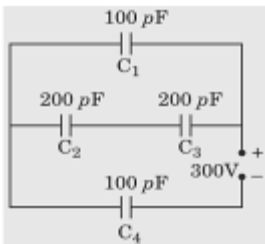


- 11 The graph shows the variation of voltage ' $V$ ' across the plates of two capacitors A and B versus increase of charge ' $Q$ ' stored on them. Which of the two capacitors has higher capacitance? Give reason for your answer. 2



### DAY-7

- 12 A capacitor of capacitance  $C$  is charged fully by connecting it to a battery of emf  $E$ . It is then disconnected from the battery. If the separation between the plates of the capacitor is now doubled, how will the following change? 3  
 (a) Charge stored by the capacitor. (b) Field strength between the plates. (c) Energy stored by the capacitor. Justify your answer in each case.
- 13 A parallel plate capacitor is charged by a battery, which is then disconnected. A dielectric slab is then inserted in the space between the plates. Explain what changes, if any, occur in the values of: 3  
 (i) Capacitance  
 (ii) Potential difference between the plates  
 (iii) Electric field between the plates, and  
 (iv) The energy stored in the capacitor
- 14 Obtain the equivalent capacitance of the network in Fig. For a 300 V supply, determine the charge and voltage across each capacitor. 3



- 15 A 600pF capacitor is charged by a 200V supply. It is then disconnected from the supply and is connected to another uncharged 600 pF capacitor. How much electrostatic energy is lost in the process 2

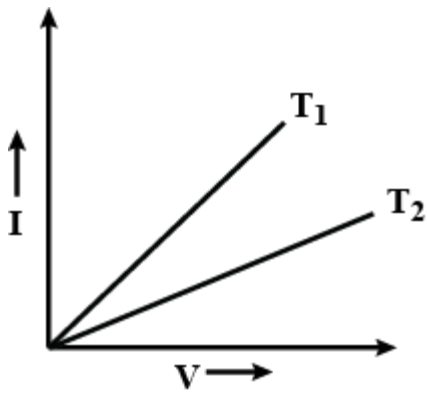
### Current Electricity

#### DAY-8

- 1 What are the factors on which the resistance of conductor depends? Define resistivity and write its SI unit 1
- 2 A potential difference  $V$  is applied across the ends of copper wire of length  $l$  and diameter  $D$ . What is the effect on drift velocity of electrons if 2  
 (i)  $V$  is halved (ii)  $l$  is doubled. (iii)  $D$  is halved.
- 3 Two wires, one of copper and the other of manganin, have same resistance and equal thickness. Which wire is longer? Justify your answer. 2
- 4 How does the drift velocity of electrons in a metallic conductor vary with the increase in potential difference ? 1
- 5 Define the term 'mobility of charge carriers in a conductor. Write its SI unit. What is its relation with relaxation time? 2

#### DAY-9

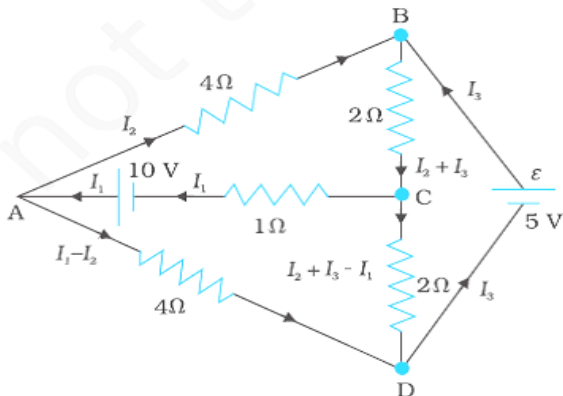
- 6 Write the limitations of ohm's law. 2  
 I – V graph for a metallic wire at two different temperatures,  $T_1$  and  $T_2$  is as shown in the figure. Which of the two temperatures is lower and why?



- 7 Explain with graph how the resistivity of metals, alloy, semiconductor or insulations depends on temperature. 3
- 8 The emf of a cell is always greater than its terminal voltage. Why? Give reason. 2
- 9 A cell of emf 'E' and internal resistance 'r' draws a current 'I'. Write the relation between terminal voltage 'V' in terms of E, I and r. 2
- 10 Plot a graph showing variation of voltage Vs the current drawn from the cell. How can one get information from this plot about the emf of the cell and its internal resistance? 2

**DAY-10**

- 11 A storage battery of emf 8.0 V and internal resistance 0.5  $\Omega$  is being charged by a 120 V dc supply using a series resistor of 15.5  $\Omega$ . What is the terminal voltage of the battery during charging? What is the purpose of having a series resistor in the charging circuit? 2
- 13 State Kirchoff's rules and explain on what basis they are justified. 2
- 14 Determine the current in each branch of the network shown in Fig. 3



- 15 Draw a circuit diagram showing balancing of Wheatstone bridge. Use Kirchoff's rules to obtain the balance condition in terms of the resistances of four arms of wheat stone Bridge 3

## CHEMISTRY-XII

### Chapter – Solution

#### Day1

##### Sub topic- Type of solution and expression concentration of solution

- 1-Which of the following are independent of temperature 1  
(a) Molarity (b) Molality. (c) Molarity and mole fraction (d) none
- 2- What is the concentration of 22 gram of carbon dioxide occupying 0.5 m<sup>3</sup> volume? 1  
(a) 1 m/l. (b) 2 m/l (c) 11 m/l. (d) 22 m/l
- 3-Calculate the molality of 10% w/w aqueous solution of H<sub>2</sub>SO<sub>4</sub>. 2
- 4- Calculate the molarity of 9.8% W/W solution of H<sub>2</sub>SO<sub>4</sub>, if the density of the solution is 1.02 g ml<sup>-1</sup> 3
- 5-This solution of glucose in the water is labelled is 10% (by mass). what would be the molality and molarity of the solution if the density of solution 1.2 g /ml 5

#### Day 2

##### Topic- Solubility

- 1-For most solid solute, what happens to the solubility as the temperature increases? 1  
(a) Solubility increases.  
(b) solubility decrease  
(c) solubility is stay the same  
(d) none of these
- 2-the solubility of a gas in liquid which of the most appropriate explanation 1  
(a) Increasing increase increase the rate at which gaseous particle are striking the surface solution  
(b) Increase in pressure increase the number of gaseous particle per unit volume over the solution  
(c) Increase in pressure increase the solubility of gas in solution  
(d) All of the above
- 3-Explain why aquatic species are more comfortable in cold water rather than in warm water. 2
- 4-State Raoult's law. How is it formulated for solutions of non-volatile solutes? 3
- 5-(a)State Henry's law and mention two of its important applications 5  
(b) H<sub>2</sub>S a toxic gas with rotten egg like smell ,is used for qualitative analysis. If the solubility of H<sub>2</sub>S in water at STP is 0.195 m, calculate Henry's law constant.

#### Day 3

##### Topic- Vapour pressure of liquid solution ,ideal and non ideal solution

- 1- of the following statements regarding Ideal solutions is false? 1  
a) Ideal solutions obey Raoult's law under all conditions of temperature and concentrations  
b) There will be some change in volume on mixing the components, i.e.,  $\Delta V_{\text{mixing}} \neq 0$   
c) There will be no change in enthalpy when the two components are mixed, i.e.,  $\Delta H_{\text{mixing}} = 0$   
d) There will be no change in volume on mixing the components, i.e.,  $\Delta V_{\text{mixing}} = 0$
- 2-Which of the following is an example of a non-ideal solution showing positive deviation? 1  
a) Acetone + Carbon disulphide  
b) Chlorobenzene +Bromobenzene  
c) Chloroform + Benzene  
d) Acetone + Aniline
- 3-The vapour pressure of a dilute aqueous solution of glucose is 750 mm of Hg at 373K.Calculate the mole fraction of the solute. 2
- 4- What is the difference between ideal and non ideal solution. 3
- 5- The vapour pressure of pure liquid A&B are 450 and 700 mm Hg respectively at 350 K . Find out the composition of the liquid mixture if total vapour pressure is 600 mm Hg .Also find the composition of the vapour phase. 5

#### Day 4

##### Topic- colligative property and abnormal molar mass

1-When a non-volatile solute is added to a solvent what is the difference in vapor pressure expressed as a fraction of original vapor pressure equal to? 1

- a) Mole fraction of solute in vapor phase
- b) Mole fraction of solvent in vapor phase
- c) Mole fraction of solute in liquid phase
- d) Mole fraction of solvent in liquid phase

2-Which of the following is Raoult's law applicable to, in order to determine molar masses correctly? 1

- a) Ionic solute in liquid
- b) Non-ionic solute in dilute solution
- c) Non-ionic solute in concentrated solution
- d) Ionic solid in insoluble form in solvent

3-Vapour pressure of pure water at 298 K is 23.8 mm Hg. 50 g of urea ( $\text{NH}_2\text{CONH}_2$ ) is dissolved in 850 g of water. Calculate the vapour pressure of water for this solution and its relative lowering. 2

4-Boiling point of water at 750 mm Hg is  $99.63^\circ\text{C}$ . How much sucrose is to be added to 500 g of water such that it boils at  $100^\circ\text{C}$ . 3

5-(a) Calculate the depression in the freezing point of water when 10g of  $\text{CH}_3\text{CH}_2\text{CHClCOOH}$  is added to 250g of water.  $K_a = 1.4 \times 10^{-3}$   $K_f = 1.86 \text{ K kg mol}^{-1}$ .

(c) Vapour pressure of water at 293 K is 17.535 mm Hg. Calculate the vapour pressure of water at 293 K when 25 g of glucose is dissolved in 450 g of water. 5

### Day-5

#### Assertion and reason type questions

(a) Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A).

(b) Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A).

(c) Assertion (A) is correct, but Reason (R) is incorrect statement.

(d) Assertion (A) is incorrect, but Reason (R) is correct statement

1-Assertion (A) : Osmotic pressure is a colligative property.

Reason (R) : Osmotic pressure is directly proportional to molarity. 1

2-Assertion : The value of colligative properties are of small order for colloids as compared to true solution. 1

Reason : Number of particles in colloidal solution is comparatively smaller than true solutions.

3-Assertion (A): Elevation in boiling point is a colligative property. 1

Reason (R): Elevation in boiling point is directly proportional to molality.

4-Assertion The values of colligative properties are of smaller order as compared to values shown by true solutions at same concentrations. 1

Reason: Osmotic pressure is best method to calculate the molar mass of macromolecules.

### Chapter-Electrochemistry:

#### Day6

1-Which of the following Electrode act as inert electrode? 1

- a) Platinum
- b) Gold
- c) Copper
- d) Both a&b

2-In Electrochemical cell(Galvanic cell) the flow of electron occur from - 1

- a) Zinc to copper
- b) Cu to Zn
- c) Both a&b
- d) None

3-Depict the Voltaic cell in which the reaction  $\text{Zn(s)} + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{Ag(s)}$  takes place. Further show: 2



a) Which of the electrode is positively charged

b) Individual reaction at each electrode

4-Give reason:

a)  $\text{Fe}^{3+}$  can not oxidize  $\text{Br}^-$  to  $\text{Br}_2$  under standard condition ( $E^0 \text{Fe}^{3+}|\text{Fe}^{2+} = 0.77\text{V}$ ,  $E^0 \text{Br}_2|\text{Br}^- = 1.09\text{V}$ )

b) Metal like Cu and Ag can't displace hydrogen from acid

c) Potential of a single electrode can't be measured.

5-Answer the following:

a) Can you store copper sulphate solution in a zinc pot?

b) What is the electrochemical series?

c) What would happen if no salt bridge were used in an electrochemical cell?

d) What is the reference electrode in determining the standard electrode potential?

e) What flows in the internal circuit of a galvanic cell?

### Day 7

#### Sub Topic – Nernst Equation

1-Nernst gave a quantitative relationship between –

a) Electrode potential and concentration of ion

b) Cell potential and concentration of ions

c) Both a & b

d) None of these

2-The electrode potential of a zinc electrode in which the zinc ion concentration is  $0.001\text{M}$  ( $E^0 \text{Zn}^{2+}|\text{Zn} = -0.76\text{V}$ ,  $\log 10 = 1$ )

a)  $0.34\text{V}$

b)  $0.80\text{V}$

c)  $-0.85\text{V}$

d)  $-2.30\text{V}$

3-Write the Nernst equation for the following cells

a)  $\text{Al}|\text{Al}^{3+} || \text{Ni}^{2+}|\text{Ni}$

b)  $\text{Mg}|\text{Mg}^{2+} || \text{Ag}^+|\text{Ag}$

c)  $\text{Zn}|\text{Zn}^{2+} || \text{HCl}|\text{H}_2, \text{Pt}$

d)  $\text{Zn}|\text{Zn}^{2+} || \text{Cu}^{2+}|\text{Cu}$

4-Calculate the standard electrode potential of  $\text{Ni}^{2+}|\text{Ni}$  electrode if the cell potential of the cell is

$0.59\text{V}$  (Given  $E^0 \text{Cu}^{2+}|\text{Cu} = 0.34\text{V}$ ) Cell reaction is  $\text{Ni}|\text{Ni}^{2+}(0.01\text{M}) || \text{Cu}^{2+}(0.1\text{M})|\text{Cu}$

5-Explain the following:

a) Write any two applications of the Nernst equation.

b) Write the relation between the equilibrium constant and  $E^0_{\text{cell}}$ .

c) Differentiate between emf and cell potential.

d) Calculate the standard Gibbs free energy change for the Daniell cell.

### Day 8

#### Electrolytic cell

1-Which of the following is incorrect about an electrolytic cell?

a) Electrical energy is converted into chemical energy

b) Anode is positively charged

c) Cathode is negatively charged

d) Chemical energy is converted into electrical energy

2-How many coulombs are required for the oxidation of 1 mole of  $\text{H}_2\text{O}$  to  $\text{O}_2$ ?

a)  $1.93 \times 10^5$

b)  $9.65 \times 10^4$

c)  $3.86 \times 10^5$

d)  $4.84 \times 10^4$

3-A solution of copper sulphate is electrolysed between Pt electrodes using a current of 7 amperes for 25 minutes. What mass of copper is deposited at the cathode?

- 4-Three electrolytic cell X ,Y Z containing solution of  $\text{CuSO}_4$ ,  $\text{ZnSO}_4$  and  $\text{AgNO}_3$  respectively are connected in series .A steady current of 2.5 amperes was passed through them until 1.45 g of copper deposited at the cathode in cell X .How long did the current flow ? what mass of Ag and Zn deposited. 3
- 5-Predict the product of electrolysis in each of the following: 5
- An aqueous solution of  $\text{AgNO}_3$  with Ag electrode
  - An aq solution of  $\text{Cu}(\text{NO}_3)_2$  with Pt electrode
  - Dilute solution of  $\text{H}_2\text{SO}_4$  with Pt electrode
  - Concentrated solution of  $\text{H}_2\text{SO}_4$  with Pt electrode
  - Molten NaCl with Pt electrode

### Day-9 Battery

- 1-Which of the following is not a primary Battery 1
- Leclanche battery
  - Hg Battery
  - Ni-Cd battery
  - Dry battery
- 2-In Dry cell the depolarizer is 1
- $\text{NH}_4\text{Cl}$
  - Zn
  - $\text{MnO}_2$
  - KOH
- 3-Write the cell reaction involve in lead storage batter during – 2
- Charging condition
  - Discharging condition
- 4- Explain how rusting of iron is envisaged(possible) as setting of electrochemical cell.? 3
- 5-Give reason: 5
- Rusting is accelerate in acidic medium
  - Presence of impurity increases the process of rusting
  - Galvanization prevent rusting
  - Alkaline solution act as anti rust
  - Rusting is not a electrolytic process

### Day10

#### Topic-Conductance in electrolytic solution

- 1-Which of the following will have greater conductance? 1
- 0.1M acetic acid
  - 0.2M acetic acid
  - 1M acetic acid
  - 0.01M acetic acid
- 2-It is not possible to determine limiting molar conductivity for weak electrolyte by extrapolation because:1
- molar conductivity does not increases linearly with dilution as for strong electrolyte
  - On dilution curve become parallel to Y axis for weak electrolyte
  - On dilution molar conductivity increases sharply
  - All of the above
- 3-The conductivity of 0.4M solution of KCl at 298 K is  $0.0496 \text{ Scm}^{-1}$  . Calculate its molar conductivity. 2
- 4-i) The resistance of conductivity cell containing 0.02M KCl at 298 K is 1600 ohm .What is the cell Constant. 3
- ii) Why conductivity decreases on dilution?
- 5-i) Define Kohlrausch's law . 5
- ii) The electrical resistance of a column of 0.05M NaOH solution of diameter 1cm and length 50cm is 5.55 ohm. Calculate its resistivity ,Conductivity and molar conductivity.
- iii) The molar conductivity of a solution ethanoicacid is  $210 \text{ Scm}^2 \text{ mol}^{-1}$  and its limiting molar conductivity is  $400 \text{ Scm}^2 \text{ mol}^{-1}$ . Calculate its degree of dissociation.

## PHYSICAL EDUCATION

### Unit-1 Management of Sporting EventsDay-1

- Q1- Which of them are part of Sports management? 1  
a) Planning b) Organizing and Staffing c) Directing and Controlling d) All of the above
- Q2- Pre-works of organizing Secretary are 1  
a) Good planning b) Staff grouping and their cooperation c) Raising funds d) All of the above
- Q3- What is planning? Give a definition of planning. 2
- Q4- Describe Five objectives of planning in sports. 2

### Unit-1 Management of Sporting EventsDay-2

- Q1-In knockout tournament a team has to play 1  
a) Play large number of Matches b) Play one match c) Gets Bye d) Play till they are winning
- Q2- What is role of various committees in planning in sports? 3
- Q3- What is the role of technical advisor? 2

### Unit-1Management of Sporting EventsDay-3

- Q1- What do you understand by tournament? 1
- Q2- What is the meaning of fixture? 1
- Q3- Types of league tournament. 1

### Unit-1 Management of Sporting EventsDay-4.

- Q1- What do you understand by knockout tournament? 1
- Q2- Types of knockout tournament. 1
- Q3-What is use of bye? 2
- Q4- What is the meaning of seeding? Write the use of seeding. 3

### Unit-1 Management of Sporting Events Day-5

- Q1- Write the procedure of giving bye. 1
- Q2- Write the merits of league tournament. 2
- Q3- Draw a knock out fixture for 14 teams. 3
- Q4- Procedure to divide teams in upper half and lower half. 2

### Unit-1 Management of Sporting EventsDay-6

- Q1- Procedure to giving seed in knockout tournament. 2
- Q2- Difference between special and simple seeding. 2
- Q3- Draw a fixture of knock out tournament for 9 team. 3
- Q4- Draw fixture of knockout tournament for 15 team with four seed. 3

### Unit-1 Management of Sporting EventsDay-7

- Q1- Write the formula for calculating the number of matches in knockout tournament and round Robin tournament. 2
- Q2- During the progress of opening ceremony of volleyball tournament in outdoor, heavy rain comes. what will be your decision as an organising secretary? 3
- Q3- Draw a fixture for 7 in single league tournament by staircase method. 3
- Q4- Draw a fixture for 9 in single league tournament by cyclic method. 3

### Day-8

#### Unit 2- Children and women In Sports

- Q1- What do you understand by posture? Give a definition of posture. 2
- Q2- Write a note on correct sitting posture. 2
- Q3- Advantages of correct posture. 2

### Day 9

#### Unit 2- Children and women In Sports

- Q1- Write four causes of bad posture. 2
- Q2- What do you understand by postural deformities? 2
- Q3- How would you recognize knock knees deformity? 2

## Day 10

### Unit 2- Children and women In Sports

- Q1- What is flat foot? Write the corrective measures of flat foot. 3
- Q2- Difference between Bow leg and knock knee. 3
- Q3- Write the spine deformities and their corrective measures. 3
- Q4- How Lordosis can be cured through exercise? 3