

D.A.V. CENTRE FOR ACADEMIC EXCELLENCE

D.A.V. COLLEGE MANAGING COMMITTEE

Chitra Gupta Road, Paharganj, New Delhi-110055

SESSION : 2018 - 19

CLASS - XI

SAMPLE QUESTION PAPERS

WITH

SCHEME OF MARKING

(SCIENCE STREAM)

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FOREWORD

Evaluation is a very important and integral part of an Educational System. Just as teaching, learning is a continuous process, so is the Evaluation. Evaluation helps us to identify the shortcomings in teaching-learning process, thus enabling us to bring about the much needed changes in the methodology of teaching. Evaluation process does not limit us to evaluate only the students, but it encompasses teachers, syllabus and curriculum as well.

Written Examination (Pen and Paper Test) is one technique which helps us in the process of evaluation. Question papers play a vital role in this process. It is, therefore, absolutely essential that the question papers are student friendly, catering to the needs of different strata of students i.e. brilliant, average and below average students. The question papers have to be balanced so that these effectively test the learning outcomes specified for different subjects.

The common examination of students of Class XI in all DAV Public Schools was started in the academic session 2010-2011 and it has proved a great success. As a consequence, the academic standards of our schools at the Secondary stage are bound to improve further.

In order to enable the teachers and students to prepare well for the Annual Examination at the end of the academic session 2018-19, the DAV Centre for Academic Excellence is providing Sample Question Papers. It is hoped that these sample question papers will certainly help the classroom transaction of the subject in our schools. These Sample Question Papers have been prepared by practicing teachers of DAV Public Schools under the guidance of experienced resource persons in workshops conducted by the DAV Education Board.

I express my gratitude to Mr. S. K. Sharma, OSD, DAVCAE and all the experts who very ably guided our teachers in the workshops organised by the Board. I would also thank the staff of DAV CAE for conducting & hosting these workshops.

I am confident that the students and teachers will use these Sample Question Papers in teaching-learning process and thus help the students to do well in the Annual Examination in February-March 2019.

Punam Suri
Chairman

DAV Centre for Academic Excellence

PREFACE

The DAV Centre for Academic Excellence decided to conduct common examination for students of Class XI in all DAV Public Schools. There were the following reasons for doing so :

- (a) The students would be appearing for an Annual External Examination for the first time in Class XII and so, such a move would give them some training for appearing in the Annual External Examination.
- (b) There would be uniform standard of teaching-learning in all DAV Schools.
- (c) The syllabus of Class XI would be fully covered by all the teachers and students, thus, helping the students in their preparation for competitive examinations at the end of Class XII because quite a sizeable portion of the question papers in the competitive examinations would be relevant to the portions of the subjects covered in Class XI.

The DAV Centre for Academic Excellence has been providing Sample Question Papers in different subjects to all the students and teachers, along with the solutions and marking scheme, ever since.

It gives me immense pleasure to state that this effort has been a great success and has helped in improving the class room transaction in our schools, and the overall performance of the students in CBSE class XII. Once again, we are happy to provide to the students and teachers of all DAV Public Schools Sample Question Papers of different subjects for Class XI.

These sample question papers are the outcome of a lot of effort put in by practising teachers of DAV Public Schools under the able guidance of experienced resource persons.

We take this opportunity to thank all the experts and participants who worked tirelessly to develop these sample question papers.

I am confident that the publication will be of immense use and great help to the students and teachers as well.

No publication is the last word on the subject. And therefore we invite suggestions for further improvement in future.

Secretary

INTRODUCTION

The DAV Centre for Academic Excellence has been making all efforts to achieve the objectives laid out for the centre. One of the objective is to bring about a uniformity in the standard of education in DAV Public Schools spread throughout the length and breadth of India. We know that our Public Schools, situated as they are, cater to the needs of different strata of society and it is, therefore a difficult task to maintain the same standard of teaching in all these institutions. However, one such activity that has helped us in bringing about some uniformity in the standard of education is the system of common examination.

Since the session (2010-11), the DAV Education Board gives common question papers for Class XI in the DAV Public Schools. For understanding the format of CBSE question papers, students are provided with sample papers. These sample question papers are a great help for the preparation of annual examination. This booklet is an assortment of sample papers for different subjects. Examination is held in all the schools as per the date sheet issued by DAV Centre for Academic Excellence.

The main tool in the written examination is the Question Paper. If the question paper is not designed properly, the test will give a totally incorrect conclusion. And in this whole process the casualty will only be the student. It has been observed that the question papers in general suffer from the following infirmities :

- The questions mostly require recall of information and as such encourage memorisation.
- Abilities like understanding and application of knowledge are seldom tested.
- The questions are vaguely worded. As a result the student is not clear about the quality of answer required.

- Question paper does not cover the whole course.
- Options are provided in the question paper which provide scope for the students to pick and choose.

In order to remove the above infirmities and administer a good and balanced question paper to the students, efforts are made to incorporate the following in the questions paper :

- (i) The question measures a single learning outcome.
- (ii) Incorporating some test tasks as would test all the abilities like knowledge understanding, application & skill appropriately.
- (iii) Including questions that -
 - (a) are within the scope of syllabus.
 - (b) are within the comprehension level of points.
 - (c) can be solved within a reasonable length of time.
 - (d) are worded in a clear, simple and unambiguous language.
 - (e) use appropriate directional words.

Hence for setting a good question paper, a great deal of planning prior to the actual writing of questions is required. The major steps in the planning/ preparation of a good and balanced question paper are :

- (i) **Preparation of the design :** it lays down the chief dimensions of the question paper. Weightage to learning objectives, weightage to content, weightage to form of questions, weightage to difficulty level-all are decided under the head 'design'. Moreover through written examination it is the cognitive domain, representing the intellectual area of the pupils, that gets evaluated. This domain involves the development of the abilities of knowledge, understanding (comprehension), application (expression) and skill. The paper setter assigns marks to each in view of its importance.

In order to cover maximum course content the paper setter has to prepare a

large number of questions of various types. These types include Very Short Answer Questions, Short Answer Questions and Long Answer Questions.

(ii) **Preparation of blue print** : The design is then followed by the preparation of a blue print. It reveals the actual picture of the question paper. The blue print gives the placement of questions in respect of :

- (a) the objective to be tested by each.
- (b) the content area to be covered by each.
- (c) the form of question suitable for testing.

It may be noted that blue print of each question paper is unique and should be carefully prepared however design of question paper is static.

(iii) **Preparation of questions** : Preparation of an appropriate questions is an art and requires knowledge of objectives and their specifications, a mastery over the subject matter and the skill of framing questions. The paper setter, while framing a question should keep in mind that -

- (a) It is based on a well defined specific objective.
- (b) It is related to a specific content area.
- (c) It is at the desired level of the difficulty.
- (d) It is well worded so as to be within the comprehension of the students and can be done within a reasonable length of time.
- (e) Its language is clear, simple and unambiguous.
- (f) It uses appropriate directional words.

(iv) **Editing the question paper** : The editing and assembling of a question paper is of crucial importance. The arrangement of question in a question paper should be from easy to difficult. Similarly Very Short Answer type questions should appear first to be followed by Short Answer Type and Long Answer Type questions.

(v) **Preparation of marking scheme/hints to solution** : This is very essential as it

- (a) reduces the subjectivity in scoring.
- (b) ensures uniformity in scoring when

a number of evaluators are involved and (c) gives the paper setter a clear idea of how the pupils will react while answering the questions. However, all teachers must understand that Marking Scheme is just a guideline to bring uniformity in evaluation.

(vi) **Preparation of question-wise analysis** : It helps the paper setter to know the strength and weakness of his/her question paper. It also enables the paper setter to reconcile the question paper with the blue print. The questions are, therefore, analysed in terms of :

- (a) objectives tested by the questions.
- (b) specification on which the question is based.
- (c) topic covered by the questions.
- (d) form of the questions.
- (e) estimated difficulty level.

SAMPLE QUESTION PAPERS

Use of Sample Question Papers by students :

The Sample Question Papers indicate the pattern of the question papers which the pupils will have to face in the forthcoming examinations. These will also help the students to know how to answer a question. Understanding a question and then answering it, is a technique which students need to know.

Use of Sample Question Papers by the teachers :

The material presented herein may provide sufficient help to the teachers in bringing improvement in the techniques and tools of evaluation. It will help the teachers in :

- understanding the objective of teaching a particular course.
- teaching various topics keeping in mind the learning objectives.
- framing appropriate questions.

- developing appropriate marking schemes for the question papers.

The Sample Question Papers along with guidelines for their evaluation printed herein were designed and developed in the workshops, held at the DAV College Managing Committee. Subject experts help and guide the participating teachers in developing these question papers. It is the matter of great satisfaction that small number of teachers participated in these workshops from Schools, worked intensively & enthusiastically to form Sample Question Paper in time.

I convey my thanks to all the resource persons for their able guidance without which preparation of a good balanced Sample Question Paper in a particular subject would not have been possible. My thanks are also due to the Mr. S. K. Sharma, OSD, DAVCAE & staff working in the DAV Centre of Academic Excellence for their devoted and dedicated work.

Director (Academics)

DAV Centre for Academic Excellence

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ENGLISH CORE

Designed & Developed

by

DAV Centre for Academic Excellence

in a workshop

held at

DAV College Managing Committee

Chitragupta Road

New Delhi - 110055

ENGLISH CORE

Time Allowed : 3 Hours

Maximum Marks : 80

General Instructions :

- i) This paper consists of 3 sections - A, B and C.
- ii) Attempt all questions.
- iii) Do not write anything on the question paper.
- iv) All the answers must be correctly numbered as in the question paper and written in the answer sheet provided.
- v) Ensure that questions of each section are answered together.
- vi) Read each question carefully and follow the instructions.
- vii) Strictly adhere to the word limit given with each question.

SECTION - A (READING SKILLS)

Typology	Reading Skills	Conceptual Understanding, Analysing, Inferring, Interpreting, Summarising & Using Appropriate Formats	Decoding,
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1. Read the following passage very carefully:

‘Content’ is the one word that best defines what the internet and digital media are all about today. In the present evolving digital landscape, content isn’t mere information; it is information curated for and presented creatively to a specific group of people on a channel, like the television or social media platforms such as YouTube or Facebook.

Much like how Google democratised the access to information, social media and video sharing, a common person too can share her/his perspective on events that impact them and others and build strong communities of like-minded people. Over the past decade, the media landscape has been in

a constant state of flux, with each new development making the previous one obsolete. The applications of emerging technologies are evolving ceaselessly at breakneck speed, and everyone involved in the production of creative content knows that with new-age digital media channels, nothing is as it once was.

Today, social media channels are the most effective vehicles for sharing user-generated content in any form- images, text, audio, video, or the most amusing of internet phenomena. GIFs. A quote attributed to the Greek philosopher Plato says, 'Those who tell the stories rule society.' In the global digital landscape, we, the people have the power to tell stories the way we want, through any of these media, and share them with the world at large.

The impact of these media on digital platforms is extremely high, and its influence on individual behaviour is also far greater than that of the television, which until the advent of the internet was the most powerful medium to send and receive information. Hence, the popularity of digital and social media channels has heralded a phenomenon that can be best described as the arrival of *television 2.0*. (modern day smart TV)

While the sharing of knowledge has unquestionably been democratised in the internet-enabled information boom. its most significant impact has been that knowledge has enabled us to be far more critical and analytical.

Such social media platforms are also increasingly becoming a source of interactive educational content which today's technology-savvy students

are leveraging extensively to help them in their academics. With the help of innovative social media tools, students can also effectively organise the course content, save, curate and share resources using online storage media like Google Drive. Social media platforms are also emerging as a source for students or professionals to search for job opportunities. More and more companies and recruiters today are using various social media platforms to source new hires. Therefore, if leveraged in the right manner, social media platforms can be a great place for candidates to share their skills, accomplishments, and experience, and reach out to recruiters.

Smaller localised content sharing networks are finding their own niche, and growing into channels with substantial value, for the brands and sellers who want to reach out to local markets without resorting to expensive advertising and promotional tools that may or may not effectively target their ideal segments. Hence, while Instagram, Snapchat. or any other large social networking platforms out there are vastly popular vehicles for global content sharing, the demand for localised digital channels is increasing rapidly and is set to have significant implications for brand communications as well as social media and digital influencers, as it offers them the opportunity to capture a large audience in an emerging social network paradigm.

- (a) On the basis of your reading of the above passage, make notes using headings and sub-headings. Use recognisable abbreviations wherever necessary. Suggest a suitable title for the passage.

- (b) Write a summary of the above passage in not more than 80 words using the notes made by you.

3

2. Read the following passage carefully :

1. As students, whether in school or college, you need to realise the enormous importance of the present year as the preparation for your work in the world. With the natural impatience of youth, you are passionately eager to be acting; but do you understand, do you at all realise, that among the youths now struggling with their books are, as in every other country, the future leaders of the nation, the ministers, the statesmen, the generals, the admirals and the judges.

2. The nation of tomorrow is in the schools and colleges of today, and on the knowledge that you are there acquiring, on the characters that you are there building, on the bodies that you are there developing, depends the India of the new era. For India is changing with extraordinary rapidity, as all the world acknowledges, and you have the splendid karma of being born in the dawn of her renovated life.

3. The responsibilities of power will fall upon your shoulders; you will have to guard your land from external attack and from internal disorder; you will have to develop her arts, her manufacturers, her trade, her commerce, her agriculture, to shape her political destiny and to guide her forward evolution. How shall you discharge your mighty task unless you use well this time of preparation, this priceless time, which wasted, cannot

be regained. All your life long you will go limping if you waste these years of your adolescence ...

4. Another thing you should learn in your school and college days is the joy of service. Help those around you and seek opportunities to help... Sometimes a school or college can start and support a night school or a school for the submerged classes; you can, in terms visit the hospitals. write letters for patients, carry messages for them. You can start a little co-operative credit society, and help the poor to become free from debt.

5. And one thing you should all do, if are living at home; you should share your education with the ladies of your families. Teach your sisters to read and write. and any others who are willing to learn. Talk with them of public matters and discuss what you read. You will soon find the charm of an educated home, of sympathy in all your interests, the sharing of your hopes and aspirations.

2. (A) On the basis of your reading of the passage, answer the following questions by choosing the best of the given options : 1×6=6

- (a) The Nation of tomorrow is
- (i) in the natural impatience of youth
 - (ii) in the schools and colleges of today
 - (iii) in the hands of politicians
 - (iv) in internal disorder

- (b) According to the author, the youth is -
- (i) patient
 - (ii) irresponsible
 - (iii) passionately eager to be acting
 - (iv) lethargic
- (c) An educated home can be achieved by
- (i) imparting education to the ladies of the family
 - (ii) educating children only
 - (iii) educating the boys only
 - (iv) unwilling learners
- (d) As students, one needs to learn-
- (i) the joys of the past
 - (ii) the joy of service
 - (iii) to respect politicians
 - (iv) to think of only individual needs
- (e) Choose the correct synonym for the word 'renovated' from the options
- (i) constructed
 - (ii) destroyed
 - (iii) repaired
 - (iv) reused

(f) Find the antonym of the word enormous from the options given below

(i) huge

(ii) gigantic

(iii) miniscule

(iv) vestigial

2. (B) Answer the following questions :

1×6=6

(a) Why is the present very important to a student?

(b) How can a student experience the Joy of Service?

(c) What are the duties of the youth? (Mention any two)

(d) How can students help the poor get rid of debt?

(e) Which word in paragraph 3 means the same as 'gradual development'?

(f) Which phrase in paragraph 4 is the same as 'deprived people'?

SECTION - B (WRITING SKILLS & GRAMMAR)

Typology	Writing Skills & Grammar	Reasoning, Knowledge, Comprehension, Appropriacy of Style and Tone, Using Appropriate Format and Fluency, Analysis, Evaluation, Creativity and Synthesis
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3. You are HR Manager of TCS Mumbai which requires posh Bungalows on company lease, as guest houses. Draft an advertisement in not more than 50 words under classified columns to be published in a national daily.

4

OR

On the occasion of World Heritage Day, design a poster in about 50 words highlighting the need to preserve the monuments of our country. You are Karan/Khushi, the President of Heritage Club of Sunshine Public School, New Delhi.

4. You have been a witness to the sale of adulterated and fake spices, milk products and chemically treated vegetables and fruits in the markets openly. Write a letter to the Health Minister of your state expressing your concern about this and requesting him for personal supervision to tackle the issue. You are Ravi / Radha, a resident of Sector-3, Chandigarh. (120.150 words)

6

OR

You are Rahul / Reena of D-I, VSS Nagar, Bhubaneswar. Recently you bought a mobile phone from the Phone Point, Satya Nagar, Bhubaneswar. The handset has developed a problem within a month of purchase. Write a letter to the dealer giving details of the nature of the problem and seeking an early replacement or repair of the handset. (120-150 words)

5. You have observed that the younger generation goes on increasing its academic qualification without proper direction. Many of them do not get any employment giving rise to the issue of the educated unemployed. As such many of them drift into anti-social activities. As Naman/Neeta of class XI write a speech to be delivered in the morning assembly on the problem

of the Educated Unemployed, suggesting some of the available options.
(150-200 words)

10

OR

You participated in a career counselling workshop organized by 'Make Your Future'. You had the opportunity of listening to experts from various fields like Food Technology, Media Management, Fashion Technology, etc. Write a report for a local daily highlighting the details of the workshop in 150-200 words.

6. In the following passage one word has been omitted in each line. Write the missing word along with the words that come before and after it.

1×4=4

	Before	Missing Word	After
The life boxing legend e.g.	life	of	boxing
Md. Ali to be given a musical	(a) _____	_____	_____
makeover. Ali died 74 last year	(b) _____	_____	_____
following illustrious career in the	(c) _____	_____	_____
ring which he became the world	(d) _____	_____	_____
champion three times.			

7. The following sentences are not in sequential order. Rearrange them in proper order to make a meaningful paragraph.

1×4=4

- (a) Moreover, there is a separate section that traces the 35 centuries of glass, its discovery and evolution over the ages.

- (b) The Corning Museum of Glass located in Corning, New York, is indeed a unique place.
- (c) Some of these are more than thousand years old.
- (d) Founded in 1951 by Corning Glass Works, the museum has more than 45.000 glass items on display.

8. Transform the sentences as directed :

1×2=2

- (1) We have elected him the President of the club. (Change the voice)
- (2) The boy is wearing a pink shirt. He is my cousin.(Join using a subordinate clause)

SECTION - C (LITERATURE)

Typology	Literature	Recalling, Reasoning, Appreciating Literary Conventions, Inference, Analysis, Evaluation, Creativity with Fluency
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9. Read the given extract carefully and answer the questions that follow (any three) :

1×3=3

It is the engine of her family.

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

Showing her barred face identity mask

- (a) Whom does 'it' refer to in the first line?
- (b) Explain, 'barred face identity mask'.
- (c) What does the poet imply by 'flirts out'.

- (d) Identify the figure of speech in the extract.

OR

Silence surrounds us. I would have
Him prodigal, returning to
His father's house, the home he knew.

- (a) Why does silence surround them?
- (b) What does the father expect from his son?
- (c) What does the poet allude to in 'have him prodigal'?
- (d) Identify the literary device in the extract.

10. Answer any three of the following in 30-40 words each.

3×3=9

- (a) What is the difference between the classical Chinese and the European form of painting? (Landscape of the Soul)
- (b) Why does Frank envy Crocker Harris? (The Browning Version)
- (c) How were Shahid's parents responsible for his secular views? (The Ghat of the Only World)
- (d) Why were the residents happy to have melon as their king? (The Tale of Melon City)

11. Answer the following question in about 120-150 words.

'With grit and determination we can overcome all odds. Justify, with reference to _We're Not Afraid to Die if We Can All Be Together.'

6

OR

The Earth's principal biological systems are in a very pathetic state. Discuss with reference to 'The Ailing 'Planet'.

12. Answer the following question in about 120-150 words.

'Mother's Day' conveys a strong social message. Discuss with reference to the text.

6

OR

'The Address' is a story of human predicament that follows war. Comment.

13. Answer the following question in about 120-150 words.

6

How does the author's experience in Hor come as a stark contrast to accounts he had read of earlier travellers? (Silk Road)

OR

The author's grandmother had a strong persona. Illustrate from the text 'The Portrait of a Lady'.

ENGLISH CORE

Time Allowed : 3 Hours

Maximum Marks : 70

MARKING SCHEME / HINTS TO SOLUTIONS

(Note : Any other relevant answer, not given herein but given by the candidates, be suitably awarded.)

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	SECTION - A (READING SKILLS)		
1.	<p>(a) Note Making</p> <p>Suggested Notes</p> <p>Abbreviations/Symbols</p> <p>Title:— Arrival of Television 2.0/ Arrival of New Age Smart TV/ Power of New Age Media/ Digital Media</p> <p>(Any other suitable title)</p> <p>Content</p> <p>1. Facts regarding digital media</p> <p>1.1. explosive content/information curated and creatively presented</p> <p>1.2. builds strong <u>commn</u> (like minded people)</p> <p>1.3. evolving at breakneck speed</p> <p>1.4. captures large audience</p> <p>2. Advantages of social media platforms</p>	<p>1</p> <p>3</p>	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>2.1. sharing user <u>genertd</u> content</p> <p>2.2. democratised, shared knowledge</p> <p>2.3. enabled critical, analytical user behaviour</p> <p>2.4. source of job opportunities and new hires</p> <p>2.4.1. candidates' skills, <u>accomp</u> & experiences available</p> <p>2.4.2. avoidance of expensive promotional tools by brands</p> <p>3. Digital media and education</p> <p>3.1. provides interactive <u>educ.</u> content</p> <p>3.2. data saved and curated (Google Drive)</p> <p><u>Key to Abbreviations :</u></p> <p>1. commn. – communication</p> <p>2. genertd. – generated</p> <p>3. accomp. – accomplishment</p> <p>4. Educ. – educational</p> <p>(b) <u>Summary :</u></p> <p>The summary should include all the important points given in the notes.</p>	1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
2.	Content	2	8
	Expression	1	
	A. (a) (ii) in the schools and colleges of today	1	12
	(b) (iii) passionately eager to be acting	1	
	(c) (i) imparting education to the ladies of the family	1	
	(d) (ii) the joy of service	1	
	(e) (iii) repaired	1	
	(f) (iii) miniscule	1	
	B. (a) preparation for their work in the world	1	
	(b) help those around, seek opportunities to help	1	
	(c) guard their land/prevent internal disorder /develop her arts/her manufacturers/her trade/ her commerce / her agriculture / to shape her political destiny / to guide her forward evolution (Any two)	1	
	(d) start co-operative credit society	1	
	(e) evolution	1	
	(f) submerged classes	1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
3.	<p>SECTION - B (WRITING SKILLS & GRAMMAR)</p> <p><u>Advertisement (Classified)</u></p> <p>Format :</p> <p>The format should include: Box, Heading, Contact details</p> <p>Content</p> <p>Expression</p> <p>Value Points :-</p> <p>Heading – WANTED/REQUIRED ACCOMMODATION</p> <ul style="list-style-type: none"> – Required as guest houses – Specifications - location, facilities, features – approximate rent – contact details - name, telephone no. – Any other relevant details 	<p>1</p> <p>2</p> <p>1</p>	4
	<p style="text-align: center;"><u>OR</u></p> <p><u>Poster</u></p> <p>Content</p> <p>Expression -</p> <p>Value points -</p> <ul style="list-style-type: none"> – Any relevant slogan 	<p>2</p> <p>2</p>	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
4.	<ul style="list-style-type: none"> - Importance of heritage - Do's and don'ts at the heritage sites - Suggested steps - Illustrations (optional) - Issuing authority 		
	<u>Letter Writing</u>		
	Format	1	
	<ul style="list-style-type: none"> - Sender's address - Date - Receiver's address - Subject - Salutation - Body of letter - Complementary close. - Sender's name 		
	Content	3	
	Expression	2	
	Value points : (Official Letter)		
	<ul style="list-style-type: none"> - Purpose of writing 		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
5.	<ul style="list-style-type: none"> - Highlighting problems of adulteration with suitable examples - Hazards caused to the public - Suggested steps to curb it - Any other relevant details 		6
	<u>OR</u>		
	<u>Value points</u> : (Letter of Complaint)		
	<ul style="list-style-type: none"> - Purpose of Writing with purchase details - Details of the problem- performance, quality or any other - Highlighting the inconvenience - Requesting for replacement/repair - Any other relevant points 		
	<u>Speech</u> Format Content Expression <ul style="list-style-type: none"> - Grammatical accuracy, appropriate words, spellings 	1 4 3	10

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<ul style="list-style-type: none"> - Coherence and relevance of ideas and style. <p><u>Value points</u></p> <ul style="list-style-type: none"> - Striving for academic qualifications without purpose - Stress on earning certificates rather than on enhancing/acquiring skills - Consequences like cut throat competition, frustration, superiority complex but inability to perform - Inability to utilize qualifications for self-employment <p>Suggestions- Proper Counselling</p> <ul style="list-style-type: none"> - Skill development & its proper channelization - Mentoring by parents, teachers, experts - Encouraging entrepreneurs <p>Any other relevant points</p> <p style="text-align: center;"><u>OR</u></p> <p>Report</p> <p>Format</p>	2	
		1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
6.	Content	4	4
	Expression		
	- Grammatical accuracy, appropriate words, spellings	3	
	- Coherence and relevance of ideas and style.	2	
	<u>Value points :</u>		
	- Type of programme/name		
	- Occasion, date, time, venue		
	- Details of the career prospects and experts		
	- Welcome address and the proceedings of the programme		
	- Views and advice of the experts		
	- Students' response		
	- Suitable conclusion		
	- Any other relevant details		
	Before Missing After		
	a. Ali is to	1	
	b. died at 74	1	
	c. following an illustrious	1	
	d. ring during/in which	1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
7.	<p>b, d, c, a</p> <p>b. The Corning Museum of Glass located in Corning New York, is indeed a unique place.</p> <p>d. Founded in 1951 by Corning Glass Works, the museum has more than 45,000 glass items on display.</p> <p>c. Some of these are more than thousand years old.</p> <p>a. Moreover, there is a separate section that traces the 35 centuries of glass, its discovery and evolution over the ages.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	4
8.	<p>Transform the sentences as directed</p> <p>a. He has been elected the President of the club (by us).</p> <p>b. The boy who is wearing a pink shirt is my cousin.</p>	<p>1</p> <p>1</p>	2
SECTION - C (LITERATURE)			
9.	<p>Answer any three of the following :</p> <p>(a) Tree</p> <p>(b) Stripes on the face which are its identity/the shadow of the branches on its face that gives the image of the bird being caged.</p> <p>(c) Flies out</p>	<p>1</p> <p>1</p> <p>1</p>	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
11.	<ul style="list-style-type: none"> - Whatever the reason, Crocker Harris is famous with the students (any other relevant answer) 	Content-2 Expression-1	9
	<p>(c) Mother bought him murtis and other religious articles</p> <ul style="list-style-type: none"> - She helped him make a temple in his room (any other relevant answer) <p>(d) Laissez Faire</p> <ul style="list-style-type: none"> - Residents happy to be free - No accountability to the state - No interference from the king (any other relevant answer) 	Content-2 Expression-1	
11.	<ul style="list-style-type: none"> - Courage not to give up - Will to fight - Determination to win - Remain positive - Author thrown overboard by the storm - Ribs cracked - Mouth filled with blood and broken teeth - Fear of sinking - Deck smashed: full of water, told his wife to take the 	Content-3 Expression-3	6

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>wheel</p> <ul style="list-style-type: none"> - Larry and Herbie pumped water out like mad men - Author half swam, half crawled to children's room - He took canvas, hammer and screws to cover the gaping holes - Arranged for spare pumps - Children too didn't lose hope - Jon said he wasn't afraid of dying if they were all together - Sue made a card and didn't complain about her injuries and wounds <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> - Fisheries, forests, croplands and grasslands form the basis - Supply food and raw material for industry - Human claims reaching an unsustainable level - Productivity impaired - Over-fishing in a protein hungry world - Forests decimated for firewood 	<p>Content-3 Expression-3</p>	



MATHEMATICS

Designed & Developed

by

DAV Centre for Academic Excellence

in a workshop

held at

DAV College Managing Committee

Chitragupta Road

New Delhi - 110055

MATHEMATICS

XI

Time : 3 Hours

DESIGN

Max. Marks : 100

I. Weightage of learning objectives :

Objective	Remembering	Understanding	Application	Hots	Evaluation	Total
Marks	20	35	25	10	10	100

II. Weightage to form of questions :

Form of Questions	LA-II (6)	LA-I (4)	SA(2)	VSA(1)	Total
No. of Questions	6	11	8	4	29
Marks	36	44	16	4	100

III. Weightage to contents

S. No.	Name of Unit	Marks
1	Sets & Functions	29
2	Algebra	37
3	Coordinate Geometry	13
4	Calculus	06
5	Mathematical Reasoning	03
6	Statistics and Probability	12

IV. Scheme of Options :-

There is no overall choice. However, internal choice is given in three questions of 4 marks each and three questions of 6 marks each.

V. Scheme of Sections :-

Section A - 4 Questions of 1 Mark each
Section B - 8 Questions of 2 Marks each
Section C - 11 Questions of 4 Marks each
Section D - 6 Questions of 6 Marks each

VI. Weightage to difficulty level :

1. Difficult questions : 20%
2. Average questions : 60%
3. Easy questions : 20%

VII. Expected length of answers to different types of questions & time management :

Types of Question	Expected Length of Answer	Expected Time for each question
1. Long Answer Type (LA-II)	6-9 Steps	8-10 Min.
2. Long Answer (LA-I)	4-6 Steps	4-6 Min.
3. Short Answer (SA)	2-3 Steps	2-3 Min.
4. Very Short Answer (VSA)	1-2 Step	1 Min.

Important Note :

There can be many Blue Prints corresponding to this design of the question paper. The Blue Print of the sample paper may be different from the Blue Print of final question paper. The design, however, will be static in all the cases.

MATHEMATICS

Time Allowed : 3 Hours

Maximum Marks : 100

- Please check that this question paper contains 29 questions and 5 printed pages before attempting it.
- Write down the serial number of the question, before attempting it.
- 15 minutes have been allotted to read the question paper. During this time the student will read the question paper and will not write any answer on the answer script.

General Instructions :

1. Question paper consists of 29 questions divided into four sections A, B, C and D.
Section A consists of 4 questions of 1 mark each.
Section B consists of 8 questions of 2 marks each.
Section C consists of 11 questions of 4 marks each.
Section D consists of 6 questions of 6 marks each.
2. There is no overall choice. However, internal choices are provided in three questions of 4 marks each and three questions of 6 marks each. In these cases, you have to attempt one out of given two options.
3. Use of calculators is not permitted.

SECTION - A

1. Find the value of $2 \cos 45^\circ \sin 15^\circ$. 1
2. Evaluate : i^{4n-3} , $n \in \mathbb{Z}$ where $i = \sqrt{-1}$. 1
3. At what point of the parabola $x^2 = 9y$, other than origin, is the abscissa three times that of the ordinate? 1
4. Write contrapositive of the statement :
"x is an even number implies x is divisible by 4". 1

SECTION - B

5. Let $P = \left\{ \frac{1}{x}; x \in N, x < 7 \right\}$ 2

and $Q = \left\{ \frac{1}{2x}; x \in N, x \leq 4 \right\}$

Find $P \cap Q$

6. Using properties of sets, prove that for all sets A and B. 2

$$(A \cup B) - B = A - B$$

7. Draw the graph of : 2

$$f(x) = x - [x], \quad 1 \leq x < 2$$

where $[x]$ denotes greatest integer less than equal to x .

8. Find the value of n if $(n + 1)! = 12 (n - 1)!$ where $n \in N$. 2

9. Find the coordinates of a point P on the line segment AB joining A $(-2, 0, 6)$ and B $(10, -6, -12)$ such that $AP = \frac{5}{6} AB$. 2

10. If $y = x \sin x + \cos x$ find $\frac{dy}{dx}$ at $x = \frac{\pi}{2}$. 2

11. State whether the 'or' used in the statement "To open an account in the bank, you must have aadhar card or voter ID card" is inclusive or exclusive. Give reason for your answer. 2

12. The probability of happening of an event A is 0.5 and that of B is 0.3. If A and B are mutually exclusive events then find the probability of neither A nor B. 2

SECTION - C

13. If $3 \tan \left(\theta - \frac{\pi}{12} \right) = \tan \left(\theta + \frac{\pi}{12} \right)$; $0 < \theta < \frac{\pi}{2}$ find θ . 4

14. Prove that : $\tan 4x = \frac{4 \tan x (1 - \tan^2 x)}{1 - 6 \tan^2 x + \tan^4 x}$. 4

15. During exam days, in a survey of 100 students, 30 students didn't bring ruler, 50 students didn't bring erasers and 10 students didn't bring any of the two. Using venn diagram, find how many of them have brought both the things. 4

16. Find the term independent of x in the binomial expansion of $\left(\sqrt{\frac{x}{3}} + \frac{3}{2x^2} \right)^{10}$. 4

17. In a job interview for 4 posts, 5 boys and 3 girls appeared. If selection of each candidate is equiprobable then find the probability that

(i) 3 boys and 1 girl or 1 boy and 3 girls are selected.

(ii) atmost 1 girl is selected. 4

18. Evaluate : $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x(e^{5x} - 1)}$. 4

OR

Find derivative of $\sin \sqrt{x}$ w.r.t ' x ' using first principle.

19. Find the square root of the complex number $z = 2 \left\{ 4 \sin \frac{3\pi}{2} + 3i \cos \pi \right\}$ 4

20. Find the number of words that can be formed using all the letters of the word 'MATHEMATICS' such that : 4

- (i) all vowels are together
- (ii) no two vowels are together

21. Find the equation of circle concentric with circle $x^2 + y^2 - 8x + 2y + 3 = 0$ and having radius twice the radius of given circle. 4

OR

Find the area of the triangle formed by the lines joining the vertex of the parabola $x^2 = 12y$ to the ends of its latus rectum.

22. Let $A = \{x : x = 3n, n \leq 6, n \in \mathbb{N}\}$. Define a relation R from A to A by

$$R = \{(x, y) : y = 2x ; x, y \in A\}. \text{ Write } R \text{ in roster form}$$

4

- (i) Write its domain, co-domain and Range.
- (ii) Also draw the arrow diagram of R .

OR

Find the domain and range of the function $f(x) = \sqrt{25 - x^2}$.

23. Find the sum to n terms of the series :

4

$$3 \times 8 + 6 \times 11 + 9 \times 14 + \dots$$

SECTION - D

24. If $x \cos \theta = y \cos \left(\theta + \frac{2\pi}{3} \right) = z \cos \left(\theta + \frac{4\pi}{3} \right)$ then find the value of $xy + yz + zx$. 6

OR

Solve the equation : $\sin 3x + \sin 5x + \sin 7x = 0$, for $\frac{\pi}{2} < x < \pi$.

25. Find the solution region for the following inequalities : 6

$$x - y \leq 0$$

$$2x - y \leq 0$$

$$y \leq 2$$

$$x, y \geq 0.$$

Also find the coordinates of the vertices of the solution region.

26. If a and b are the roots of $x^2 - 3x + p = 0$ and c, d are the roots of 6

$$x^2 - 12x + q = 0, \text{ where } a, b, c, d \text{ form a G.P.}$$

Prove that $(q + p) : (q - p) = 17 : 15$.

OR

Between 5 and 35, m numbers have been inserted in such a way that the resulting sequence is an A.P. and the ratio of 3rd and $(m - 2)$ th numbers is $7 : 13$. Find the value of m .

27. Using principle of mathematical induction, prove that $4^n + 15n - 1$ is divisible by 9, for all $n \in \mathbb{N}$. 6

28. If the lines $y = 3x + 1$ and $2y = x + 3$ are equally inclined to the line $y = mx + 4$, find the value of m . 6

OR

The points (1, 3) and (5, 1) are two opposite vertices of a rectangle. The other two vertices lie on the line $y = 2x + c$. Find c and the remaining vertices.

29. Calculate mean, variance and standard deviation for the following frequency distribution.

6

Classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

MATHEMATICS

Time Allowed : 3 Hours

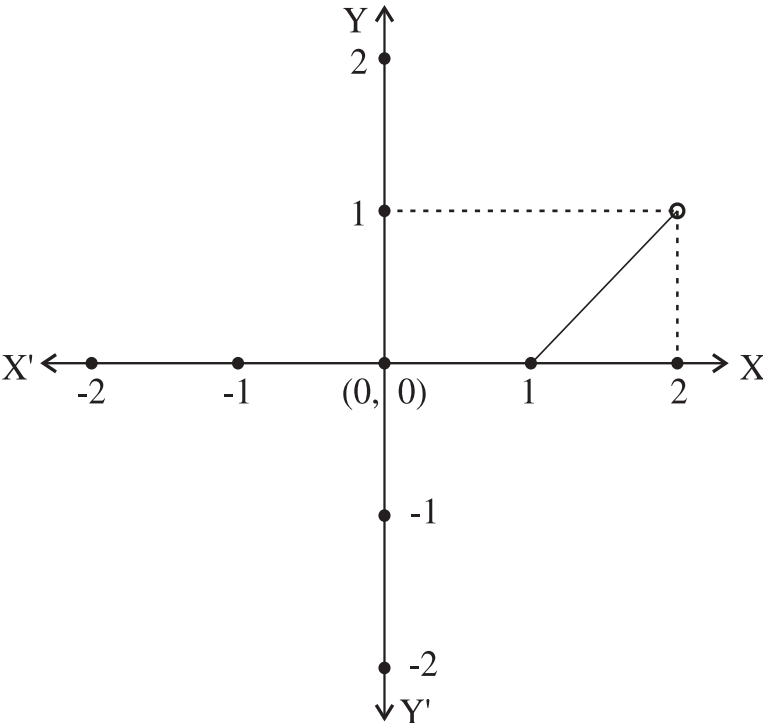
Maximum Marks : 100

MARKING SCHEME / HINTS TO SOLUTIONS

(Note : Any other relevant answer, not given herein but given by the candidates, be suitably awarded.)

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
1.	$2 \cos A \sin B = \sin (A + B) - \sin (A - B)$ $2 \cos 45^\circ \sin 15^\circ = \sin 60^\circ - \sin 30^\circ$ $= \frac{\sqrt{3}}{2} - \frac{1}{2} = \frac{\sqrt{3}-1}{2}$	$\frac{1}{2}$ $\frac{1}{2}$	1
2.	$i^{4n-3} = i^{4n-4} \cdot i$ $= i^{4(n-1)} \cdot i$ $= 1 \cdot i = i$	$\frac{1}{2}$ $\frac{1}{2}$	1
3.	$x^2 = 9y$ $x = 3y$ (given) $\Rightarrow (3y)^2 = 9y$ $9y^2 = 9y$ $\Rightarrow y(y-1) = 0$ $\Rightarrow y = 0 \quad \text{or} \quad 1$ $\Rightarrow x = 0 \quad \text{or} \quad x = 3$ point other than origin is (3, 1)	$\frac{1}{2}$ $\frac{1}{2}$	1

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
4.	If x is not divisible by 4 then x is not an even number.	1	1
5.	$P = \left\{ \frac{1}{x}; x \in N, x < 7 \right\}$ $= \left\{ 1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6} \right\}$ $Q = \left\{ \frac{1}{2x}; x \in N, x \leq 4 \right\}$ $\left\{ \frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8} \right\}$ $P \cap Q = \left\{ \frac{1}{2}, \frac{1}{4}, \frac{1}{6} \right\}$ $\text{or } \left\{ \frac{1}{2x}; x \in N, x \leq 3 \right\}$	$\frac{1}{2}$ $\frac{1}{2}$	2
6.	$(A \cup B) - B = (A \cup B) \cap B'$ $= (A \cap B') \cup (B \cap B') \quad (\text{distributive law})$ $= (A \cap B') \cup \phi \quad (B \cap B' = \phi)$ $= A \cap B'$ $= A - B$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
7.	<p>For $1 \leq x < 2$, $[x] = 1$</p> <p>Thus $f(x) = x - 1, 1 \leq x < 2$</p>	$\frac{1}{2}$	

S. No.	VALUE POINTS/ KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
8.	 <p> $(n+1)! = 12(n-1)!$ $\Rightarrow (n+1)n(n-1)! = 12(n-1)!$ $\Rightarrow (n+1)n = 12$ $\Rightarrow n^2+n-12 = 0$ $\Rightarrow n^2+4n-3n-12 = 0$ $\Rightarrow (n+4)(n-3) = 0$ $\Rightarrow n = -4, 3$ $n = -4$ rejected so $n=3$ </p>	<p>$1\frac{1}{2}$</p> <p>1</p> <p>1</p>	<p>2</p> <p>2</p>

S. No.	VALUE POINTS/ KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
12.	<p>Given that $P(A) = 0.5$ of $P(B) = 0.3$</p> <p>A & B are mutually exclusive events</p> <p>$A \cap B = \phi$</p> <p>$\Rightarrow P(A \cap B) = 0$</p> <p>so $P(\text{neither A nor B})$</p> $= P(A' \cap B')$ $= P(A \cup B)'$ $= 1 - P(A \cup B)$ $= 1 - \{P(A) + P(B)\}$ $= 1 - 0.8$ $= 0.2$	<p>1</p> <p>1</p>	2
13.	<p>Given $3 \tan\left(\theta - \frac{\pi}{12}\right) = \tan\left(\theta + \frac{\pi}{12}\right)$</p> $\Rightarrow \frac{\tan\left(\theta + \frac{\pi}{12}\right)}{\tan\left(\theta - \frac{\pi}{12}\right)} = \frac{3}{1}$ $\Rightarrow \frac{\tan\left(\theta + \frac{\pi}{12}\right) + \tan\left(\theta - \frac{\pi}{12}\right)}{\tan\left(\theta + \frac{\pi}{12}\right) + \tan\left(\theta - \frac{\pi}{12}\right)} = \frac{3+1}{3-1}$	1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
14.	$\Rightarrow \frac{\sin\left(\theta + \frac{\pi}{12}\right)\cos\left(\theta - \frac{\pi}{12}\right) + \cos\left(\theta + \frac{\pi}{12}\right)\sin\left(\theta - \frac{\pi}{12}\right)}{\sin\left(\theta + \frac{\pi}{12}\right)\cos\left(\theta - \frac{\pi}{12}\right) - \sin\left(\theta - \frac{\pi}{12}\right)\cos\left(\theta + \frac{\pi}{12}\right)} = \frac{4}{2}$	1	4
	$\Rightarrow \frac{\sin\left(\theta + \frac{\pi}{12} + \theta - \frac{\pi}{12}\right)}{\sin\left(\theta + \frac{\pi}{12} - \theta + \frac{\pi}{12}\right)} = 2$		
	$\Rightarrow \frac{\sin 2\theta}{\sin \frac{\pi}{6}} = 2$		
	$\Rightarrow \sin 2\theta = 2\sin \frac{\pi}{6}$	1	
	$\Rightarrow \sin 2\theta = 1$	1	
	$\Rightarrow 2\theta = \frac{\pi}{2}$		
	$\Rightarrow \theta = \frac{\pi}{4}$		
	Taking LHS	1/2	
	$\tan 4x$		
	$= \tan 2(2x)$		
$= \frac{2 \tan 2x}{1 - \tan^2 2x}$	1/2		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
15.	$= \frac{2\left(\frac{2 \tan x}{1 - \tan^2 x}\right)}{1 - \left(\frac{2 \tan x}{1 - \tan^2 x}\right)^2}$	1	4
	$= \frac{\frac{4 \tan x}{1 - \tan^2 x}}{\frac{(1 - \tan^2 x)^2 - 4 \tan^2 x}{(1 - \tan^2 x)^2}}$	1	
	$= \frac{4 \tan x (1 - \tan^2 x)}{1 - 6 \tan^2 x + \tan^4 x}$	1	
	<p>Let R be the set of students who didn't bring ruler and E be the set of students who didn't bring eraser.</p> <p>Using venn diagram,</p> $\begin{aligned} a + c &= 30 \\ b + c &= 50 \\ c &= 10 \\ \Rightarrow a &= 20 \\ b &= 40 \end{aligned}$	1	
	<p>So $n(R \cup E) = 20 + 10 + 40$</p> $= 70$	2	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
16.	Required number of students = $100 - 70$ $= 30$	1	4
	We know, $T_{r+1} = {}^nC_r x^{n-r} y^r$ Given expression is $\left(\sqrt{\frac{x}{3}} + \frac{3}{2x^2} \right)^{10}$		
	$\therefore T_{r+1} = {}^{10}C_r \left(\sqrt{\frac{x}{3}} \right)^{10-r} \left(\frac{3}{2x^2} \right)^r$	1	
	$= {}^{10}C_r \left(\frac{1}{\sqrt{3}} \right)^{10-r} x^{\frac{10-r}{2}} \left(\frac{3}{2} \right)^r x^{-2r}$		
	$= {}^{10}C_r \left(\frac{1}{\sqrt{3}} \right)^{10-r} x^{\frac{10-5r}{2}} \left(\frac{3}{2} \right)^r$	1	
	For term independent of x , we have $\frac{10-5r}{2} = 0$ $\Rightarrow 10 - 5r = 0$ $\Rightarrow r = 2$ Hence, the term independent of x is T_3 i.e. 3 rd term	1	

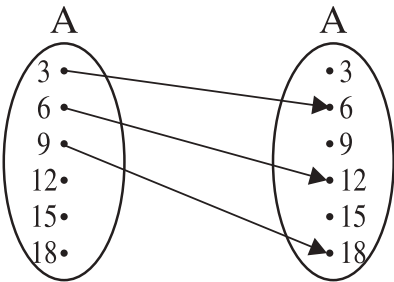
S. No.	VALUE POINTS/ KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
17.	$\Rightarrow T_3 = {}^{10}C_2 \frac{1}{3^4} \frac{3^2}{2^2}$ $= 45 \left(\frac{1}{36} \right) = \frac{5}{4}$	1	4
	(i) Required probability = $\frac{{}^5C_3 \times {}^3C_1 + {}^5C_1 \times {}^3C_3}{{}^8C_4}$	1	
	$= \frac{10 \times 3 + 5 \times 1}{70}$ $= \frac{1}{2}$	1	
	(ii) Required Probability = $\frac{{}^3C_0 \times {}^5C_4 + {}^3C_1 \times {}^5C_3}{{}^8C_4}$	1	
18.	$\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x(e^{5x} - 1)}$		4
	$= \lim_{x \rightarrow 0} \frac{2 \sin^2 x}{5x \left(\frac{e^{5x} - 1}{5} \right)}$	1	
	$= \lim_{x \rightarrow 0} 2 \left(\frac{\sin^2 x}{x^2} \right) \left(\frac{1}{\frac{e^{5x} - 1}{5x}} \right) \times \frac{1}{5}$	1½	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>Using $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ and $\lim_{x \rightarrow 0} \left(\frac{e^x - 1}{x} \right) = 1$</p> <p>$= 2(1)^2(1) \times \frac{1}{5}$</p> <p>$= 2/5$</p> <p style="text-align: center;"><u>OR</u></p> <p>Let $f(x) = \sin \sqrt{x}$</p> <p>$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$</p> <p>$= \lim_{h \rightarrow 0} \frac{\sin \sqrt{x+h} - \sin \sqrt{x}}{h}$</p> <p>$= \lim_{h \rightarrow 0} \frac{2 \cos \left(\frac{\sqrt{x+h} + \sqrt{x}}{2} \right) \sin \left(\frac{\sqrt{x+h} - \sqrt{x}}{2} \right)}{h}$</p> <p>$= \lim_{h \rightarrow 0} \frac{2 \cos \left(\frac{\sqrt{x+h} + \sqrt{x}}{2} \right) \sin \left(\frac{\sqrt{x+h} - \sqrt{x}}{2} \times \frac{\sqrt{x+h} + \sqrt{x}}{\sqrt{x+h} + \sqrt{x}} \right)}{h}$</p> <p>$= \lim_{h \rightarrow 0} \frac{2 \cos \left(\frac{\sqrt{x+h} + \sqrt{x}}{2} \right) \sin \left(\frac{x+h-x}{2(\sqrt{x+h} + \sqrt{x})} \right)}{h}$</p>	<p>$1/2 + 1/2$</p> <p>$1/2$</p> <p>1</p> <p>$1/2$</p> <p>$1/2$</p>	4

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	$= \lim_{h \rightarrow 0} \frac{2 \cos \left(\frac{\sqrt{x+h} + \sqrt{x}}{2} \right) \sin \left(\frac{h}{2(\sqrt{x+h} + \sqrt{x})} \right)}{\frac{h}{2(\sqrt{x+h} + \sqrt{x})} \times 2(\sqrt{x+h} + \sqrt{x})}$	1	
	$= \frac{\cos \left(\frac{2\sqrt{x}}{2} \right)}{\sqrt{x} + \sqrt{x}}$	1/2	
	$= \frac{\cos \sqrt{x}}{2\sqrt{x}}$	1/2	
19.	$Z = 2 \left\{ 4 \sin \frac{3\pi}{2} + 3i \cos \pi \right\}$		
	$= 2\{-4 - 3i\}$		
	$= -8 - 6i$	1	
	Let square root of $Z = x+iy$		
	$\Rightarrow \sqrt{-8-6i} = x+iy$	1/2	
	Squaring both sides, we get		
	$-8-6i = x^2 - y^2 + 2xyi$		
	$\Rightarrow x^2 - y^2 = -8 \text{ _____(i) and } 2xy = -6$	1/2	
	Now, $(x^2+y^2)^2 = (x^2-y^2)^2 + (2xy)^2$		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
20.	$= 64 + 36$ $= 100$ $\Rightarrow x^2 + y^2 = 10$ _____(ii) using (i) & (ii), we get $x^2 = 1$ or $x = \pm 1$ When $x = 1, y = -3$ When $x = -1, y = 3$ \therefore Square roots of z are $1 - 3i$ and $-1 + 3i$.	1	4
	(i) There are 4 vowels A, E, A, I and 7 consonant M, T, H, M, T, C, S consider all vowels as one object (A,E,A,I) M, T, H, M, T, C S	$\frac{1}{2}$	
	The possible arrangement are $\frac{8!}{2!2!} \times \frac{4!}{2!}$ Thus, required no. of words formed = $\frac{8! \times 4!}{2!2!2!}$	1	
	= 120960	$\frac{1}{2}$	
	(ii) 4 vowels namely A, E, A, I 7 consonants M, T, H, M, T, C, S		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>* M * T * H * M * T * C * S *</p> <p>Consonants can be arranged in $\frac{7!}{2!2!}$ ways</p> <p>& vowels can be placed at *marked places</p> <p>which can be done in $\frac{{}^8P_4}{2!}$ ways</p> <p>Thus, No. of words in which no two vowels are together = $\frac{7!}{2!2!} \times \frac{{}^8P_4}{2!}$</p> <p>= 1058400</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	4
21.	<p>$x^2 + y^2 - 8x + 2y + 3 = 0$</p> <p>$x^2 - 8x + 16 + y^2 + 2y + 1 - 14 = 0$</p> <p>$(x - 4)^2 + (y + 1)^2 = 14$</p> <p>$(4, -1), \quad r = \sqrt{14}$</p> <p>Circle having twice the radius of given circle has centre $(4, -1)$ and radius $= 2\sqrt{14}$</p> <p>$x^2 - 8x + 16 + y^2 + 2y + 1 = 56$</p> <p>$x^2 + y^2 - 8x + 2y - 39 = 0$</p> <p style="text-align: center;"><u>OR</u></p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	4

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>$R = \{(3, 6), (6, 12), (9, 18)\}$</p> <p>Domain of $R = \{3, 6, 9\}$</p> <p>Range of $R = \{6, 12, 18\}$</p> <p>Co-domain of $R = A$</p> <p>Arrow diagram :</p>  <p style="text-align: center;"><u>OR</u></p> <p>$f(x) = \sqrt{25 - x^2}$</p> <p><u>Domain</u> : $f(x)$ will assume real value</p> <p style="padding-left: 40px;">if and only if $25 - x^2 \geq 0$</p> <p style="padding-left: 40px;">$\Leftrightarrow x^2 \leq 25$</p> <p style="padding-left: 40px;">$\Leftrightarrow -5 \leq x \leq 5$</p> <p>$\therefore$ Domain of $f = [-5, 5]$</p> <p><u>Range</u> : Let $f(x) = y$</p> <p style="padding-left: 40px;">$\Rightarrow \sqrt{25 - x^2} = y$</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p> <p>1</p>	4

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
23.	$\Rightarrow 25 - x^2 = y^2$ $\Rightarrow x^2 = 25 - y^2$ $\Rightarrow x = \pm \sqrt{25 - y^2}$	$\frac{1}{2}$	
	Clearly x is real $\Leftrightarrow 25 - y^2 \geq 0$		
	$\Leftrightarrow -5 \leq y \leq 5$ _____ (i)	$\frac{1}{2}$	
	Also, $y = \sqrt{25 - x^2} \geq 0$ for $x \in [-5, 5]$ _____ (ii)	$\frac{1}{2}$	
	using (i) & (ii)		
	$0 \leq y \leq 5$		
23.	Thus range of $f = [0, 5]$	$\frac{1}{2}$	
	3, 6, 9,		
	$a_n = 3n$		
	8, 11, 14,		
	$b_n = 3n + 5$		
	t_n of the given series is $3n (3n + 5)$		
23.	$= 9n^2 + 15n$	1	
	$S_n = 9 \sum_{K=1}^n K^2 + 15 \sum_{K=1}^n K$	$\frac{1}{2}$	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
24.	$= \frac{9(n)(n+1)(2n+1)}{6} + \frac{15(n+1)n}{2}$	1	4
	$= \frac{9n(2n+1)(n+1) + 45n(n+1)}{6}$		
	$= \frac{9n(n+1)[(2n+1)+5]}{6}$	1/2	
	$= \frac{3n(n+1)(2n+6)}{2}$		
	$= 3n(n+1)(n+3)$	1	
	Note that $xy + yz + zx = xyz \left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right)$	1/2	
	Put $x \cos \theta = y \cos \left(\theta + \frac{2\pi}{3} \right) = z \cos \left(\theta + \frac{4\pi}{3} \right) = K$		
	Then, $x = \frac{K}{\cos \theta}$, $y = \frac{K}{\cos \left(\theta + \frac{2\pi}{3} \right)}$ and $z = \frac{K}{\cos \left(\theta + \frac{4\pi}{3} \right)}$	1	
	So that,		
	$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{1}{K} \left[\cos \theta + \cos \left(\theta + \frac{2\pi}{3} \right) + \cos \left(\theta + \frac{4\pi}{3} \right) \right]$	1/2	
	$= \frac{1}{K} \left[\cos \theta + \cos \theta \cos \frac{2\pi}{3} - \sin \theta \sin \frac{2\pi}{3} + \cos \theta \frac{4\pi}{3} - \sin \theta \sin \frac{4\pi}{3} \right]$	1+1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	$= \frac{1}{K} \left[\cos\theta + \cos\theta \left(\frac{-1}{2} \right) - \frac{\sqrt{3}}{2} \sin\theta - \frac{1}{2} \cos\theta + \frac{\sqrt{3}}{2} \sin\theta \right]$ $= \frac{1}{K} \times 0 = 0$ <p>Hence $xy + yz + zx = 0$</p> <p style="text-align: center;"><u>OR</u></p> <p>The given equation can be written as :-</p> $\sin 7x + \sin 3x + \sin 5x = 0$ <p>or $2\sin 5x \cos 2x + \sin 5x = 0$</p> <p>or $\sin 5x (2 \cos 2x + 1) = 0$</p> <p>$\therefore \sin 5x = 0$ or $2\cos 2x + 1 = 0$</p> <p>$5x = n\pi$ or $\cos 2x = -\frac{1}{2}$</p> <p>$x = \frac{n\pi}{5}$ or $\cos 2x = \cos \frac{2\pi}{3}; n \in \mathbb{Z}$</p> <p style="text-align: center;">or $2x = 2n\pi \pm \frac{2\pi}{3}; n \in \mathbb{Z}$</p> <p style="text-align: center;">or $x = 2n\pi \pm \frac{\pi}{3}; n \in \mathbb{Z}$</p> <p>Now,</p> <p>given $\frac{\pi}{2} < x < \pi$</p>	<p>$1\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$1\frac{1}{2}+2$</p>	6

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks								
25.	So required values of x are										
	$\frac{3\pi}{5}, \frac{4\pi}{5}$	$\frac{1}{2}$									
	& $\frac{2\pi}{3}$	$\frac{1}{2}$									
	The given equations are :										
	$x - y \leq 0 ; \quad 2x + y \leq 6 ; \quad y \leq 2 ; \quad x, y \leq 0$										
	consider										
	$x - y = 0$ _____ (i)										
	<table border="1"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>y</td> <td>0</td> <td>1</td> <td>2</td> </tr> </table>	x	0	1	2	y	0	1	2		
	x	0	1	2							
	y	0	1	2							
$2x + y = 6$ _____ (ii)											
<table border="1"> <tr> <td>x</td> <td>0</td> <td>3</td> </tr> <tr> <td>y</td> <td>6</td> <td>0</td> </tr> </table>	x	0	3	y	6	0					
x	0	3									
y	6	0									
$y = 2$ _____ (iii)											
For correct graph of line (i) & line (ii) $1\frac{1}{2} \times 2 = 3$ m	3										
for correct graph of line (iii) $\frac{1}{2}m$	$\frac{1}{2}$										
For correct shading of region 1m	1										
Thus, the required points are											
$O(0, 0), A(0, 2) \& B(2, 2)$ $1\frac{1}{2}m$	$1\frac{1}{2}$										

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
26.	<div data-bbox="203 287 1016 1042" data-label="Figure"> </div> <p>Given that a & b are the roots of the equation</p> $x^2 - 3x + p = 0$ <p>$\therefore a + b = 3$, $ab = p$ _____ (i)</p> <p>Also c, d are the roots of the eqn $x^2 - 12x + q = 0$</p> <p>$\therefore c + d = 12$, $cd = q$ _____ (ii)</p> <p>Given that a, b, c d are in G.P.</p>	<div data-bbox="1094 1293 1125 1323" data-label="Text"> <p>$\frac{1}{2}$</p> </div> <div data-bbox="1094 1377 1125 1407" data-label="Text"> <p>$\frac{1}{2}$</p> </div>	6

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>Let $b = ar, c = ar^2, d = ar^3$</p> <p>from (i) & (ii)</p> <p>$a + ar = 3 \Rightarrow a(1 + r) = 3$</p> <p>& $ar^2 + ar^3 = 12 \Rightarrow ar^2(1 + r) = 12$</p> <p>On dividing, we get</p> $\frac{ar^2(1+r)}{a(1+r)} = \frac{12}{3}$ <p>$\Rightarrow r^2 = 4$</p> <p>Since $ab = p$ & $cd = q$</p> $\therefore \frac{q+p}{q-p} = \frac{cd+ab}{cd-ab}$ $= \frac{ar^2 \cdot ar^3 + a \cdot ar}{ar^2 \cdot ar^3 - a \cdot ar}$ $= \frac{a^2 r(r^4 + 1)}{a^2 r(r^4 - 1)}$ $= \frac{16+1}{16-1} = \frac{17}{15}$ <p>Thus $(q + p) : (q - p) = 17 : 15$</p>	<p>$\frac{1}{2}$</p> <p>2</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p>	6

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p style="text-align: center;"><u>OR</u></p> <p>Let $A_1, A_2, A_3, \dots, A_m$ be the m numbers between 5 and 35 such that 5, $A_1, A_2, A_3, \dots, A_m, 35$ are in A.P.</p> <p>Hence $a_4 = 5, a_{m+2} = 35$</p> $d = \frac{30}{m+1}$ <p>Given $\frac{A_3}{A_{m-2}} = \frac{7}{13}$</p> $\frac{5+3d}{5+(m-2)d} = \frac{7}{13}$ $35 + 39d = 35 + 7(m-2)d$ $30 = (7m-53) \frac{30}{m+1}$ $m+1 = 7m-53$ $6m = 54$ $m = 9$	<p>$\frac{1}{2}$</p> <p>$1\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$1\frac{1}{2}$</p> <p>1</p>	
27.	<p>Let the given statement be denoted by $P(n)$, i.e.</p> <p>$P(n) : 4^n + 15n - 1$ is divisible by 9.</p> <p>For $n = 1$, we have</p> <p>$P(1) : 4 + 15 - 1$ is divisible by 9.</p>		6

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
28.	18 is divisible by 9, which is true.		6
	Thus, P(1) is true.	1	
	We assume that P(k) is true for some natural no. k, i.e.,		
	P(k) : $4^k + 15k - 1$ is divisible by 9.		
	$\Rightarrow 4^k + 15k - 1 = 9m$, for some integer m _____(1)	1	
	We shall now show that P(k+1) is also true,		
	P(k+1) : $4^{k+1} + 15(k+1) - 1$ is divisible by 9.	1	
	Consider,		
	$4^{k+1} + 15(k+1) - 1$		
	$= 4(4^k) + 15k + 14$		
	$= 4(9m - 15k + 1) + 15k + 14$ {using (1)}		
	$= 36m - 45k + 18$		
	$= 9(4m - 5k + 2)$, which is divisible by 9.	2	
	Thus, P(k+1) is true, whenever P(k) is true.		
	By the principle of mathematical induction,		
	the statement P(n) is true for all $n \in \mathbb{N}$.	1	
	Given lines are :		
	$y = 3x + 1$ and $2y = x + 3$		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>slope = 3 slope = $\frac{1}{2}$</p> <p>\therefore Gives lines are equally inclined with the line $y = mx + 4$</p> <p>$\therefore \left \frac{m-3}{1+3m} \right = \left \frac{m-\frac{1}{2}}{1+\frac{m}{2}} \right$</p> <p>$\Rightarrow \frac{m-3}{1+3m} = \pm \frac{m-\frac{1}{2}}{1+\frac{m}{2}}$</p> <p>$\Rightarrow \frac{m-3}{1+3m} = \frac{2m-1}{2+m}$ and $\frac{m-3}{1+3m} = -\frac{2m-1}{2+m}$</p> <p>$\Rightarrow 2m + m^2 - 6 - 3m$</p> <p>$\quad = 2m - 1 + 6m^2 - 3m \quad , \quad m^2 - m - 6 = -6m^2 + m + 1$</p> <p>$\Rightarrow 5m^2 = -5$ or $7m^2 - 2m - 7 = 0$</p> <p>$\Rightarrow m^2 = -1$ or $m = \frac{2 \pm \sqrt{4 - 4(7)(-7)}}{2 \cdot 7}$</p> <p>No solution $\Rightarrow m = \frac{2 \pm 10\sqrt{2}}{14}$</p> <p> or $m = \frac{1 \pm 5\sqrt{2}}{7}$</p> <p>Thus possible values of m are</p> <p>$\frac{1+5\sqrt{2}}{7}$ and $\frac{1-5\sqrt{2}}{7}$</p> <p style="text-align: center;"><u>OR</u></p>	<p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>1</p>	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>Let ABCD be the rectangle with B (1, 3) and D(5, 1) then</p> <p>mid-point of BD is (3, 2)</p> <p>It lies on $y = 2x + c$</p> <p>$\Rightarrow c = -4$</p> <p>so that equation of AC is $y = 2x - 4$</p> <p>Let A be (α, β) then $\beta = 2\alpha - 4$ _____ (i)</p> <p>Since $AB \perp AD$</p> <p>$\therefore \frac{\beta - 3}{\alpha - 1} \times \frac{\beta - 1}{\alpha - 5} = -1$</p> <p>or $(\beta - 3)(\beta - 1) + (\alpha - 1)(\alpha - 5) = 0$</p> <p>$\Rightarrow \alpha^2 + \beta^2 - 6\alpha - 4\beta + 8 = 0$ _____ (ii)</p> <p>from (i) & (ii), we get</p> <p>$\alpha^2 + (2\alpha - 4)^2 - 6\alpha - 4(2\alpha - 4) + 8 = 0$</p> <p>$\Rightarrow 5\alpha^2 - 30\alpha + 40 = 0$</p> <p>or $\alpha^2 - 6\alpha + 8 = 0$</p> <p>$\Rightarrow \alpha = 2, 4$</p>	<p>1</p> <p>1</p> <p>1</p> <p>2</p>	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks																																																						
29.	from (i), when $\alpha = 2, \beta = 0$	1	6																																																						
	and when $\alpha = 4, \beta = 4$																																																								
	Hence the remaining vertices are A (2, 0) and (4, 4)																																																								
	Let the assumed mean be A = 65.																																																								
	Here h = 10																																																								
	<table><tr><th>Classes</th><th>frequency (f)</th><th>Mid point (xi)</th><th>$yi = \frac{xi - 65}{10}$</th><th>fiyi</th><th>fi yi²</th></tr><tr><td>30-40</td><td>3</td><td>35</td><td>-3</td><td>-9</td><td>27</td></tr><tr><td>40-50</td><td>7</td><td>45</td><td>-2</td><td>-14</td><td>28</td></tr><tr><td>50-60</td><td>12</td><td>55</td><td>-1</td><td>-12</td><td>12</td></tr><tr><td>60-70</td><td>15</td><td>65</td><td>0</td><td>0</td><td>0</td></tr><tr><td>70-80</td><td>8</td><td>75</td><td>1</td><td>8</td><td>8</td></tr><tr><td>80-90</td><td>3</td><td>85</td><td>2</td><td>6</td><td>12</td></tr><tr><td>10-100</td><td>2</td><td>95</td><td>3</td><td>6</td><td>18</td></tr><tr><td></td><td>N=50</td><td></td><td></td><td>-15</td><td>105</td></tr></table>			Classes	frequency (f)	Mid point (xi)	$yi = \frac{xi - 65}{10}$	fiyi	fi yi ²	30-40	3	35	-3	-9	27	40-50	7	45	-2	-14	28	50-60	12	55	-1	-12	12	60-70	15	65	0	0	0	70-80	8	75	1	8	8	80-90	3	85	2	6	12	10-100	2	95	3	6	18		N=50			-15	105
	Classes			frequency (f)	Mid point (xi)	$yi = \frac{xi - 65}{10}$	fiyi	fi yi ²																																																	
	30-40			3	35	-3	-9	27																																																	
	40-50			7	45	-2	-14	28																																																	
	50-60			12	55	-1	-12	12																																																	
60-70	15	65	0	0	0																																																				
70-80	8	75	1	8	8																																																				
80-90	3	85	2	6	12																																																				
10-100	2	95	3	6	18																																																				
	N=50			-15	105																																																				
Table : xi																																																									
Σfyi																																																									
Σfyi^2																																																									
$\therefore \bar{x} = A + \frac{\Sigma fyi}{50} \times h = 65 - \frac{15}{50} \times 10 = 62$																																																									

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>Variance $\sigma^2 = \frac{h^2}{N^2} \left[N \sum f_i y_i^2 - (\sum f_i y_i)^2 \right]$</p> <p>$= \frac{(10)^2}{(50)^2} \left[50 \times 105 - (-15)^2 \right]$</p> <p>$= \frac{1}{25} [5250 - 225]$</p> <p>$= 201$</p> <p>Standard deviation (σ) = $\sqrt{201} = 14.18$</p>	<p>1½</p> <p>1</p>	



PHYSICAL EDUCATION

Designed & Developed

by

DAV Centre for Academic Excellence

in a workshop

held at

DAV College Managing Committee

Chitragupta Road

New Delhi - 110055

PHYSICAL EDUCATION XI

Time : 3 Hours

DESIGN

Max. Marks : 70

I. Weightage of learning objectives :

Objective	Remembring	Understanding	Application	Creative	Hot	Total
% of Marks	27.14	11.5	30	4.3	27.1	100
Marks	19	08	21	03	19	70

II. Weightage to form of questions :

Type of Questions	LA	SA	VS	Total
No. of Questions	07	08	11	26
Marks	35	24	11	70

III. Weightage to Content :

S. No.	Name of Unit
1	Changing Trends & Career in Physical Education
2	Olympic Movement
3	Physical Fitness, Wellness and lifestyle
4	Physical Education & Sports for children with special need.
5	Yoga
6	Physical activity and leadership training
7	Test measurement and Evaluation
8	Fundamentals of Anatomy and Physiology
9	Kinesiology, Biomechanics & Sports
10	Psychology and Sports
11	Training in Sports
12	Doping

IV. Weightage to difficulty level :

1. Difficult questions : 30%
2. Average questions : 50%
3. Easy questions : 20%

V. Expected length of answers to different types of questions & time management :

S. No.	Types of Questions	Expected length of Answers.	Expected time for each question
1	Long Answer (LA)	75-100	11 Min. Approx
2	Short Answer (SA)	30-50	07 Mins.
3	Very Short Answer (VSA)	10-20	02 Mins

PHYSICAL EDUCATION

Time Allowed : 3 Hours

Maximum Marks : 70

General Instructions :

1. All question are compulsory.
2. Question paper consists of 26 questions.
3. 01 mark questions must be answered in 10-20 words.
4. 03 mark questions must be answered in 30-50 words.
5. 05 marks question must be answered in 75-100 words.

SECTION - A (READING SKILLS)

- | | |
|--|---|
| 1. What do you understand by Physical Education? | 1 |
| 2. Briefly explain the meaning of positive lifestyle. | 1 |
| 3. Give the aim of adaptive physical education. | 1 |
| 4. What do you mean by deaflympics? | 1 |
| 5. Briefly explain the term 'Pratyahara'. | 1 |
| 6. Which Somato body type is suitable for strength dominating sports? | 1 |
| 7. Enlist any two properties of muscles. | 1 |
| 8. Name two ball and socket joints. | 1 |
| 9. Write any two muscles which are found around the shoulder region. | 1 |
| 10. Define sports psychology. | 1 |
| 11. Recovery is an essential part of sports training. Justify your answer. | 1 |

12. Give a brief account of the Ancient Olympic Games. 3
13. Write the main functions of IOC. (Give any six) 3
14. Discuss the role of physical education teacher for children with special need in detail. 3
15. Describe any three objectives of adventure sports in detail. 3
16. Discuss the process of creating leaders through physical education. (Write any three) 3
17. Explain the mechanism of respiration. 3
18. Discuss the harmful effects of prohibited substances. (Write any six) 3
19. What are athletes responsibilities for doping control? 3
20. What do you mean by soft skills? Discuss any four soft skill which are required for the career in the field of physical education. 1+4=5
21. How can health threats be prevented through lifestyle change? Discuss in detail. 5
22. What are yogic kriyas? Explain any two kriyas in detail. 1+4=5
23. What is the procedure to measure the following anthropometric measurements : 5
 - (a) Height Measurement.
 - (b) Weight measurement.

24. Most of our body movements are produced with the help of levers formed by the bones. Describe the different types of levers employed by the body while playing with suitable examples. 2+3=5
25. Elaborate the developmental characteristics during infancy and childhood. 5
26. Explain the role of free play in the development of motor components. 5

PHYSICAL EDUCATION

Time Allowed : 3 Hours

Maximum Marks : 70

MARKING SCHEME / HINTS TO SOLUTIONS

(Note : Any other relevant answer, not given herein but given by the candidates, be suitably awarded.)

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
1.	Physical education is an education through physical activities for the overall development of human personality.	1	1
2.	Positive life style means practicing of healthy habits, which keeps us away from diseases, stress and improve quality of life.	1	1
3.	The aim of adaptive physical education is to help or aid children with special need to achieve physical mental, emotional and social growth.	1	1
4.	Deaflympics is to provide opportunities to persons with hearing disability to participate in elite sports.	1	1
5.	Pratyahara is a process of self-control in which an individual is able to exercise control over his/her senses.	1	1
6.	Endomorph body type is most suitable for strength dominating sports.	1	1
7.	1. Excitability		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
8.	2. Contractility	$\frac{1}{2} + \frac{1}{2}$	1
	3. Elasticity		
9.	4. Extensibility (any two)	$\frac{1}{2} + \frac{1}{2}$	1
	1. Shoulder joint		
10.	2. Hip joint	$\frac{1}{2} + \frac{1}{2}$	1
	1. Biceps		
11.	2. Triceps	$\frac{1}{2} + \frac{1}{2}$	1
	3. Deltoid		
12.	4. Trapezius	$\frac{1}{2} + \frac{1}{2}$	1
	5. Pectoralis major and minor (any two)		
10.	According to 'Singer' sports psychology explores one's behaviour in athletics".	1	1
	<u>OR</u>		
	According to John Luther, "Sports psychology is the scientific study of persons and their behaviours in sports contexts and the practical application of that knowledge."		
11.	Recovery is an essential part of sports training as it helps in regaining what we lost during training and prepare for the next task.	1	1
12.	The origin of Olympic Games belongs to Greece. The records say that the first historic mentioning of games occurred in the		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>year 776 BC. These games were played in the state of Athens near the valley of Appheur river at olympiad. The games were held with religious customs in the honour of their God; Zeus:</p> <p>The ceremony of olympic games begins from the new moon day in July after four years. The events of olympic continued for five days.</p> <p>The prize given to winners were made from olive leaves.</p> <p>Ancient Olympic games came to a sudden end when the Roman emperor Theodosius banned these games in the year 394 A.D.</p>	3	3
13.	<p>Main functions of IOC are discribed below :-</p> <ol style="list-style-type: none"> 1. The place where the Olympic will be organised is decided by this committee. 2. It takes action in order to strengthen the unity and to protect the independence of the Olympic movement. 3. It acts against any form of discrimination affecting the Olympic movement. 4. It encourages and supports the promotion of women in sports at all levels. 5. It leads the fight against doping in sports. 6. It opposes any political or commercial abuse of sports and athletes. 	$\frac{1}{2} \times 6$	3

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
14.	Physical Education Teacher help children with special need to develop physical ability and healthy habits, that can last for their lives. P.E.T. modify sports activities and allow the special need children to get the cardiovascular, flexibility and strength training benefits that allows children to stay healthy. He also provide such physical activities which help in reducing anxiety and stress.	3	3
15.	<ol style="list-style-type: none"> 1. To develop self confidence : - It is one of the main objectives of adventure sports. In fact, the individuals who engage in adventure sports compete with themselves and therefore have a greater sense of achievement when they achieve their goal. 2. To have bonding with nature : - Most of the adventure sports are outdoor activities which give participants ample opportunities to experience nature. The participants come closer to the nature. They have bonding with the nature. 3. Proper use of abundant energy : - Adventure sports provide the participants a positive and healthy channelisation for their abundant energy and enthusiasm. Indeed, it can be said that the use of 		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
16.	abundant energy and enthusiasm in such a way is beneficial for the participants for their harmonious development.	1×3	3
	<ol style="list-style-type: none"> 1. Provide them some leadership courses and course leads to an application of knowledge, skill and understanding in valuable context. 2. Give them opportunities to continue developing their skills. 3. To have faith and confidence in students. 4. Give them some reward for improvement and give more responsibility to successful student. 5. Offer the students a range of leadership roles such as supervising and managing sports activities. 6. Recognise the leaders by giving them a cap, badge or uniform. This will be force of motivation for other students. (any three) 	3	3
17.	The mechanism of respiration is the process of inspiration and expiration during inspiration the intercostal muscles, elevates the ribcage and the diaphragm is pushed down words. Thus forcing the atmospheric air to enter into the lungs and gas exchange take place. During expiration the intercostal		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>muscles and the diaphragm return to its original position and force the lungs to expire the air out.</p>	3	3
18.	<p>There are many side effects of prohibited substance. The side effects are like :-</p> <ol style="list-style-type: none"> 1. Dehydration and decreased circulation. 2. Complications like stroke, cardiac arrhythmias, Psychosis and even death. 3. Increased heart rate and blood pressure. 4. Sexual Dysfunction 5. Masculinization (features like male) in females. 6. Physical and Psychological dependence leading to many problems associated with addiction and withdrawal. 7. Enlargement of the prostate gland. 	<p>3</p> <p>$\frac{1}{2} \times 6$</p>	3
19.	<p>There are various responsibilities of athletes with regard to the anti-doping policies and rules of WADA. There should not be any violation of these codes. The responsibilities of athletes are stated below :-</p> <ol style="list-style-type: none"> 1. Be knowledgeable of and comply with all applicable anti-doping policies and rules. 2. Be available for the sample collection at all times. 		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
20.	<p>3. Take the responsibility in the context of anti doping, for what they ingest and use.</p> <p>4. Inform medical personnel of their obligation not to use prohibited substances and prohibited methods and to take the responsibility to make sure that any medical treatment received does not violate anti-doping policies.</p> <p>5. Report immediately to the doping control station for testing unless delayed for valid reasons.</p> <p>6. Maintain control of one's sample until it is sealed. (any three)</p>	1×3	3
	<p>Soft skills are combination of interpersonal skills, communication skills, character traits, attitudes and carrier attributes that enable a person to navigate their environment effectively.</p> <p>(a) Communication skills : - The ability to read, write, and speak clearly and effectively.</p> <p>(b) Team work : - Working with a team spirit to face challenges and reacting to a common goal is called a good team work.</p> <p>(c) Interpersonal Relations : - The most important qualities are the willingness to share, the ability to listen others and be patient with others as one work with others.</p>	1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
21.	<p>(d) Leadership skills : - Ability to lead a team effectively in the field of Physical Education as it involves keeping a team in such a way that they are motivated and inspired.</p>	1×4	5
	<p>(a) Healthy eating habits : - The quantity and quality of food you eat can effect the well being of individuals. Choose nutritious foods which have vitamins, minerals, fiber and other nutrients.</p> <p>(b) Manage chronic conditions : If you have high cholestrol or high blood pressur, follow the doctors advice and recommendations.</p> <p>(c) Manage stress : Take steps to reduce stress or learn to deal with stress in a healthy way.</p> <p>(d) Include Physical Activity in your daily routine : Choose sports or other activities which you enjoy, Aerobics, brisk walking and other activities for 30 min a day for five days a week to keep Physically active everyday.</p> <p>(e) Don't smoke : Do not smoke or use other tobacco products as it may lead to cancer.</p> <p>(f) Preventing injury.</p> <p>(g) Limiting amount of Alcohol.</p>	1×5	5

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
22.	<p>Yogi Kriyas help the individual to clean the internal and external organs of the body.</p> <p>(I) NETI KRIYA - It is done in many ways jalneti, sutraneti, dhritneti, telneti and dugdhneti. Water or the above mentioned substance is poured into a bowl having a spout. From the spout it is put inside one of the nostrils. It comes out of the other nostril. But the nostril out of which the water or other substance has to come, should be kept low. These Kriyas should be done under the able guidance of some expert.</p> <p>(II) NAULI KRIYA - In this Kriya one bends forward and breathes out. The stomach is shrunk so that the front muscles of the stomach may meet its back muscles. Afterwards, the muscles of stomach facing the head should be exposed. Keeping the hands on the thighs rotate the muscles clockwise and anti-clockwise. This Kriya is helpful in the treatment of acidity, constipation and other diseases related to the intestines.</p> <ul style="list-style-type: none"> • Dhuti Kriya • Bhasti Kriya • Tratak Kriya • Kapalbhati Kriya 	<p>1</p> <p>2</p> <p>2</p>	5

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
23.	<p>Height Measurements : The procedure to measure anthropometric measurement is as follow :</p> <p>(i) Participants are asked to remove their shoes, heavy outer garments, and ornaments.</p> <p>(ii) The participant is asked to stand with his / her back to the height rule. The back of the Head, back, buttocks, calves and heels should be touching the upright, feet together. The participant asked to look straight.</p> <p>(iii) The head piece of stadiometer or the sliding part of the measuring rod is lowered so that the hair (if present) is pressed flat.</p> <p>(iv) Height is recorded to the resolution of the height rule to the nearest centimetre.</p> <p>WEIGHT MEASUREMENT</p> <p>(i) Participants are asked to remove their heavy outer garments and shoes. The participant stand in the centre of the platform, weight distributed evenly to both feet. Standing off-centre may affect measurement.</p> <p>(ii) The weight is recorded to the resolution of the scale to the nearest Kg.</p>	<p>2½</p> <p>2½</p>	5
24.	There are three types of levers which play a vital role in		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
25.	<p>sports and physical activity.</p> <p>A- Class I Lever</p> <p>B - Class II Lever</p> <p>C - Class III Lever</p> <p>Class-I Lever - Have the fulcrum between the effort (force) and load.</p> <p>(Resistance) Example - Seated dumbbells triceps extension and hand grip.</p> <p>Class-II Lever - Have the load (Resistance) between the efforts (force) and fulcrum.</p> <p>Example - Lever includes push-ups, Leg lifts</p> <p>Class-III-Lever - Lever have the effort (force) between the load (Resistance) and fulcrum.</p> <p>Example - Holding the Tennis Racket and base ball bat.</p>	2	5
	<p>1. Infancy and Baby hood stage (Brith to 3 year)</p> <p>During this stage of body the growth and development occur in progressive manner. Individual gains considerable weight and height. The cognitive development starts as child tries to balance his body.</p> <p>2. Childhood Stage (3 years to 12 years)</p> <p>The child hood stage began from the 3rd year and ends</p>	2½	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
26.	<p>by the 12th year. In this stage we can see the following changes in child.</p> <ul style="list-style-type: none"> • Enough control on their muscles. • Neuro-muscular coordination becomes more efficient. • Concentration power increases. • Thinking ability, memory logic and decision making ability increases. • Children develop control over their emotions, and improve social qualities. <p>Free play refers to the spontaneous and unstructured activities that engage the motor components of the individual. The development of motor skill involves the control and co-ordination of arms and legs, fingers and toes. Playing on see-saw help children to understand about the balancing and develop lower body strength.</p> <p>(i) Bodyawareness : Activities like jumping, skipping a rope, playing a hop scotch, involve co-ordination of the body parts and certain changes in body postures.</p> <p>(ii) Spatial awareness : Crawling tunnels and obstacle races help children to understand how to move with a</p>	2½	5

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>restricted space, as they go over, under, around and through objects, playing with blocks, with instructions to build different structures also enhances spatial awareness.</p> <p>(iii) Awareness of directions : Playing like dodge ball, in which children try to avoid getting hit by a sponge ball, helps to learn about position of objects with respect their body parts.</p> <p>(iv) Hand - eye co-ordination - Activities like tossing, catching, dribbling and aiming with a ball develops hand - eye co-ordination, attention and timing skills.</p> <p>(v) Development of fine motor skills : - Refers to the control of small muscles of hands and feet. Playing with sand, beads and strings improve the co-ordination of muscles.</p>	1×5	5



CHEMISTRY

Designed & Developed

by

DAV Centre for Academic Excellence

in a workshop

held at

DAV College Managing Committee

Chitragupta Road

New Delhi - 110055

CHEMISTRY

CLASS - XI

Time : 3 Hours

Max. Marks : 70

I. Weightage of learning objectives :

Objectives	Knowledge	Understanding	Application	Evaluation	HOTS	Total
% of Marks	14.3%	27%	36%	14.3%	8.4%	100%
Marks	10	19	25	10	06	70

II. Weightage to form of questions :

Type of Questions	LA	SA - I	SA - II	VSA	Total
No. of Questions	3	7	12	5	27
Marks	15	14	36	5	70

III. Scheme of options :

There is no overall choice. However an internal choice has been provided in one question of 2 marks one question of three marks and all the questions of 5 marks weightage.

IV. Weightage to difficulty level :

Difficulty Level	Marks	%
Easy	11	15.7%
Average	42	60.0%
Difficult	17	24.3%
Total	70	100%

Important Note :

There can be many Blue Prints corresponding to this DESIGN of the Question Paper. The Blue Print of the Sample Paper can be quite different from the Blue Print of the final examination paper. The Design however, will be static in all the cases.

CHEMISTRY

Time Allowed : 3 Hours

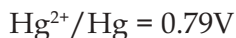
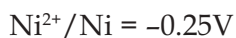
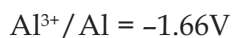
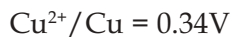
Maximum Marks : 70

General Instructions :

- i. All questions are compulsory.
- ii. There are 27 questions in all. Questions 1 to 5 carry one mark each, questions 6 to 12 carry two marks each, questions 13 to 24 carry three marks each and questions 25 to 27 carry five marks each.
- iii. There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all the three questions of five marks each. You have to attempt only one of the choices in such questions.
- iv. Fifteen minutes time has been allotted to read this question paper. During this time, the student will read the question paper only and will not write any answer on the answer script.
- v. Use of calculator is not allowed. Use log table, if necessary.

1. Out of Al and Ga, which one has higher ionisation enthalpy and why? 1

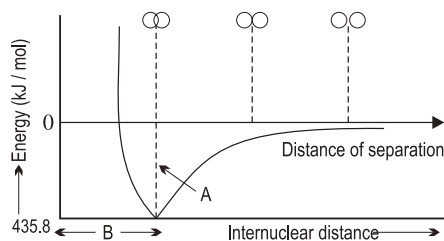
2. Given the standard electrode potentials : 1



Arrange these metals in their increasing order of reducing power.

3. Why is KO_2 paramagnetic? 1

4. Give structure of metamers with molecular formula $C_4H_{10}O$. 1
5. Give reason for loss of aromatic character by arenium ion formed during electrophilic substitution of benzene. 1
6. (a) The electronic configuration of oxygen is written as $1s^2 2s^2 2p_x^2 2p_y^1 2p_z^1$ and not as $1s^2 2s^2 2p_x^2 2p_y^2$? State the rule governing this type of distribution. 1
- (b) Why electronic energy is negative? 2
7. What does A and B signify in the potential energy curve for the formation of H_2 molecule as a function of internuclear distance of the hydrogen atoms. 2
8. Give two conditions under which ΔH is equal to ΔU . 2
9. Explain how a mixture of CH_3COOH and CH_3COONa acts as a buffer solution. 2



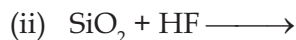
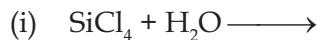
OR

Derive relationship between K_a and K_b using NH_3 and its conjugate acid.

10. Name the following : 2
- (i) Alkali metal which has least melting point.

- (ii) Alkali metal which gives hydrated salts.
- (iii) Thermally unstable alkaline earth metal carbonate.
- (iv) Alkaline earth metal used for treatment of cancer.

11. Complete and balance the following chemical equations : 2



12. The peroxide effect is not observed in addition of HCl and HI to an asymmetrical alkene. Justify. 2

13. H_2 reacts with O_2 to form H_2O . If in a reaction mixture 3.0g of H_2 and 29g of O_2 is present. 3

- (a) Which is the limiting reactant?
- (b) Calculate the maximum amount of H_2O that can be formed.
- (c) Calculate the amount of the reactant left unreacted.

14. When electromagnetic radiation of wavelength 300 nm falls on the surface of sodium metal, electrons are emitted with a kinetic energy of $1.68 \times 10^5 \text{ Jmol}^{-1}$. What is the minimum energy needed to remove an electron from sodium atom? 3

15. (a) Why do halogens show exceptionally large electron gain enthalpy.
 (b) Would you expect the first ionisation enthalpies for protium and deuterium to be same or different. Justify your answer.
 (c) Be has higher $\Delta_i H_1$ than that of B. 3

16. (a) Out of NaCl and KCl which ionic compound has more covalent character. Justify your answer.
- (b) Though NH_3 and NF_3 both are pyramidal but the resultant dipole moment of NF_3 is lower.
- (c) Write an example of compound having expanded octet. 3

OR

- (a) Write the molecular orbital configuration of F_2 molecule.
- (b) Find the bond order in F_2 molecule.
- (c) Identify its magnetic behaviour giving appropriate reason.
17. Calculate the enthalpy change ΔH of the following reaction

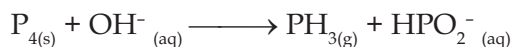


Given average bond enthalpies of

$\text{C} - \text{H}$, $\text{C} \equiv \text{C}$, $\text{O} = \text{O}$, $\text{C} = \text{O}$, and

$\text{O} - \text{H}$ as 414, 814, 499, 724, 640 kJ / mol respectively. 3

18. The ionization constant of chloroacetic acid is 1.35×10^{-3} . What will be the pH of 0.1M acid and its 0.1M sodium salt solution. 3
19. Balance the following redox reaction in basic medium by ion-electron method 3



20. (a) Classify the following hydrides as Lewis acid or Lewis base.



(b) Write chemical reactions to justify that hydrogen peroxide can function as both oxidising as well as reducing agent. 3

21. Give reasons : 3

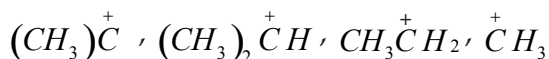
- (a) Lithium salts are mostly hydrated.
- (b) Alkali metal salts impart characteristic colour to the flame.
- (c) Alkali metals dissolve in liquid ammonia to give deep blue solutions.

22. (a) Do the following conversions :

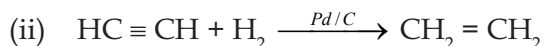
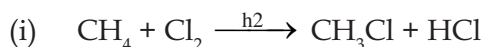
- (i) Propan-2-ol to 2 - Bromopropane
- (ii) Bromoethene to Benzene

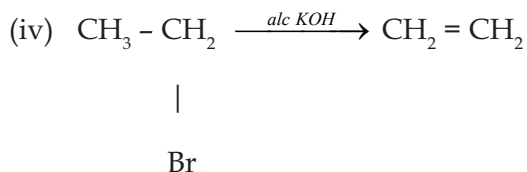
(b) Give the principle of steam distillation technique used in the purification of organic compounds. 3

23. (a) Which one of the following carbocations is most stable? Justify your answer.



(b) Classify the following reactions according to their type





3

24. What is photo chemical smog? How is it different from classical smog?

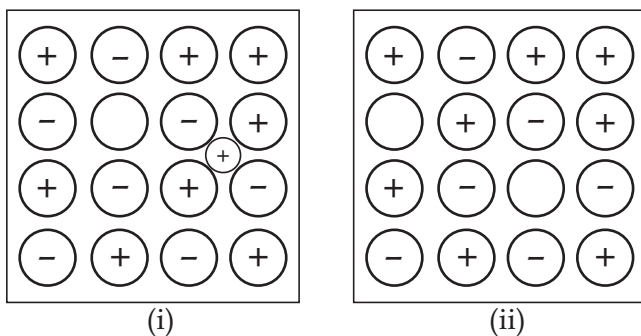
Give two methods to control photochemical smog.

3

25. (a) 135 ml of gas is collected over water at 298K and 0.993 bar pressure.

If the gas weighs 0.16g and the aqueous tension at 298K is 0.0317 bar calculate the molar mass of the gas.

(b) Identify the defects in the following diagrams.



(c) Name a solid which shows both the above type of defect.

5

OR

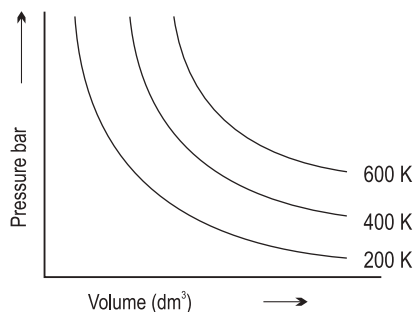
(a) X-ray diffraction studies show that copper crystallises in an fcc unit cell with cell edge of 3.608×10^{-8} cm. In a separate experiment copper is determined to have density 8.92 g/cc.

Calculate atomic mass of copper.

(b) The variation of pressure with volume of the gas at different temperature can be graphically represented as shown in figure. On the basis of this graph answer the following questions.

(i) How will the volume of a gas change if its pressure is increased at constant temperature.

(ii) At a constant pressure how will the volume of a gas change if the temperature is increased from 200K to 400K.



(c) Give S.I. unit of co-efficient of viscosity.

26. (a) When concentrated sulphuric acid was added to an unknown salt present in a test tube, a brown gas (A) was evolved. This gas intensified when copper turnings were added to this test tube. On cooling the gas (A) changed into colourless solid (B)

(i) Identify (A) and (B)

(ii) Write the structure of (A) and (B)

(iii) Why does gas (A) change to solid on cooling?

(b) Arrange the following in the decreasing order of their reducing character.



(c) Complete and balance the following reaction

5

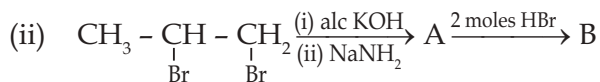
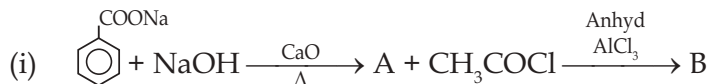


OR

Give reasons :-

- (a) Bond angle in NH_3 is greater than that in PH_3 .
- (b) NH_3 is polar while BF_3 is not.
- (c) AlCl_3 exists as dimer.
- (d) SiCl_4 undergoes hydrolysis but CCl_4 doesnot.
- (e) Silicones are used for water proofing of fabrics.

27. (a) Identify A & B in the following reactions



(b) Give a three step mechanism for nitration of benzene.

5

OR

- (a) An alkene with molecular formula C_6H_{12} on ozonolysis gives 2 moles of a ketone with molar mass 58μ . Write the structure and IUPAC name of Ketone and alkene.
- (b) What are meta directing groups? Give an example. Are they activating or deactivating towards electrophilic substitution reactions. Explain.
- (c) Convert n-heptane to Toluene.

CHEMISTRY

Time Allowed : 3 Hours

Maximum Marks : 70

MARKING SCHEME / HINTS TO SOLUTIONS

(Note : Any other relevant answer, not given herein but given by the candidates, be suitably awarded.)

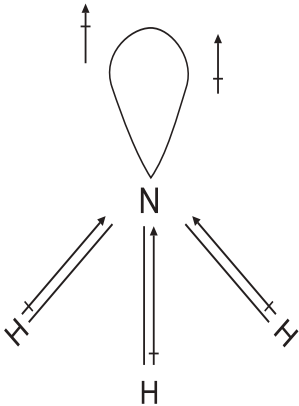
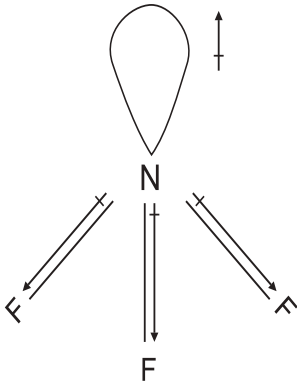
S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
1.	Ga has higher ionisation enthalpy because of poor shielding effect due to intervening d-orbital electrons.	1	1
2.	$\text{Hg}^{2+}/\text{Hg} < \text{Cu}^{2+}/\text{Cu} < \text{Ni}^{2+}/\text{Ni} < \text{Al}^{3+}/\text{Al}$	1	1
3.	The superoxide ion O_2^- is paramagnetic due to presence of one unpaired electron in π^*2p molecular orbital	1	1
	<u>OR</u>		
	O_2^- is an odd e-species		
4.	Metamers :- $\text{CH}_3\text{OCH}_2\text{CH}_2\text{CH}_3$ $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$	$\frac{1}{2}$ $\frac{1}{2}$	1
5.	In arenium ion delocalisation of π electrons stops at Sp^3 hybridised carbon hence aromaticity is lost.	1	1
6.	(a) Hund's Rule : It states that pairing of electrons in degenerate orbitals occurs only when each degenerate orbital is singly occupied.	1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	(b) The electronic energy at infinity is zero, hence when an electron is brought from infinity to the n^{th} shell, it loses its energy and energy acquires a negative value.	1	2
7.	'A' signifies Bond energy	1	
	'B' signifies Bond length	1	2
8.	(i) At constant volume ($\Delta V = 0$)	1	
	(ii) number of moles of gaseous product is equal to number of moles of gaseous reactants, i.e. $\Delta n_g = 0$	1	2
9.	$\text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COO}^- + \text{H}^+$ (Partially ionised)	$\frac{1}{2}$	
	$\text{CH}_3\text{COONa} \longrightarrow \text{CH}_3\text{COO}^- + \text{Na}^+$ (Completely ionised)	$\frac{1}{2}$	
	When a drop of conc HCl is added H^+ ions of HCl combine with CH_3COO^- to form CH_3COOH which ionises to small extent.	$\frac{1}{2}$	
	When a drop of NaOH is added, OH^- reacts with undissociated acid to form H_2O .	$\frac{1}{2}$	
	So no appreciable change in H^+ ion conc and pH remains unchanged.		2
	<u>OR</u>		
	$\text{NH}_3 + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4^+ + \text{OH}^-$		
	$K_b = \frac{[\text{NH}_4^+][\text{OH}^-]}{[\text{NH}_3]}$	$\frac{1}{2}$	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	$\text{NH}_4^+ + \text{H}_2\text{O} \rightleftharpoons \text{NH}_3 + \text{H}_3\text{O}^+$ $K_a = \frac{[\text{NH}_3][\text{H}_3\text{O}^+]}{[\text{NH}_4^+]}$ $K_b = \frac{[\text{NH}_4][\text{OH}^-][\text{H}_3\text{O}^+]}{[\text{NH}_3][\text{H}_3\text{O}^+]} = \frac{K_w}{K_a}$ $\Rightarrow K_w = K_a.K_b$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	
10.	(i) Caesium (ii) Lithium (iii) Beryllium (iv) Radium	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
11.	$\text{SiCl}_4 + 4\text{H}_2\text{O} \longrightarrow \text{Si}(\text{OH})_4 + 4\text{HCl}$ $\text{SiO}_2 + 4\text{HF} \longrightarrow \text{SiF}_4 + 2\text{H}_2\text{O}$	1 1	2
12.	Peroxide effect is not observed in addition of HCl and HI to an asymmetrical alkene due to - H - Cl bond being stronger than H - Br bond is not cleaved by free radical H - I bond is weaker and Iodine free radicals combine to give I ₂ molecule instead of adding to double bond.	1 1	2
13.	$2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$ $2 \times 2.0 \text{ g} \quad \quad 2 \times (2.0 + 16)$ $= 4.0 \text{ g} \quad 32\text{g} \quad \quad = 36.0\text{g}$		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
14.	3g of H ₂ requires O ₂ = $\frac{32}{4.0} \times 3$		3
	= 24 g	1/2	
	Thus, O ₂ (29g) is present in excess.		
	Hence, H ₂ is the limiting reactant.	1/2	
	4.0 g of H ₂ forms H ₂ O = 36g		
	3.0 g of H ₂ form H ₂ O = $\frac{36}{4} \times 3g$	1	
	= 27g		
	Amount of O ₂ left unreacted = 29g - 24g = 5g	1	
	Energy of a photon of radiation of wavelength 300 nm will be		
	$E = h\nu = \frac{hc}{\lambda} = \frac{(6.626 \times 10^{-34} Js)(3.0 \times 10^8 ms^{-1})}{(300 \times 10^{-9} m)}$ = 6.626 × 10 ⁻¹⁹ J	1/2	
	∴ Energy of 1 mole of photons = (6.626 × 10 ⁻¹⁹ J) (6.022 × 10 ²³ mol ⁻¹) = 3.99 × 10 ⁵ J mol ⁻¹	1/2	
	As E = E ₀ + KE	1/2	
	∴ Minimum energy (E ₀) required to remove 1 mole of electrons from sodium = E - KE = (3.99 - 1.68) × 10 ⁵ J mol ⁻¹ = 2.31 × 10 ⁵ Jmol ⁻¹	(-1/2 for error in writing unit or not writing the unit) 1/2	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
15.	<p>∴ Minimum energy required to remove one electron = $\frac{2.31 \times 10^5 \text{ J mol}^{-1}}{6.022 \times 10^{23} \text{ mol}^{-1}} = 3.84 \times 10^{-19} \text{ J/atom}$</p>	1	3
	(a) Because halogens attain stable noble gas electronic configuration by gaining an electron.	1	
	(b) As isotopes of an element have some electronic configuration and same nuclear charge hence they have some Ionisation energy.	1	
	(c) The penetration of 2s electron to the nucleus in Be is more than that of 2p electron in B.	1	3
16.	<u>OR</u>		
	2p e ⁻ of Boron is more shielded from Nucleus by the inner core of electrons than the 2s electrons of Be.		
	<u>OR</u>		
	Be 1s ² 2s ² (more stable completely filled S - orbital) B 1s ² 2s ² 2p ¹		
16.	(a) NaCl has more covalent character because according to Fajan's rule smaller the size of cation more is the covalent character.	1	
	(b) NF ₃ has lower dipole moment than NH ₃ because in NF ₃		

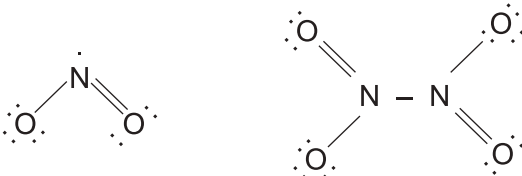
S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>the orbital dipole is in the direction opposite to the resultant dipole moment of the three N – F bonds whereas in NH₃ the orbital dipole is in the same direction as the resultant dipole moment of the N – H bonds.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>(c) Example of expanded octet PF₅, SF₆, H₂SO₄ (any one)</p> <p style="text-align: center;"><u>OR</u></p> <p>(a) Molecular orbital configuration of F₂ molecule</p> $\sigma 1s^2 < \sigma^* 1s^2 < \sigma 2s^2 < \sigma^* 2s^2 < \sigma 2P_z^2 < \pi 2P_x^2 = \pi 2P_y^2 < \pi^* 2P_x^2 = \pi^* 2P_y^2$ <p>(b) Bond order = $\frac{1}{2} (10-8)$</p> <p style="text-align: center;">= 1</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>3</p>

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
17.	<p>(c) Diamagnetic due to absence of unpaired electrons.</p> $\text{H} - \text{C} \equiv \text{C} - \text{H} + \frac{5}{2} (\text{O} = \text{O}) \longrightarrow 2 (\text{O} = \text{C} = \text{O}) + \text{H} - \text{O} - \text{H}$ $\Delta_a \text{H}^0 = \sum \Delta_f \text{H}^0 \text{ Reactants} - \sum \Delta_f \text{H}^0 \text{ Products}$ $= 2 \Delta_{\text{C-H}} \text{H}^0 + \Delta_{\text{C} \equiv \text{C}} \text{H}^0 + \frac{5}{2} \Delta_{\text{O}=\text{O}} \text{H}^0$ $- 4 \Delta_{\text{C}=\text{O}} \text{H}^0 + 2 \Delta_{\text{O-H}} \text{H}^0$ $= (2 \times 414 + 814 + \frac{5}{2} \times 499) - (4 \times 724 + 2 \times 640)$ $= 2889.5 - 4176$ $= -1286.5 \text{ kJ}$	<p>1</p> <p>½</p> <p>½</p> <p>1</p> <p>1</p>	3
18.	$\text{CH}_2\text{ClCOOH} + \text{H}_2\text{O} \rightleftharpoons \text{CH}_2\text{ClCOO}^- + \text{H}_3\text{O}^+$ $\text{K}_a = 1.35 \times 10^{-3}$ $\text{pK}_a = -\log \text{K}_a = -\log (1.35 \times 10^{-3})$ $= 3 - 0.13$ $= 2.87$ $[\text{H}_3\text{O}^+] = \sqrt{\text{K}_a \cdot \text{C}} = \sqrt{1.35 \times 10^{-3} \times 0.1}$ $= 1.16 \times 10^{-2} \text{M}$ $\text{pH} = -\log [\text{H}_3\text{O}^+]$ $= -\log (1.16 \times 10^{-2})$ $= 2 - 0.08$	1	

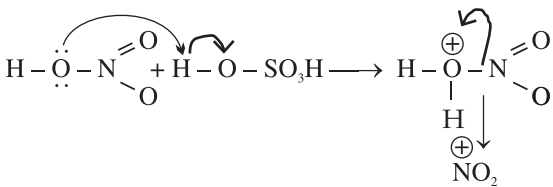
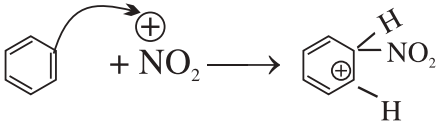
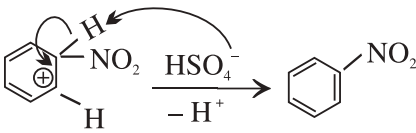
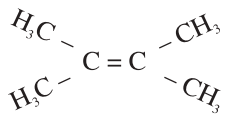
S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
21.	(b) Oxidising action of H_2O_2 $2Fe_{(aq)}^{2+} + 2H_{(aq)}^{+} + H_2O_{2(aq)} \longrightarrow 2Fe_{(aq)}^{3+} + 2H_2O_{(l)}$ OR $2Fe^{2+} + H_2O_2 \longrightarrow 2Fe^{3+} + 2OH^{-}$ OR Any other correct chemical equation	1	3
	Reducing action of H_2O_2 . $2MnO_4^{-} + 6H^{+} + 5H_2O_2 \longrightarrow 2Mn^{2+} + 8H_2O + 5O_2$ OR $I_2 + H_2O_2 + 2OH^{-} \longrightarrow 2I^{-} + 2H_2O + O_2$ OR Any other correct chemical equation	1	
	(a) Due to small size of Li^{+} ion high charge density on Li^{+} ion	1	
	(b) Because the heat from the flame excites the loosely held electron to the higher energy level and when this electron comes back to the ground state, there is emission of radiation in the visible region.	1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
22.	(c) Due to ammoniated electrons which absorb energy in the visible region.	1	3
	(a) $\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_3 \xrightarrow[\Delta]{\text{Conc H}_2\text{SO}_4} \text{CH}_3 - \text{CH} = \text{CH}_2 \xrightarrow{\text{HBr}} \text{CH}_3 - \underset{\text{Br}}{\text{CH}} - \text{CH}_3$	1/2+1/2	
	(b) $\text{CH}_2 = \underset{\text{Br}}{\text{CH}} \xrightarrow{\text{NaNH}_2} \text{HC} \equiv \text{CH} \xrightarrow[873\text{K}]{\text{Red Hot Fe tube}} \text{C}_6\text{H}_6$	1/2+1/2	
23.	(c) Substances which are steam volatile and water immiscible are separated by passing steam through organic liquid while heating it so that it vaporises at lower temperature than its boiling point.	1	3
	(a) $(\text{CH}_3)_3\text{C}^+$ is the most stable carbocation	1/2	
	It is tertiary carbocation having 3 methyl groups attached and has max extent of Hyper conjugation and +I effect	1/2	
	(b) (i) Substitution reaction	1/2	
	(ii) Addition reaction	1/2	
	(iii) Substitution and rearrangement reaction. (Marks to be awarded even if anyone out of the 2 identified.)	1/2	
	(iv) Elimination reaction	1/2	3

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
24.	<p>Photo chemical smog is an oxidising smog occurring in warm, dry climate by action of sunlight on unsaturated hydrocarbons and nitrogen oxides.</p> <p>Classical smog is a reducing smog that occurs in cool, humid climate containing mixture of smoke, fog and sulphur dioxide.</p> <p>Methods to control photochemical smog</p> <p>(1) use of catalytic converters in automobiles</p> <p>(2) Plantation of certain plants as Pinus, Juniperus, Pyrus etc.</p>	<p>1</p> <p>1</p> <p>1/2</p> <p>1/2</p>	3
25.	<p>(a) $P_{\text{gas}} = P_{\text{tot}} - P_{\text{H}_2\text{O}}$</p> <p>$= 0.993 - 0.0317$</p> <p>$= 0.9613 \text{ bar}$</p> <p>$PV = nRT = \frac{m}{M} RT$</p> <p>or, $M = \frac{mRT}{PV}$</p> <p>$= \frac{0.160\text{g} \times 0.083 \times 298}{0.9613 \times 0.135\text{dm}^3}$</p> <p>$= 30.49 \text{ g mol}^{-1}$</p> <p>(b) The defects in fig (i) Frenkel defect</p> <p>(ii) Schottky defect</p> <p>(c) AgBr</p>	<p>1/2</p> <p>1/2</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	5

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<u>OR</u>		
	(a) Z for fcc unit cell = 4	1/2	
	$\rho = \frac{ZM}{a^3 N_A} \Rightarrow M_z = \frac{\rho a^3 N_A}{Z}$ $= \frac{8.92 \text{ g/cc} \times (3.608 \times 10^{-8} \text{ cm})^3 \times 6.023 \times 10^{23}}{4}$ $= 63 \text{ g mol}^{-1}$	1/2	
	(b) (i) According to Boyle's law, the volume of a gas will decrease if the pressure on the gas is increased keeping the temperature constant.	1	
	(ii) According to charle's law, on increasing the temperature from 200K to 400K, the volume of a gas will increase when pressure is kept constant.	1	
	(c) SI unit of co-efficient of viscosity is Newton second per square meter (Nsm ⁻²)	1	
26.	(a) (i) A = NO ₂ B = N ₂ O ₄	1/2	
	(ii)	1/2	
		1/2, 1/2	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>(iii) Because NO_2 dimerses to N_2O_4 / NO_2 is an odd electron species.</p> <p>(b) $\text{BiH}_3 > \text{SbH}_3 > \text{AsH}_3 > \text{PH}_3 > \text{NH}_3$</p> <p>(c) $2\text{Al} + 2\text{NaOH} + 6\text{H}_2\text{O} \longrightarrow 2 \text{Na} [\text{Al} (\text{OH})_4] + 3\text{H}_2$</p> <p style="text-align: center;"><u>OR</u></p> <p>(a) Nitrogen being small in size has high e^- density over it hence has greater e-pair repulsion and more Bond angle.</p> <p style="text-align: center;"><u>OR</u></p> <p>electron pair repulsion in NH_3 is higher than that in PH_3</p> <p>(b) NH_3 being Pyramidal has net dipole moment while BF_3 being planar has zero dipole moment hence it is non polar.</p> <p>(c) In AlCl_3, Al has incomplete octet / Al - has only 6 electrons in its valence shall even after combination.</p> <p>(d) Si has vacant d- orbitals in its valence shell while carbon does not.</p> <p>(e) Because of hydrophobic nature of silicones.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	5
27.	<p>(a) (i) $\text{A} \longrightarrow \text{C}_6\text{H}_6$ $\text{B} \longrightarrow \text{C}_6\text{H}_5\text{COCH}_3$</p> <p>(ii) $\text{A} \rightarrow \text{H}_3\text{C} - \text{C} \equiv \text{CH}$ $\text{B} \rightarrow \text{H}_3\text{C} - \underset{\text{Br}}{\overset{\text{Br}}{\text{C}}} - \text{CH}_3$</p>	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
(b)	<p>Mechanism for nitration of Benzene :-</p> <p>Setp I : Generation fo Electrophile -</p>  <p>Step II : Formation of carbocation (arenium ion)</p>  <p>Step III : Removal of proton -</p>  <p style="text-align: center;"><u>OR</u></p> <p>(a) $\text{CH}_3 - \underset{\text{O}}{\underset{\parallel}{\text{C}}} - \text{CH}_3$</p> <p>Propanane</p>  <p>2, 3 - Dimethyl but - 2 - ene</p> <p>(b) The groups which direct the incoming group to meta position are called meta directing groups.</p> <p>Example - NO_2, - CN - CHO (any one)</p> <p>They are deactivating groups.</p>	<p>1</p> <p>1</p> <p>1</p> <p>5</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	



PHYSICS

Designed & Developed

by

DAV Centre for Academic Excellence

in a workshop

held at

DAV College Managing Committee

Chitragupta Road

New Delhi - 110055

PHYSICS

CLASS - XI

Time : 3 Hours

Max. Marks : 70

Sl. No.	Typology of Question	Very Short Answer (VSA) (1 Mark)	Short Answer-I (SA-I) (2 Marks)	Short Answer-II (SA-II) (3 Marks)	Long Answer (LA) (5 Marks)	Total Marks (No. of questions)	%age Weight-age
1	Remembering (K) (Knowledge based simple recall questions, to know specific facts, terms, concepts, principles or theories, identity, define or recite information).	3(3)	4(2)	-	-	7(5)	10%
2	Understanding (U) (Comprehension - to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase information).	1(1)	4(2)	6(2)	10(2)	21(7)	30%
3	Application (A) (Use abstract information in concrete situations, to apply knowledge to new situations, use given content to interpret a situation, provide an example or solve a problem.	-	4(2)	12(4)	5(1)	21(7)	30%
4	Higher Order Thinking Skills (HOTS) (H) (Analyse and Synthesis-classify, compare contrast or differentiate between different pieces of information, organize and / or integrate unique pieces or information from a variety of sources.)	1(1)	-	9(3)	-	10(4)	14%
5	Evaluation (E) (Appraise, judge and / or justify the value or worth of decision or outcome, or to predict outcomes based on values)	-	2(1)	9(3)	-	11(4)	16%
	Total	5(5)	14(7)	36(12)	15(3)	70(27)	100%

The 'difficulty level' breakup is as follows

Easy	15%	11 Marks
Average	70%	49 Marks
Difficult	15%	10 Marks
	<u>100%</u>	<u>70 Marks</u>

Marks wise weightage to different typology of questions in the blue-print for the given sample paper.

Typology (Marks)	Marks (No. of questions)	Total Marks (No. of Questions)
K (7 Marks)	3(3) + 4(2)	7(5)
U (21 Marks)	1(1) + 4(2) + 6(2) + 10(2)	21(7)
A (21 Marks)	4(2) + 12(4) + 5(1)	21(7)
H (10 Marks)	1(1) + 9(3)	10(4)
E (11 Marks)	2(1) + 9(3)	11(4)
Total		70(27)

Questionwise Break up.

Type of Questions	Marks Per Question	Total Number of Questions	Total Marks
VSA	1	5	05
SA-I	2	7	14
SA - II	3	12	36
LA	5	3	15
Total		27	70

Internal Choice :

There is no overall choice in the paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage and all the three questions of 5 marks weightage.

Time Management :

There would be a time of 15 minutes at the start of the examination for reading the question paper.

The questions have been designed so that the students are able to complete the different forms of questions in the time indicated against them.

The expected time, for answering each question of different categories, is as follows :

S. No.	Type of Question	Time (in minutes) for each question	No. of Questions	Total time in minutes
1	Long Answer Type (LA)	14	03	42
2	Short Answer (SA-II)	08	12	96
3	Short Answer (SA-I)	03	07	21
4	Very Short Answer (VSA)	01	05	05
	Sub Total	-	27	164
	Time for Revision			16
	Total		27	180

Important Note :

The '**blue print**', and the '**topics**' that may be used for the final examination paper, can be **QUITE DIFFERENT** from the blue print, and topics, used for making this sample paper. The topics, covered in the final examination paper, can also be from **any other part** of the syllabus of the relevant unit. The **DESIGN**, of the final examination paper, however, would be the **same** as that for this sample paper.

PHYSICS

Please check that this question paper contains 27 questions and 8 printed pages.

Time Allowed : 3 Hours

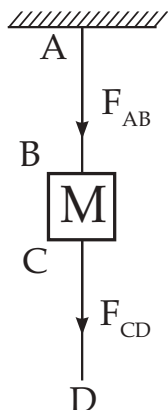
Maximum Marks : 70

General Instructions :

1. All questions are compulsory. There are 27 questions in all.
2. This question paper has four sections : Section A, Section B, Section C and Section D.
3. Section A contains five questions of one mark each, Section B contains seven questions of two marks each, Section C contains twelve questions of three marks each and Section D contains three questions of five marks each.
4. There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.
5. Fifteen minutes time has been allotted to read this question paper. During this time, the student will only read the question paper and will not write any answer on the answer script.

SECTION - A

1. Name the types of fundamental force due to which the elastic spring force in a stretched spring arises. 1
2. A given mass 'M' is suspended, as shown, between two parts AB and CD of a given string. State the relation between the force F_{AB} and the force F_{CD} . 1



3. Name the physical quantity that is

(i) conserved

(ii) not conserved, during an inelastic collision.

1

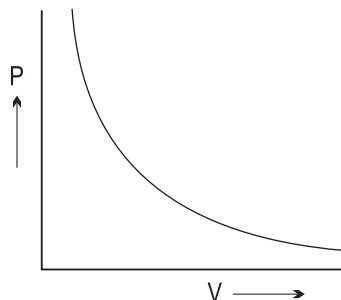
4. Under given conditions, the P - V

diagram for an ideal, gas has

the form shown here. Draw its

corresponding,

P - T diagram



1

5. A ray of light is incident on the interface of two given media. Name the

two factors on which the value of its angle of refraction depends.

1

SECTION - B

6. In the relation

$$P = \frac{\alpha}{\beta} \sin \left(\frac{\alpha Z}{K_B T} \right)$$

'P' stands for pressure, Z represents a distance, K_B is the Boltzmann constant

and 'T' represents temperature. Obtain the dimensional formula for ' β '.

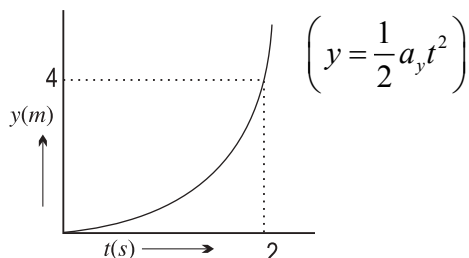
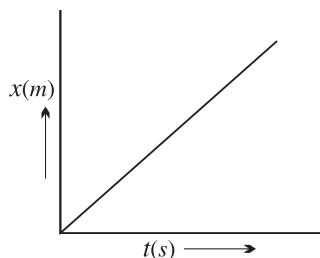
2

7. A small object of mass 500g, is moving in the X-Y plane. The dependence,

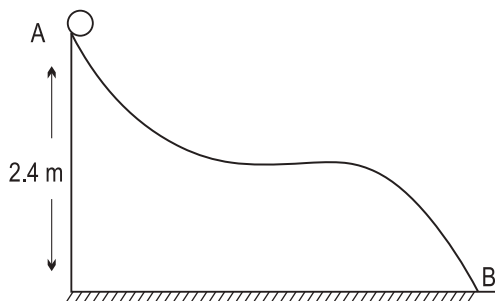
of its 'X' and 'Y' coordinates on time, is as shown.

Find the net force acting on the object at $t = 2$ s

2



8. A small ball of mass 'M', having a speed of 4ms^{-1} at 'A', slides down a smooth curved track and reaches a point 'B' located a vertical distance 2.4 m below A. Find the velocity of the ball at B. (Take $g \approx 10\text{ ms}^{-2}$)



2

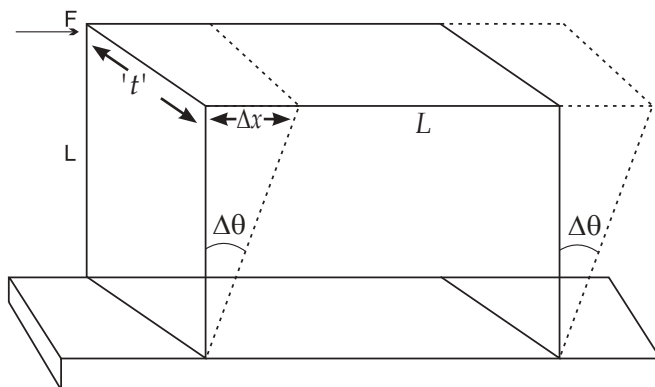
9. An object is raised to a height $h = \frac{R_E}{3}$; (R_E is radius of earth) above the surface of the earth. A student uses the relation

$$g_n = g_o \left(1 - \frac{2h}{R_E} \right), \text{ to compare the value of the acceleration due to}$$

2

gravity at the height h with its value g_o on the surface of the earth. Why is the relation used by the student incorrect? Obtain the correct relation between g_h and g_o in this case.

10. A lead slab, of side 'L' and thickness 't', is subjected to a shearing force F, applied as shown. The lower edge of the slab is rivetted to the floor. If the shear modulus for lead equals G, obtain an expression for the displacement of the upper edge.



2

11. Name the process in which a given system undergoes a change without any

2

(i) change in its temperature

(ii) heat entering or leaving it.

State the relations for an ideal gas, for these two processes.

12. Two pairs of waves, represented by the relations :

(i) $Y_1 = a \sin (\omega t - kx)$

$$Y_2 = a \sin (\omega t + kx + \pi)$$

(ii) $Y_1 = a \sin (\omega t - kx)$

$$Y_2 = a \sin (\omega t - kx + \pi)$$

superpose to form their resultant wave. In which of the two cases would the resultant wave can be a standing wave? State the values of the separation (in terms of k) between

(a) two adjacent nodes

(b) a node and its adjacent antinode

in the resulting stationary wave.

OR

A mass m , when attached to a spring of spring constant ' K ', oscillates with an angular frequency ' ω '. Write expressions for the oscillation frequency of the same mass if it were attached to a (i) parallel (ii) series, combination of two such identical springs.

2

SECTION - C

13. A cyclist, starting from the point $x = x_0$ is moving along the x - axis.

The velocity $v(t)$ of this cyclist, during the time interval $0 \leq t \leq 5.0$ s, is

$$\text{given by } v(t) = 2.0 \text{ ms}^{-1} + (0.6 \text{ ms}^{-2}) t^2$$

The cyclist is observed to cross the point $x = 10.0$ m at $t = 2.0$ s. Find the position of the cyclist at $t = 3$ s.

3

14. A particle is moving in a circle of radius 'R' in such a way that at any instant the normal and tangential components of the acceleration are equal. If its speed at $t = 0$ is μ_0 , obtain an expression for the time taken to complete the first revolution?

3

15. When a horse pulls a cart, the cart also pulls the horse back with an equal and opposite force, as per Newton's third law of motion. Use the appropriate force diagram to obtain the condition under which the horse - cart system can move forward as a whole.

3

16. A horizontally kept linear elastic spring, having a spring constant 'K' is fixed at one end and has an object of mass 'm' attached to its free end. The mass 'm' is stretched from the equilibrium position through a distance $x = a$. Obtain an expression for the potential energy of the spring in terms of its displacement x ($0 \leq x \leq a$). Also find the total energy of the spring at any position. Obtain expressions for the speed of the mass 'm', at the displacement 'x', when

3

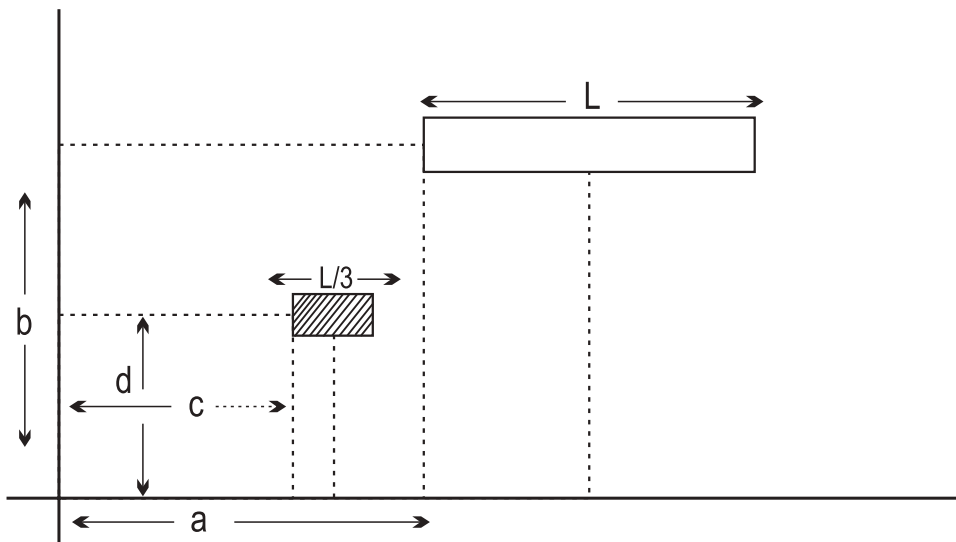
(i) $0 < x < a$

(ii) $x = 0$

17. A circular disc, of mass 'M' and radius 'R', is rotating about an axis, passing through its centre and perpendicular to its plane, with angular velocity ω_1 . Two small particles, each of mass 'm', are now very gently attached to two diametrically opposite points on the edge of the disc. Find the final angular velocity ' ω_2 ' of the disc.

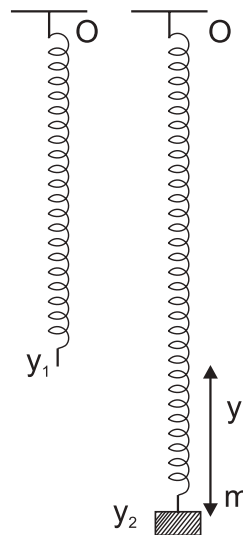
OR

A uniform thin rectangular rod of Mass 'M' and length 'L', is located in the X - Y plane as shown. Imagine the rod to break, by itself, into two parts of length $\frac{L}{3}$ and $\frac{2L}{3}$, respectively. If the smaller part were, at some instant, located at the position shown by the shaded region, find the co-ordinates of the centre of mass of the larger part at this very instant.



18. Using expressions for power and kinetic energy for rotational motion, derive the relation $\tau = I\alpha$, where letters have their usual meanings. Express the result in vector form. 3
19. A star, like the sun, has several identical bodies moving around it at different distances. Consider that all of them are moving in circular orbits. Let 'r' be the distance of the body from the centre of the star and let its linear velocity be 'v', angular velocity be ω , kinetic energy be K, gravitational P.E be U, total energy be E and angular momentum be L. If the radius 'r' of the orbit were to increase, determine which of the above quantities would increase and which one / ones would decrease. 3
20. A large open tank has two holes in its wall. One is a square hole of side 'L' having its centre at a depth y from the top and other is a circular hole, of radius R, having its centre at a depth $4y$ from the top. When the tank is completely filled with water, the quantities of water, flowing out per second, from both holes are the same. Find the relation between 'R' and 'L'. 3
21. A vessel is filled with a mixture of two different gases. However the number of molecules per unit volume of the two gases in the mixture are the same.
- (i) Will the mean kinetic energy per molecule of both the gases be equal?
- (ii) Will the root mean square velocities of the molecules be equal?
- Justify your answers. 3

22. An ideal spring of spring constant 'K' is vertically hung from a rigid point O, as shown. The lowest point of it is at $y = y_1$. When loaded with a mass 'm' kg, the spring executed SHM of time period 3 seconds, about the mean position y_2 . It is found that $y = y_2 - y_1 = 9$ cm.

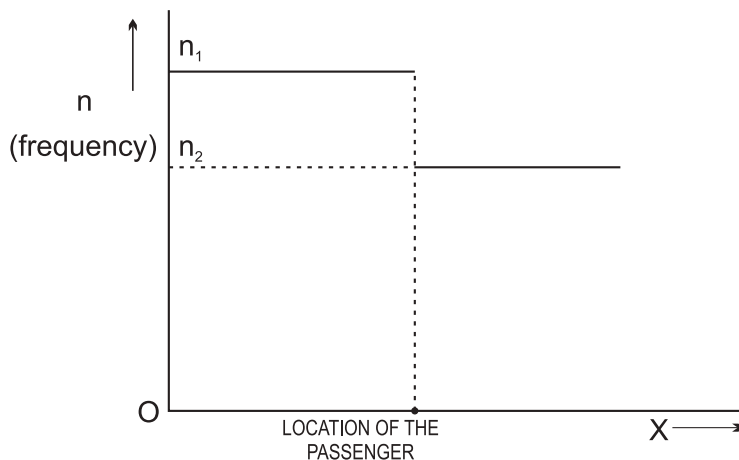


When the mass is increased by 1 kg, the period of oscillations increases by one second.

- Find the value of the initial mass 'm'?
- Obtain the new mean position, about which the mass (m+1) kg, oscillates.

3

23. The graph, given here represents the change in the observed frequency of the sound of horn of a train, when the approaching train crosses a passenger standing on the platform. If the speed of the train is $1/p$ of the speed of sound in air, obtain the actual frequency of the sound of horn, in terms of n_1 and n_2 .



3

24. A thin bi-convex lens made of glass of refractive index 1.5, has equal radii of curvature for its surfaces. Using lens maker's formula, check whether the centre of curvature of its surface and the principal focus coincide or not, when the lens is in air. How would the position of the centre of curvature and principal focus change, if the lens is placed in water of refractive index $\frac{4}{3}$?

3

SECTION - D

25. A projectile is projected with a speed ' V_0 ' at an angle ' θ_0 ' with the horizontal.

- (a) Show that for this projectile, the angle between its velocity and X-axis, as a function of time varies as per the relation :

$$\theta(t) = \tan^{-1} \left(\frac{V_{0y} - gt}{V_{0x}} \right)$$

- (b) Show that the projection angle ' θ_0 ', for a projectile launched from the origin, is given by

$$\theta_0 = \tan^{-1} \left(\frac{4h_m}{R} \right)$$

Where h_m = maximum height

R = horizontal range

OR

Objects A and B move with velocities \vec{V}_A and \vec{V}_B respectively, the directions

of which are separated by an angle ' θ '.

Draw a vector diagram representing the magnitude and direction of the relative velocity of object 'A' with respect to object B (\vec{V}_{AB}). Derive an expression for the magnitude of this relative velocity. Obtain the condition for which the magnitude of \vec{V}_{AB} is (a) maximum (b) minimum.

5

26. State stoke's law for the viscous drag experienced by a small spherical body falling through a viscous liquid. Why does the spherical body achieve a terminal speed? State the formula for terminal speed and write any two factors on which it depends. Give one example each of motion, where the object acquires a (i) positive (ii) negative terminal velocity.

OR

- (a) Define surface energy. Show that surface energy is numerically equal to the surface tension.
- (b) Excess pressure inside one soap bubble is thrice the excess pressure inside another soap bubble. Find the ratio between the volumes of the first and the second bubbles.

5

27. (a) Draw a ray-diagram showing refraction of a ray of monochromatic light, when it is passed through a glass prism of angle ' A '.
- (b) Obtain an expression for the angle of deviation (d) in terms of angle of incidence (i), angle of emergence (e) and angle of prism (A)

- (c) Draw a graph showing the variation of ' d ', when ' i ' is increased from small values to almost 90° .

OR

- (a) Draw a ray diagram, showing the image formation by a compound microscope.
- (b) Define angular magnification produced by this microscope.
- (c) From the above diagram, obtain an expression for the angular magnification.

5

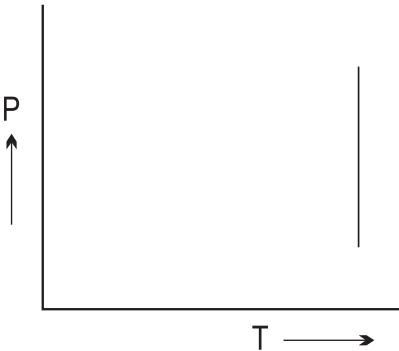
PHYSICS

Time Allowed : 3 Hours

Maximum Marks : 70

MARKING SCHEME / HINTS TO SOLUTIONS

(Note : Any other relevant answer, not given herein but given by the candidates, be suitably awarded.)

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<u>SECTION - A</u>		
1.	Electromagnetic force	1	1
2.	$F_{AB} = F_{CD} + Mg$	1	1
3.	(i) Momentum	$\frac{1}{2}$	
	(ii) Kinetic energy	$\frac{1}{2}$	1
4.		1	1
5.	(i) The angle of incidence	$\frac{1}{2}$	
	(ii) The relative refractive index of the two media (Also accept the relative values of the speeds of light in the two media)	$\frac{1}{2}$	1

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<u>SECTION - B</u>		
6.	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Stating that the agreement of sine is dimensionless - 1/2 Finding dimension of α - 1 Finding dimensions of β - 1/2 </div> <p>The argument of sine being dimensions, we have</p> $\left[\frac{\alpha Z}{K_B T} \right] = [M^0 L^0 T^0]$ $[\alpha] = \left[\frac{K_B T}{Z} \right]$ <p>Now $K_B T$ = energy = $[ML^2 T^{-2}]$</p> $\therefore [\alpha] = \frac{[ML^2 T^{-2}]}{[L]}$ $[\alpha] = [MLT^{-2}]$ $\therefore \beta = \left[\frac{\alpha}{P} \right]$ $= \frac{[MLT^{-2}]}{[MLT^{-2} T^2]}$ $= [M^0 L^2 T^0]$	<div style="text-align: center; margin-bottom: 10px;">1/2</div> <div style="text-align: center; margin-bottom: 10px;">1/2</div> <div style="text-align: center; margin-bottom: 10px;">1/2</div> <div style="text-align: center;">1/2</div>	2
7.	<div style="border: 1px solid black; padding: 5px;"> Finding f_x - 1/2 Finding f_y - 1 Finding net force - 1/2 </div>		

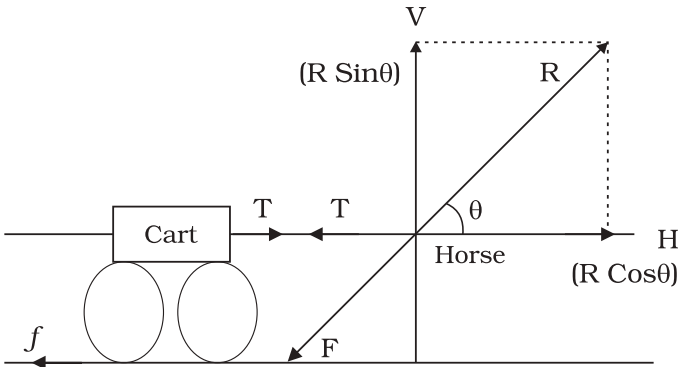
S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks								
8.	As per the graph, the velocity is constant along X-axis										
	$\therefore f_x = ma_x = 0$	1/2									
	For the (y - t) graph, we have										
	$y = \frac{1}{2} a_y t^2$										
	$\therefore 4 = \frac{1}{2} a_y (2)^2$										
	or $a_y = 2\text{m/s}^2$	1/2									
	$\therefore f_y = \left(\frac{500}{1000} \times 2 \right) N$										
	$f_y = 1N$	1/2									
	\therefore Net force on the object = 1N along the y - axis	1/2	2								
	<table border="1"> <tr> <td>Total energy at A</td> <td>-</td> <td>1/2</td> </tr> <tr> <td>Total energy at B</td> <td>-</td> <td>1/2</td> </tr> <tr> <td>Finding velocity at B</td> <td>-</td> <td>1</td> </tr> </table>	Total energy at A	-	1/2	Total energy at B	-	1/2	Finding velocity at B	-	1	
Total energy at A	-	1/2									
Total energy at B	-	1/2									
Finding velocity at B	-	1									
At A :											
Total energy = $\frac{1}{2} m \times (4)^2 + m \times 10 \times 2.4$ <div style="text-align: right;">= 32 m</div>	1/2										
At B :											
Total energy = $0 + \frac{1}{2} m \times V_B^2$ using law of conservation of energy	1/2										

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
9.	$\frac{1}{2} m \times V_B^2 = 32m$	$\frac{1}{2}$	2
	$\therefore V_B = 8 \text{ m/s}$	$\frac{1}{2}$	
	Reason for incorrectness - $\frac{1}{2}$		
	Obtaining the correct relation - $1\frac{1}{2}$		
	The relation used is incorrect because it is to be used only for $h \ll R_E$	$\frac{1}{2}$	
10.	We have		2
	$mg_h = \frac{GM_E m}{(R_E + h)^2}$	$\frac{1}{2}$	
	and $mg_0 = \frac{GM_E m}{(R_E)^2}$	$\frac{1}{2}$	
	$\therefore \frac{g_h}{g_0} = \frac{R_E^2}{(R_E + h)^2} = \frac{R_E^2}{\frac{16}{9} R_E^2} = \frac{9}{16}$		
	$\therefore g_h = \frac{9}{16} g_0$	$\frac{1}{2}$	
10.	Finding shearing stress - $\frac{1}{2}$		$\frac{1}{2}$
	Finding shearing strain - $\frac{1}{2}$		
	Finding Δx - 1		
	Shearing stress = $F/a = \frac{F}{Lt}$		


S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
11.	Shearing strain = $\frac{\Delta x}{L}$	$\frac{1}{2}$	2
	$\therefore G = \frac{F}{Lt} \times \frac{L}{\Delta x}$	$\frac{1}{2}$	
	or $\Delta x = \frac{F}{tG}$	$\frac{1}{2}$	
	Naming the two process - $\frac{1}{2} + \frac{1}{2}$		
	Stating the two relation - $\frac{1}{2} + \frac{1}{2}$		
	(i) Isothermal	$\frac{1}{2}$	2
	(ii) Adiabatic	$\frac{1}{2}$	
	For an ideal gas, we have		
	PV = constant for an isothermal process.	$\frac{1}{2}$	
	and PV^γ = constant for an adiabatic process	$\frac{1}{2}$	
12.	Identifying the correct set - $\frac{1}{2}$		
	Relation between K and λ - $\frac{1}{2}$		
	Required value of separation. - $\frac{1}{2} + \frac{1}{2}$		
	We would get a standing wave pattern in case (i) only	$\frac{1}{2}$	
	we have $K = \frac{2\pi}{\lambda}$ or $\lambda = \frac{2\pi}{K}$	$\frac{1}{2}$	
	(a) Separation between two adjacent		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>We are given that</p> <p>tangential acceleration = normal acceleration</p> $\therefore \frac{dV}{dt} = \frac{V^2}{R} \quad \text{_____ (1)}$ $\therefore \int_{u_0}^v \frac{dV}{V^2} = \int_0^t \frac{1}{R} dt \quad \Rightarrow \quad \left[\frac{V^{-2+1}}{-2+1} \right]_{u_0}^v = \frac{1}{R} t$ $-\left[\frac{1}{v} \right]_{u_0}^v = \frac{1}{R} t$ $-\left[\frac{1}{v} - \frac{1}{u_0} \right] = \frac{1}{R} t$ $R \left[\frac{1}{u_0} - \frac{1}{v} \right] = t \quad \text{_____ (2)}$ <p>We can find the value of time taken (T)</p> <p>to complete the first revolution if we can substitute</p> <p>here the value of v when the particle has</p> <p>moved a distance $s = 2\pi R$.</p> <p>We rewrite the relation (1) as</p> $\frac{dV}{dt} = \left(\frac{dV}{dS} \cdot \frac{dS}{dt} \right) = \frac{V^2}{R}$	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
15.	$\left(\frac{dV}{dS}\right).V = \frac{V^2}{R}$	$\frac{1}{2}$	3
	$\text{or } \frac{dV}{V} = \frac{dS}{R}$		
	$\therefore \int_{u_0}^v \frac{dV}{V} = \int_0^{2\pi R} \frac{dS}{R} = \frac{1}{R} \int_0^{2\pi R} ds$		
	$\text{Log}_e V - \text{Log}_e u_0 = \frac{1}{R} (2\pi R)$		
	$\text{Log}_e \left(\frac{V}{u_0}\right) = 2\pi$		
15.	$\text{or } \frac{V}{u_0} = e^{2\pi} \Rightarrow V = u_0 e^{2\pi} \quad (3)$	$\frac{1}{2}$	3
	From (2) and (3), we get		
	$T = R \left[\frac{1}{u_0} - \frac{1}{u_0 e^{2\pi}} \right]$		
	$T = \frac{R}{u_0} [1 - e^{-2\pi}]$		
15.	Diagram indicating all forces	-	1
	Equation of motions of horse and cart	-	$\frac{1}{2} + \frac{1}{2}$
	Calculation of a	-	$\frac{1}{2}$
	Condition for the system to move	-	$\frac{1}{2}$

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	 <p>Let m be mass of horse and</p> <p>M be mass of cart</p> <p>Initially the horse presses the ground with a force F in an inclined direction. The reaction R of the ground acts on the horse in the opposite direction. The reaction R can be resolved into two rectangular components.</p> <p>(i) Vertical component 'V' balances the weight of horse</p> <p>(ii) Horizontal component 'H' which helps the horse to move forward</p> <p>Equation of motion of horse $H - T = ma$ _____(i)</p> <p>Equation of motion of cart $T - F = Ma$ _____ (ii)</p> <p>(i) + (ii) gives $H - F = (M+m)a$</p> $a = \frac{(H - F)}{M + m}$ <p>Obviously, a is positive only if H - F is positive</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
16.	or if $H > F$. Thus the system moves if $H > F$		3
	or $R \cos\theta > F$	$\frac{1}{2}$	
	Obtaining the expression for potential energy - 1		
	Expression for total energy - $\frac{1}{2}$		
	Expression for speed in case (i) - $\frac{1}{2} + \frac{1}{2}$		
	(ii) - $\frac{1}{2}$		
	Work done in stretching the spring		
	from $x = x$ to $x' = x + dx$ is :	$\frac{1}{2}$	
	$dW = Kx dx$		
	$\therefore W = \int_0^x Kx dx$		
	$W = \frac{1}{2} Kx^2$		
	\therefore The P.E. of the spring at displacement x is : $U = \frac{1}{2} Kx^2$	$\frac{1}{2}$	
	At any position $x(0 \leq x \leq a)$, the spring has a		
	potential energy, U , and the mass		
	attached has K.E. = $\frac{1}{2} mV^2$		
	\therefore Total energy of the spring man system is -		
	T.E. = P.E. + K.E		
	$= \frac{1}{2} Kx^2 + \frac{1}{2} mV^2$	$\frac{1}{2}$	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks									
17.	We have T.E. = $\frac{1}{2} Kx^2 + \frac{1}{2} mV^2$											
	Now, T.E. equals P.E _{max.} , at $x = a$ (where $v = 0$)											
	\therefore T.E. = $\frac{1}{2} Ka^2$	$\frac{1}{2}$										
	(i) Hence $\frac{1}{2} Ka^2 = \frac{1}{2} Kx^2 + \frac{1}{2} mV^2$ ($0 < x < a$)											
	or $mV^2 = K(a^2 - x^2)$											
	$v = \sqrt{\frac{K}{m}(a^2 - x^2)}$	$\frac{1}{2}$										
	(ii) When $x = 0$, $V = \sqrt{\frac{K}{m}}a$	$\frac{1}{2}$	3									
	<table><tr><td>Initial M.I. and initial angular momentum</td><td>-</td><td>$\frac{1}{2} + \frac{1}{2}$</td></tr><tr><td>Final M.I. value</td><td>-</td><td>1</td></tr><tr><td>Final angular velocity</td><td>-</td><td>1</td></tr></table>	Initial M.I. and initial angular momentum	-	$\frac{1}{2} + \frac{1}{2}$	Final M.I. value	-	1	Final angular velocity	-	1		
Initial M.I. and initial angular momentum	-	$\frac{1}{2} + \frac{1}{2}$										
Final M.I. value	-	1										
Final angular velocity	-	1										
	Let L_1 be the initial angular momentum of the circular disc.											
	We then have $L_1 = I_1\omega_1 = \frac{1}{2} MR^2\omega_1$	$\frac{1}{2} + \frac{1}{2}$										
	When two small spheres are attached on the edge of the disc, the moment											
	of inertia becomes											
												
	$I_2 = \frac{1}{2} MR^2 + mR^2 + mR^2$											

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks												
	$= \frac{1}{2} MR^2 + 2mR^2$ $= \frac{1}{2} MR^2 \left[1 + \frac{4m}{M} \right]$ <p>If ω_2 is the new angular velocity, the final angular momentum will be</p> $L_2 = I_2 \omega_2 = \frac{1}{2} MR^2 \left[1 + \frac{4m}{M} \right] \omega_2$ <p>Using the law of conservation of angular momentum (there being no external torque), we have</p> $L_2 = L_1$ $\frac{1}{2} MR^2 \left(1 + \frac{4m}{M} \right) \omega_2 = \frac{1}{2} MR^2 \omega_1$ $\Rightarrow \omega_2 = \left(\frac{M}{M + 4m} \right) \omega_1$ <p style="text-align: center;"><u>OR</u></p> <table border="1"> <tr> <td>Coordinates of C.M. of whole rod</td> <td>-</td> <td>$\frac{1}{2}$</td> </tr> <tr> <td>Coordinates of C.M. of smaller part</td> <td>-</td> <td>$\frac{1}{2}$</td> </tr> <tr> <td>Calculation of x</td> <td>-</td> <td>1</td> </tr> <tr> <td>Calculation of y</td> <td>-</td> <td>1</td> </tr> </table> <p>Co-ordinates of the centre of mass of the whole rod : $\left[\left(a + \frac{1}{2} \right), b \right]$</p>	Coordinates of C.M. of whole rod	-	$\frac{1}{2}$	Coordinates of C.M. of smaller part	-	$\frac{1}{2}$	Calculation of x	-	1	Calculation of y	-	1	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	<p>3</p>
Coordinates of C.M. of whole rod	-	$\frac{1}{2}$													
Coordinates of C.M. of smaller part	-	$\frac{1}{2}$													
Calculation of x	-	1													
Calculation of y	-	1													

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
18.	At the given instant co-ordinates of the centre of mass of the smaller part are $\left[\left(C + \frac{L}{6} \right), d \right]$	$\frac{1}{2}$	
	Let the coordinates of the centre of mass of the larger part, at this instant be (x, y) . We then have		
	$\frac{\frac{m}{3} \left(c + \frac{L}{6} \right) + \frac{2m}{3} x}{m} = \left(a + \frac{L}{2} \right)$	$\frac{1}{2}$	
	and $\frac{\frac{m}{3} d + \frac{2m}{3} y}{m} = b$	$\frac{1}{2}$	
	These give, $x = \left[\frac{1}{2} (3a - c) + \frac{2}{3} L \right]$ and	$\frac{1}{2}$	
	$y = \left(\frac{3}{2} b - \frac{d}{2} \right)$	$\frac{1}{2}$	
	Expression for power - $\frac{1}{2}$		
	Expression for K.E. - $\frac{1}{2}$		
	Calculation for torque - $1\frac{1}{2}$		
	Vector form of result - $\frac{1}{2}$		
We have $P = \tau\omega$	$\frac{1}{2}$		
$\text{K.E.} = \frac{1}{2} I\omega^2$	$\frac{1}{2}$		
Now the power for rotational motion equals to time rate of			

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>work done during the rotational motion. This work done is stored in the form of pinetic energy. Hence,</p> $P = \frac{d}{dt} (\text{K.E.})$ $\therefore \tau\omega = \frac{d}{dt} \left(\frac{1}{2} I\omega^2 \right)$ $= \frac{1}{2} I (2\omega) \frac{d\omega}{dt}$ $= \frac{1}{2} I (2\omega) \alpha$ <p>or $\tau\omega = I\omega\alpha$</p> <p>or $\tau = I\alpha$</p> <p>Vector from $\Rightarrow \vec{\tau} = I\vec{\alpha}$</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	
19.	<div style="border: 1px solid black; padding: 5px;"> <p>Finding the nature of change in each of the six quantities - $\frac{1}{2} \times 6 = 3$</p> </div> <p>The linear velocity of the body, orbiting a star, is</p> $V = \sqrt{\frac{GM}{r}}$ <ul style="list-style-type: none"> When r increases, V decreases $\omega = \frac{V}{r} = \sqrt{\frac{GM}{r^3}}$ When r increases, ω decreases. $K = \frac{1}{2} mv^2 = \frac{GMm}{2r}$ 	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	3

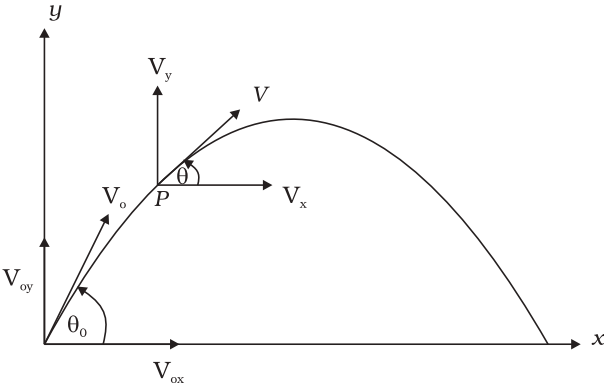
S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
20.	When r increases, K decreases	$\frac{1}{2}$	3
	• P.E, $U = - \frac{GMm}{2r}$		
	When r increases, U increases	$\frac{1}{2}$	
	(U becomes less $-ve$)		
	• $E = K + u = \frac{GMm}{2r} + \left(-\frac{GM_m}{r}\right) = -\frac{GMm}{2r}$	$\frac{1}{2}$	
	\therefore When r increases, E increases (E becomes less $-ve$)		3
	• $L = mvr = m \sqrt{\frac{GM}{r}} r$		
	$L = \sqrt{GMm^2r}$, when r increases, L increases.	$\frac{1}{2}$	
	Writing the expression for (V_1, A_1) and (V_2, A_2)	- $\frac{1}{2} + \frac{1}{2}$	
	Expression for rate of flow	- $\frac{1}{2}$	
	Finding relation between R and L	- $1\frac{1}{2}$	
	$V_1 = \sqrt{2gy}$ and $A_1 = L^2$	$\frac{1}{2}$	3
	$V_2 = \sqrt{2g \times 4y}$, $A_2 = \pi R^2$	$\frac{1}{2}$	
	Rate of flow = VA	$\frac{1}{2}$	
	Equating the rates of flow		
	$V_1 A_1 = V_2 A_2$	$\frac{1}{2}$	
	$\sqrt{2gy} L^2 = \sqrt{2g \times 4y} \times \pi R^2$		
	$L^2 = 2\pi R^2$	$\frac{1}{2}$	
	or $R = \frac{L}{\sqrt{2\pi}}$	$\frac{1}{2}$	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
21.	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Correct choice in each case - $\frac{1}{2} + \frac{1}{2}$ Justification for each case - 1+1 </div> <p>(i) Yes</p> <p>K-E per molecule, $\frac{1}{2} m \overline{V^2} = \frac{3}{2} K_B T$.</p> <p>As the temperature of both the gases in the mixture is same, so mean K.E. per molecule of both the gases will be equal</p> <p>(ii) No.</p> $V_{rms} = \sqrt{\frac{3K_B T}{m}}$ <p>Due to different masses of the molecules, the <i>r.m.s</i> velocities for the two gases will not be equal.</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	3
22.	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Finding th value of m - 1 The new mean position - 2 </div> <p>(a) We have, $T = 2\pi \sqrt{\frac{m}{K}}$</p> $\therefore 3 = 2\pi \sqrt{\frac{m}{K}}$ <p>and $4 = 2\pi \sqrt{\frac{m+1}{K}}$</p> <p>or $\frac{3}{4} = \frac{\sqrt{m}}{\sqrt{m+1}}$</p>		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	$\text{or } \frac{9}{16} = \frac{m}{m+1}$ $\text{or } m = \frac{9}{7} \text{ kg}$ <p>(b) $mg = Ky$ ($\because y = y_2 - y_1$ is elongation shown when m is attached to the spring)</p> <p>Let y' be the elongation when $(m+1)$ is attached.</p> $\therefore (m+1)g = Ky'$ $mg + g = Ky'$ $\text{or } Ky + \frac{K}{m} y = Ky'$ $\text{or } y' - y = \frac{1}{m} y$ $\text{or } y' - 9 = \frac{1}{(9/7)} \times 9$ $y' = 16 \text{ cm}$ <p>So the mass $(m+1)$ will oscillate about a mean position which is 16cm below the point y_1.</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	3
23.	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> Expression for n in terms of n_1 - $1\frac{1}{2}$ Obtaining n in terms of n_2 - $1\frac{1}{2}$ </div> <p>Observed frequency, when the train is approaching the passenger is :</p>		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks							
24.	$n_1 = \left(\frac{v}{v - v_s} \right) n$	1/2	3							
	$= \left[\frac{v}{\left(v - \frac{v}{p} \right)} \right] n$									
	$= \left(\frac{p}{(p-1)} \right) n$	1/2								
	$\therefore n = \left(\frac{p-1}{p} \right) n_1$	1/2								
	Observed frequency, when the train is moving away from the passenger									
	$n_2 = \left(\frac{v}{v + v_s} \right) n$	1/2								
	$= \left[\frac{v}{\left(v + \frac{v}{p} \right)} \right] n$									
	$n_2 = \left(\frac{p}{p+1} \right) n$	1/2								
	$\therefore n = \left(\frac{p+1}{p} \right) n_2$	1/2								
	<table> <tr> <td>Lens Maker's formula</td> <td>-</td> <td>1/2</td> </tr> <tr> <td>Finding F when the Lens is in air</td> <td>-</td> <td>1</td> </tr> <tr> <td>Finding F' when the lens is put in water</td> <td>-</td> <td>1½</td> </tr> </table>	Lens Maker's formula		-	1/2	Finding F when the Lens is in air	-	1	Finding F' when the lens is put in water	-
Lens Maker's formula	-	1/2								
Finding F when the Lens is in air	-	1								
Finding F' when the lens is put in water	-	1½								

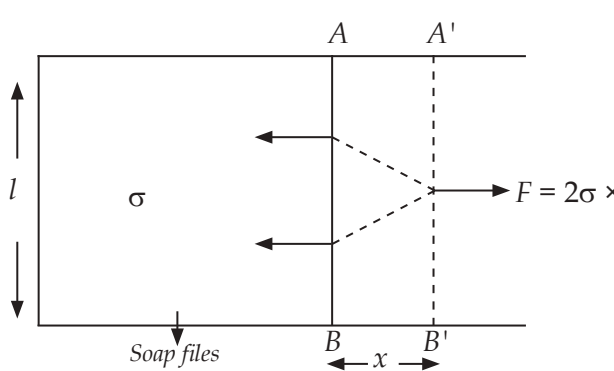
S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>Given $R_1 = R_2 = R$</p> <p>$\therefore R_1 = +R$ and $R_2 = -R$</p> <p>$\mu_1 = 1$ (for air)</p> <p>$\mu_2 = 1.5$ (for glass)</p> <p>Lens maker's formula is :</p> $\frac{1}{f} = \left(\frac{\mu_2}{\mu_1} - 1 \right) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$ <p>\therefore When the lens is in air, we have</p> $\frac{1}{f} = \left(\frac{1.5}{1} - 1 \right) \left(\frac{1}{R} - \left(-\frac{1}{R} \right) \right)$ <p>or $\frac{1}{f} = 0.5 \times \frac{2}{R}$</p> <p>$\therefore \frac{1}{f} = \frac{1}{R}$</p> <p>or $f = R$</p> <p>Hence the two coincide, when the lens is placed in air.</p> <p>When the lens is placed in water of $\mu = \frac{4}{3}$, we have :</p> <p>$R_1 = +R,$ $R_2 = -R$</p> <p>$\mu_1 = \frac{4}{3},$ $\mu_2 = 1.5$</p> <p>Now $\frac{1}{f'} = \left(\frac{\mu_2}{\mu_1} - 1 \right) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	

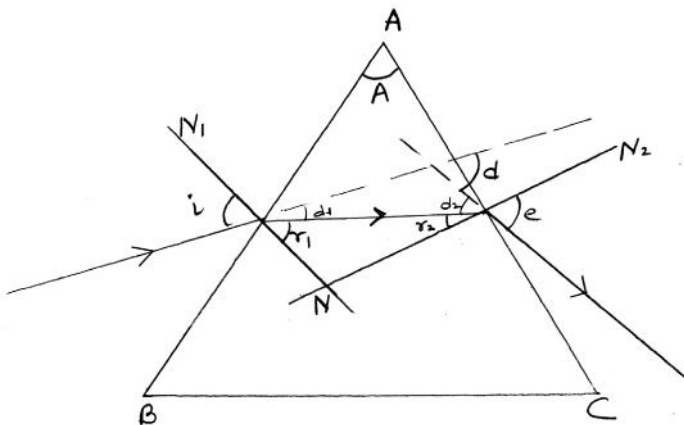
S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks					
	$\frac{1}{f'} = \left(\frac{1.5}{4/3} - 1 \right) \left(\frac{1}{R} - \left(-\frac{1}{R} \right) \right)$ $\therefore \frac{1}{f'} = \frac{1}{4R}$ $\therefore f^1 = 4R$ <p>Hence centre of curvature remains same but principal focus shifts away from the lens.</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	3					
25.	<p style="text-align: center;"><u>SECTION - D</u></p> <table border="1"> <tr> <td>Dependence of $\theta(t)$ on t</td> <td>-</td> <td>3</td> </tr> <tr> <td>Relation between θ_0, h_m and R</td> <td>-</td> <td>2</td> </tr> </table> <div style="text-align: center;">  </div> <p>The projectile is thrown θ_0 at an angle θ_0 with the horizontal.</p> <p>Let V_{ox} and V_{oy} be the horizontal and vertical components of V_o, along the X-axis and Y- axis respectively.</p> <p>At any time t, let V be its velocity at point 'P' and V_x and V_y</p>	Dependence of $\theta(t)$ on t		-	3	Relation between θ_0 , h_m and R	-	2
Dependence of $\theta(t)$ on t	-	3						
Relation between θ_0 , h_m and R	-	2						

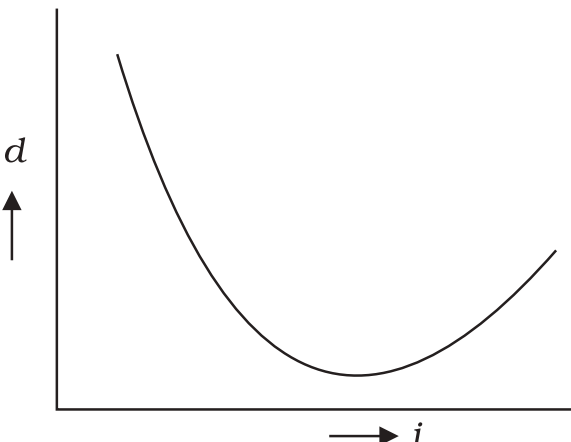
S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>be its components along x-direction and y-direction.</p> <p>Then $V_x = V_{ox}$</p> <p>$V_y = V_{oy} - gt$</p> <p>If V makes an angle θ with x=axis then</p> <p>$\tan\theta = \frac{V_y}{V_x}$</p> <p>$= \frac{V_{oy} - gt}{V_{ox}}$</p> <p>$\theta = \tan^{-1}\left(\frac{V_{oy} - gt}{V_{ox}}\right)$</p> <p>(b) Maximum height attained by the projectile</p> <p>$h_m = \frac{V_0^2 \sin^2 \theta_0}{2g}$</p> <p>Horizontal range of the projectile</p> <p>$R = \frac{V_0^2 \sin 2\theta_0}{g}$</p> <p>$\therefore \frac{h_m}{R} = \frac{V_0^2 \sin^2 \theta_0}{2g} \times \frac{g}{V_0^2 \sin 2\theta_0}$</p> <p>$\frac{h_m}{R} = \frac{\tan \theta_0}{4}$</p> <p>$\tan \theta_0 = \frac{4h_m}{R}$</p> <p>$\theta_0 = \tan^{-1}\left(\frac{4h_m}{R}\right)$</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	5

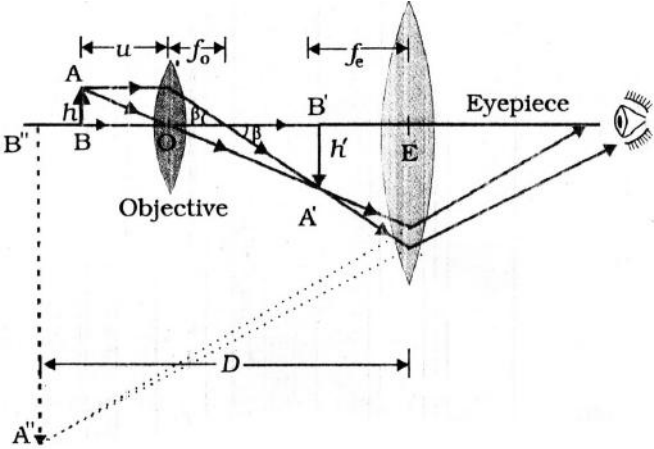
S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks															
26.	$\therefore V_{AB} = \left[V_A^2 + V_B^2 + 2 V_A V_B \cos \alpha \right]^{\frac{1}{2}}$																	
	$V_{AB} = \left[V_A^2 + V_B^2 - 2 V_A V_B \cos \alpha \right]^{\frac{1}{2}}$																	
	$\therefore \cos \alpha = \cos (180 - \theta) = - \cos \theta$	1																
	The condition for which																	
	(i) V_{AB} is maximum if $\cos \theta = - 1$ or $\theta = 180^0$	$\frac{1}{2}$																
	$\text{We have } V_{AB} = V_A + V_B$																	
	(ii) V_{AB} is minimum if $\cos \theta = + 1$ or $\theta = 0^0$	$\frac{1}{2}$																
	$\text{we have } V_{AB} = V_A - V_B$	$\frac{1}{2}$																
	<table><tr><td>Stokes law</td><td>-</td><td>1</td></tr><tr><td>Reason for terminal speed</td><td>-</td><td>1</td></tr><tr><td>Expresion for terminal speed</td><td>-</td><td>1</td></tr><tr><td>Factors</td><td>-</td><td>$\frac{1}{2} + \frac{1}{2}$</td></tr><tr><td>Examples</td><td>-</td><td>$\frac{1}{2} + \frac{1}{2}$</td></tr></table>	Stokes law	-	1	Reason for terminal speed	-	1	Expresion for terminal speed	-	1	Factors	-	$\frac{1}{2} + \frac{1}{2}$	Examples	-	$\frac{1}{2} + \frac{1}{2}$		
	Stokes law	-	1															
Reason for terminal speed	-	1																
Expresion for terminal speed	-	1																
Factors	-	$\frac{1}{2} + \frac{1}{2}$																
Examples	-	$\frac{1}{2} + \frac{1}{2}$																
Stoke's Law states that when a small spherical ball is made to fall through a viscous medium, a backward dragging force comes into play whose magnitude depends on radius of spherical body 'r', its speed 'v' and coefficient of viscosity ' η '.	1																	
$f = 6\pi r \eta v$																		
When a spherical ball falls through a viscous medium,																		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks									
	<p>it accelerates initially due to gravity. The force of viscosity increases as the velocity of the body increases.</p> <p>A stage is reached when upward force becomes equal to downward force, and net force on the body becomes zero.</p> <p>Then the body begins to fall with a constant velocity, called terminal velocity V_T. We have</p> $V_T = \frac{2}{9} r^2 \frac{(\rho - \sigma)}{\eta} g$ <p>Terminal velocity depends on</p> <p>(1) Radius of spherical body</p> <p>(2) Coefficient of viscosity of medium</p> <p>(3) Density of spherical body and density of the medium (any two)</p> <p>Example - Positive terminal velocity ($\rho > \sigma$) steel ball following through glycerine</p> <p>Negative terminal velocity ($\rho < \sigma$) air bubbles in a soda water bottle</p> <p style="text-align: center;"><u>OR</u></p> <table border="1"><tr><td>Defination</td><td>-</td><td>1</td></tr><tr><td>Showing the equality</td><td>-</td><td>2</td></tr><tr><td>Finding the ratio</td><td>-</td><td>2</td></tr></table>	Defination	-	1	Showing the equality	-	2	Finding the ratio	-	2	<p>1</p> <p>1</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	5
Defination	-	1										
Showing the equality	-	2										
Finding the ratio	-	2										

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>(a) Surface energy - It is work done in increasing the area of the surface film by a unit amount.</p>  <p>Force of surface tension acting on AB is $f = 2\sigma \times l$</p> <p>Work done in moving AB through a distance x</p> <p>e.i. $w = f \times x = 2\sigma l \times x$</p> <p>Increase in surface area $= 2lx$</p> <p>\therefore Surface energy $= \frac{\text{Work done}}{\text{Increase in Surface area}}$</p> $= \frac{2\sigma lx}{2lx}$ $= \sigma$	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p>	
(b)	<p>Given $P_1 = 3P_2$</p> <p>Excess pressure inside a soap bubble</p> $P = \frac{4\sigma}{r}$	<p>$\frac{1}{2}$</p>	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks								
27.	$\therefore \frac{4\sigma}{r_1} = \frac{3 \times 4\sigma}{r_2}$										
	$\text{or } r_2 = 3r_1$	1/2									
	$\frac{V_1}{V_2} = \frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \left(\frac{r_1}{r_2}\right)^3 = \left(\frac{1}{3}\right)^3$	1/2									
	$\therefore \frac{V_1}{V_2} = \frac{1}{27}$	1/2									
	<table border="1"> <tr> <td>Diagram</td> <td>-</td> <td>1</td> </tr> <tr> <td>Derivation of 'd'</td> <td>-</td> <td>3</td> </tr> <tr> <td>Graph</td> <td>-</td> <td>1</td> </tr> </table>	Diagram	-	1	Derivation of 'd'	-	3	Graph	-	1	
Diagram	-	1									
Derivation of 'd'	-	3									
Graph	-	1									
	<p>(a)</p> 	1									
	<p>(b) Angle of deviation is d :</p> <p>From the diagram</p> $d = d_1 + d_2$										

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks									
	<div>$= (i - r_1) + (e - r_2)$$= (i + e) - (r_1 + r_2)$<p>Now $r_1 + r_2 + N = 180^0$</p><p>Also $90^0 + 90^0 + A + N = 360^0$</p><p>or $A + N = 180^0$</p>$\therefore r_1 + r_2 = A$<p>Hence $d = (i + e) - A$</p></div> <div>(c)<div></div></div> <div><div>OR</div><table><tr><td>Diagram</td><td>-</td><td>2</td></tr><tr><td>Defination</td><td>-</td><td>1</td></tr><tr><td>Derivation of expression</td><td>-</td><td>2</td></tr></table></div>	Diagram	-	2	Defination	-	1	Derivation of expression	-	2	<div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div>	5
Diagram	-	2										
Defination	-	1										
Derivation of expression	-	2										

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
(a)		2	
(b)	<p>Angular magnification produced by a compound microscope is defined as the ratio of the angle subtended by the final image at the eye to the angle subtended by the object, when both are placed at least distance of distinct vision (d) from the eye.</p>	1	
(c)	<p>As the first image is formed very near to the eye-piece, we have $v_o \approx L$, when the object AB is nearer to F_o.</p> <p>Now magnification produced by objective is</p> $m_o = \frac{v_o}{u_o} \approx \frac{L}{f_o}$ <p>For the eye piece, which acts as simple microscope,</p> $m_e \approx 1 + \frac{D}{f_e}$ $\approx D/f_e$	1	
		1/2	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>We know that the magnification produced by the microscope (i.e the two lenses together) is :</p> $m = m_o \times m_e$ $\therefore m = \frac{L}{f_o} \frac{D}{f_e}$	1/2	



BIOLOGY

Designed & Developed

by

DAV Centre for Academic Excellence

in a workshop

held at

DAV College Managing Committee

Chitragupta Road

New Delhi - 110055

BIOLOGY

XI

Time : 3 Hours

DESIGN

Max. Marks : 70

I. Weightage of learning objectives :

Objective	Remembring	Understanding	Application	HOTS	Evaluation	Total
Marks	7	21	21	12	9	70

II. Weightage to form of questions :

Form of Questions	LA (5)	SA-II (3)	SA-I (2)	VSA (1)	Total
No. of Questions	3	12	7	5	27
Marks	15	36	14	5	70

III. Weightage to Content :

S. No.	Name of the Unit	Marks
1	Diversity in the Living World	07
2	Structural Organisation in Plants and Animals	12
3	Cell : Structure and Functions	15
4	Plant Physiology	18
5	Human Physiology	18

BIOLOGY

Time Allowed : 3 Hours

Maximum Marks : 70

General Instructions :

- i. There are a total 27 questions in four sections in the question paper. All questions are compulsory.
- ii. Section A contains question numbers 1 to 5, Very Short Answer Type questions of one mark each.
- iii. Section B contains question numbers 6 to 12, Short Answer Type-I questions of two marks each.
- iv. Section C contains question numbers 13 to 24, Short Answer Type-II questions of three marks each.
- v. Section D contains question numbers 25 to 27, Long Answer Type questions of five marks each.
- vi. There is no overall choice in the question paper, however, an internal choice is provided in one question of two marks, one question of three marks and all three questions of five marks each.
- vii. Fifteen minutes reading time has been allotted to read the question paper. Students will not write anything during this time.
- viii. Draw neat and well-labelled diagrams wherever necessary.

SECTION - A

- | | |
|--|---|
| 1. What is the title of publication of Linnaeus? | 1 |
| 2. Which type of ovary is present in the flowers of china rose and brinjal? | 1 |
| 3. What is the major site for synthesis of steroidal hormones in an eukaryotic cell? | 1 |
| 4. Name the intervening stage present between plasmogamy and karyogamy. | 1 |

5. Give an example of a gymnospermous tree with male cones and female cones borne on different trees. 1

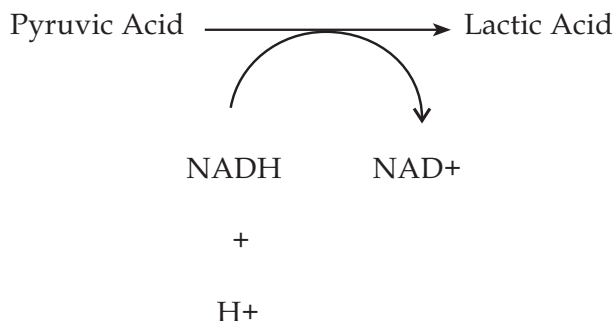
SECTION - B

6. Name the parts present in the members of different phyla / classes of animal kingdom.
- (a) File like rasping organ for feeding in Mollusca.
 - (b) Excretory organ in Hemichordata.
 - (c) Common chamber into which alimentary canal, urinary and reproductive tracts open in Amphibia.
 - (d) Specialised cells present in Platyhelminthes for osmoregulation and excretion. 2
7. "The predominant stage of the life cycle of a moss is the gametophyte which consists of two stages". Explain the second stage that bears the sex organs. 2
8. Give difference between Anaphase I and Anaphase II of meiosis. 2
9. Name any two protein digesting enzymes released as proenzymes in the small intestine of man. How are they activated? 2
10. Which hormone plays an important role in regulation of daily rhythm of body. In which gland is it produced? What are the other two functions performed by this hormone?

Thymus gland secretes thymosins. How do thymosins play a major role in the development of immunity?

11. Study the given physiological reaction and answer the questions given below :

2



- (a) Name the enzyme involved in this reaction
- (b) Under what conditions does this process take place in an animal cell?
12. Differentiate between the given modes of transport systems in cell membrane. (Any one difference)
- (a) Facilitated diffusion and Active Transport
- (b) Symport and Antiport

2

SECTION - C

13. (a) How are receptors of taste (gustation) and smell (olfaction) functionally similar?

- (b) Describe the olfactory receptors of our body. 3
14. Draw a well labelled diagram of a monocotyledonous seed and label the parts of the embryo. 3
15. Give three points of structural difference between Red muscle fibres and White muscle fibres. 3
16. Write a note on the main reproductive organ found in the given segments of a cockroach.
- (a) 2nd-6th abdominal segments of a female cockroach.
- (b) 6th-7th abdominal segments of a male cockroach.

OR

3

Explain the structure and function of the following :-

- (a) Spermatophore in a male cockroach.
- (b) Ootheca in a female cockroach.
17. Differentiate between the structures of the following components of a cell.
- (a) Ribosomes of a prokaryote and an eukaryote.
- (b) Cristae and mesosomes 3
18. How are prosthetic groups different from other cofactors? Which prosthetic group is present in catalase? What is the reaction catalyzed by catalase? 3

19. (a) What is leghaemoglobin? How does it protect the enzyme nitrogenase?
- (b) How many ATP molecules are required for fixing one molecule of nitrogen into ammonia?
- (c) Which process fulfils the need of high energy input required during nitrogen fixation in a cell?

3

20. Fill in the blanks (A), (B), (C), (D), (E) and (F) to complete the given flow chart.

The cells release (A), when there is fall in (B), or low availability of water in the body.



The released chemical converts (C) in the blood to Angiotensin I and then to Angiotensin II



Angiotensin II being a vasoconstrictor, increases the (D)



Angiotensin II also activates adrenal cortex to release (E)



It causes reabsorption of Na^+ and water, causing rise in (F)

3

21. (a) Where does the formation of Acetyl CoA take place in a cell during aerobic respiration? Which enzyme catalyzes this step?
(b) Mention the two steps in Krebs' Cycle where decarboxylation occurs. 3
22. (a) Which plant growth regulator inhibits the growth of lateral buds in flowering plants?
(b) Name the inhibitory effect caused by the above growth regulator.
(c) How is this phenomenon used commercially in agricultural and horticultural practices? 3
23. Trypsin is referred to as a heteropolymer, whereas cellulose and inulin are homopolymers. Explain. 3
24. Give reasons why :-
(a) Syncytium is present in coconut.
(b) Continuous growth takes place throughout the life in meristematic tissue in plants.
(c) Conservation of specific chromosome number of each species across generations in sexually reproducing organisms. 3

SECTION - D

25. Explain the role of vascular cambium in increasing the girth of the stem of a dicotyledonous plant.

- (a) Explain the three main types of specialised cell junctions which provide both structural and functional links between its individual cells.
 - (b) Give reasons :
 - (i) The inner surface of fallopian tube is lined by ciliated epithelium.
 - (ii) Dry surface of the skin is covered by compound epithelium.
26. (a) Describe the various steps involved in the process of blood clotting.
- (b) Name the various blood groups present in human beings. The blood of which one of the blood groups can be transfused to any person. Give a reason in support of your answer.

- (a) List two major factors which affect the rate of diffusion during exchange of gases through the respiratory membrane of the lungs.
 - (b) What is the term given to the additional volume of air, a person can inspire by a forcible inspiration?
 - (c) What is emphysema? State its one major cause.
27. (a) Why is the Calvin cycle of photosynthesis also known as C_3 cycle?
- (b) Where is NADP⁺ reductase enzyme located in the chloroplasts?

What is the role of this enzyme in proton gradient development?

- (c) Calvin cycle includes three stages. Describe the carboxylation stage of this cycle.

OR

5

A student was studying a transverse section of a leaf under a microscope. He identified it as a leaf of a C₄ plant.

- (a) Which type of anatomy is observed by the student in the section of the leaf? List its identifying features.
- (b) Give two examples of plants showing this type of anatomy.
- (c) Why do these plants lack photorespiration?

BIOLOGY

Time Allowed : 3 Hours

Maximum Marks : 70

MARKING SCHEME / HINTS TO SOLUTIONS

(Note : Any other relevant answer, not given herein but given by the candidates, be suitably awarded.)

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
1.	Systema Naturae	1	1
2.	Superior Ovary	1	1
3.	SER / Smooth Endoplasmic Reticulum	1	1
4.	Dikaryophase	1	1
5.	<i>Cycas</i>	1	1
6.	(a) Radula	½	2
	(b) Proboscis gland	½	
	(c) Cloaca	½	
	(d) Flame Cells	½	
7.	<ul style="list-style-type: none"> Second stage is the leafy stage It develops from the secondary protonema as a lateral bud. 		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<ul style="list-style-type: none"> They have upright axis Bear spirally arranged leaves Attached to soil through multicellular and branched rhizoids. (Any four points) 	$\frac{1}{2} \times 4$	2
8.	Anaphase I - Homologous chromosomes separate while sister chromatids remain associated at their centromeres.	1	
	Anaphase II - Splitting of the centromere of each chromosome, allowing the sister chromatids to move towards opposite poles of the cell.	1	2
9.	<p>Trypsinogen - Activated by enzyme Enterokinase.</p> <p>Chymotrypsinogen - Activated by enzyme Trypsin</p> <p>Procarboxy peptidase - activated by enzyme Trypsin.</p> <p>(Any two)</p>	$(\frac{1}{2} + \frac{1}{2}) \times 2$	2
10.	<ul style="list-style-type: none"> Melatonin Pineal gland <p>Functions :</p> <p>- maintaining normal rhythm of sleep-wake cycle / body</p>	$\frac{1}{2}$ $\frac{1}{2}$	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>temperature.</p> <ul style="list-style-type: none"> - pigmentation / metabolism - menstrual cycle / defense capability. <p>(Any two functions)</p> <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none"> - plays major role in differentiation of T-lymphocytes - provide cell mediated immunity. - promote production of antibodies - provide humoral immunity. 	<p>$\frac{1}{2} + \frac{1}{2}$</p>	2
11.	<p>(a) Lactate dehydrogenase</p> <p>(b) During vigorous exercise, when oxygen is inadequate for cellular respiration.</p>	<p>1</p> <p>1</p>	2
12.	<p>(a) Facilitated Diffusion : Movement of molecules from high concentration to low concentration / as per concentration gradient.</p> <ul style="list-style-type: none"> - No ATP required. 	<p>$\frac{1}{2}$</p>	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
13.	Active Transport : Movement of molecules against concentration gradient.	1/2	2
	- ATP is required. (Any one difference)		
	(b) Symport - both molecules cross the membrane in the same direction.	1/2	
	Antiport - two molecules crossing the membrane move in opposite direction.	1/2	
		1	3
	(a) Both detect dissolved chemicals	1/2	
	(b) - Olfactory receptors are mucus coated receptors	1/2	
	- for receiving the sense of smell.	1/2	
	- These are made up of olfactory epithelium		
	- Neurons of epithelium extend from outside into a pair of bean sized organs, called olfactory bulb.	1/2	
14.		1	
	Correct diagram		
	(NCERT Fig. 5.19. Pg. 77)	1/2	
	Coleoptile	1/2	
	Plumule	1/2	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
15.	Radicle	$\frac{1}{2}$	3
	Coleorhiza		
	Scutellum (any four)		
	Red Muscle White Muscle		3
	Fibre Fibre		
	1. Myoglobin content High Less	1	
	2. Mitochondria number More Less/Few	1	
	3. Sarcoplasmic Reticulum Less High	1	
16.	Amount		3
	(a) • Two large ovaries.	$\frac{1}{2}$	
	• Group of eight / ovarioles	$\frac{1}{2} + \frac{1}{2}$	
	• Have a chain of developing ova.	$\frac{1}{2}$	
	(b) • Mushroom gland.	$\frac{1}{2}$	
	• accessory reproductive organ	$\frac{1}{2}$	
	<u>OR</u>		
	(a) Spermatophore	1	3
	– sperms glued together in the form of a bundle.		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
17.	<ul style="list-style-type: none"> - discharged during copulation / sperms are transferred through spermatophores. 	1/2	3
	(b) Ootheca		
	<ul style="list-style-type: none"> - Dark reddish to blackish brown capsules / Fertilised eggs are encased in ootheca 	1	
	<ul style="list-style-type: none"> - Each ootheca has about 14-16 eggs which develop into nymphs. 	1/2	
	(a) Prokaryote - 70s ribosomes	1/2	
	<ul style="list-style-type: none"> - 50s and 30s sub units. 	1/2	
	Eukaryote - 80s ribosomes	1/2	
	<ul style="list-style-type: none"> - 60s and 40s subunits 	1/2	
	(1/2 marks to be given only if both the subunits are correctly mentioned.)		
	(b) Cristae - Infolding of inner membrane of mitochondria	1/2	
18.	Mesosomes - Extensions of plasma membrane into a cell.	1/2	3
	<ul style="list-style-type: none"> - Prosthetic groups are tightly bound to the apoenzyme. 	1	
	<ul style="list-style-type: none"> - Haem is present in catalase 	1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
19.	- Catalase catalyze the breakdown of hydrogen peroxide to water and oxygen.	1	3
	(a) - It is oxygen scavenger.	1	
	- Nitrogenase is sensitive to molecular oxygen.	1/2	
	Leghaemoglobin creates oxygen free condition in nodules.	1/2	3
	(b) 8 ATP molecules	1/2	
20.	(c) Respiratory process of host cells.	1/2	
	(A) - Renin	1/2	3
	(B) - Glomerular Blood Flow / GFR / Glomerular blood pressure	1/2	
	(c) - Angiotensinogen	1/2	
	(d) - Glomerular blood pressure	1/2	
	(e) - Aldosterone	1/2	
	(f) - Blood Pressure / GFR	1/2	
21.	(a) - Matrix of Mitochondria	1/2	3
	- Pyruvate dehydrogenase	1/2	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	(b) Step 1 :- Citric Acid \longrightarrow α - Ketoglutaric acid. Step 2 :- α - Ketoglutaric acid \longrightarrow Succinic acid	1 1	3
22.	(a) Auxin (b) Apical Dominance (c) In tea plantation and hedge making	1 1 1	3
23.	Trypsin - is made of 20 different types of amino acids therefore it is a heteropolymer. Cellulose - is made up of only glucose monomers repeating 'n' number of times, therefore it is a homopolymer. Inulin - is made up of only fructose monomers to form a polymer.	1 1 1	3
24.	(a) Karyokinesis is not followed by cytokinesis. (b) Due to mitosis (c) Meiosis leads to formation of germ cells, with half the number of chromosomes, followed by fertilisation to	1 1	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
25.	restore the chromosome number of the cells/ organism.	1	3
	- Cambium present between xylem and phloem is intrafascicular cambium.	1/2	
	- Adjoining cells of medullary ray forms interfascicular cambium.	1/2	
	- Cambial ring is formed.	1/2	
	- New cells cut towards the pith mature into secondary xylem.	1/2	
	- Cells cut towards periphery mature into secondary phloem.	1/2	
	- Amount of secondary xylem is more than secondary phloem.	1/2	
	- The primary and secondary phloem gets gradually crushed.	1/2	
	- The primary xylem remains more or less intact.	1/2	
	- At some places, cambium forms narrow bands of parenchyma in radial directions	1/2	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>– to form secondary medullary rays.</p> <p style="text-align: center;"><u>OR</u></p> <p>(a) • Tight junctions</p> <p>– help to stop substances from leaking across a tissue</p> <p>• Adhering junctions</p> <p>– perform cementing function to keep neighbouring cells together.</p> <p>• Gap junctions</p> <p>– facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells.</p> <p>(b) (i) To move particles (ovum / secondary oocyte) in a specific direction.</p> <p>(ii) Provides protection against mechanical and chemical stresses.</p>	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1</p> <p>1</p>	5
26.	(a) • Blood platelets or tissues at the site of injury release	1/2	

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	<p>certain factors to initiate clotting.</p> <ul style="list-style-type: none"> A number of inactive factors present in plasma show (cascade) series of linked enzymatic reactions. Thrombokinase enzyme complex is formed. It converts prothrombin into thrombin. Thrombin converts fibrinogen into fibrins. Network of fibrins traps dead and damaged blood elements to form a clot. <p>(b) A, B, AB, O (All four blood groups - 1 mark)</p> <p>Any three $\frac{1}{2}$ mark</p> <p>O / O⁻ (Rh -ve)</p> <p>Transfused RBCs donot have A and B antigens on its surface.</p> <p style="text-align: center;"><u>OR</u></p> <p>(a) - Pressure / concentration of diffusing gases.</p> <p>- Thickness of the membranes involved in diffusion</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>1</p> <p>1</p>	5

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
27.	(b) Inspiratory reserve volume (IRV)		5
	(c) - Emphysema is a chronic disorder in which alveolar walls are damaged due to which respiratory surface is decreased.	1	
	- One of the major causes of emphysema is cigarette smoking.	1	
	(a) Because the first product of carbon dioxide fixation is a C_3 acid.	1	
		1	
	(b) Stroma side of the thylakoid membrane.		
	- It removes protons from stroma for reduction of $NADP^+$ to $NADPH+H^+$	1	
	(c) Carboxylation	$\frac{1}{2}$	
	- RuBP accepts CO_2		
	- catalyzed by enzyme RuBisCO (RuBP carboxylase oxygenase)	1	
	- Two molecules of 3PGA are formed.	$\frac{1}{2}$	
	<u>OR</u>		

S. No.	VALUE POINTS / KEY POINTS	Marks Allotted to each value Point/Key Point	Total Marks
	(a) Kranz anatomy	1	
	– Large sized bundle sheath cells	1/2	
	– Several layers of bundle sheath cells around vascular bundles.	1/2	
	(b) Maize, Sorghum	1/2+1/2	
	(c) – In C ₄ plants, C ₄ acid is formed in mesophyll cells.	1/2	
	– It splits in bundle sheath cells to release CO ₂ .	1/2	
	– Carbon dioxide concentration increases in bundle sheath cells.	1/2	
	– So, RuBis CO acts as carboxylase and not oxygenase.	1/2	



COMPUTER SCIENCE

Designed & Developed

by

DAV Centre for Academic Excellence

in a workshop

held at

DAV College Managing Committee

Chitragupta Road

New Delhi - 110055

COMPUTER SCIENCE

XI

Time : 3 Hours

DESIGN

Max. Marks : 70

I. Weightage of learning objectives :

Objective	To understand basics of Computers and open Source Software	To develop logic for problem solving and computing logic	To develop problem solving skills and their implementation through C++	Total
% of Marks	14.3%	17.1%	68.6%	100
Marks	10	12	48	70

II. Weightage to different form of questions :

Type of Questions	LA	SA - I	SA - II	VSA	Total
No. of Questions	3	6	17	6	32
Marks	12	18	34	6	70

III. Weightage to different topics/contents units / learning objectives

S. No.	Topics	Marks
1	Computer Fundamentals	10
2	Programming Methodology	12
3	Introduction to C++	14
4	Programming in C++	34
	Total	70

IV. Scheme of Options

This question papers caters to students of Computer Science who have opted for C++ (instead of Phthon)

V. Weightage to difficulty level :

1. Difficult questions : 18.75%
3. Easy questions : 25%

2. Average questions : 56.25%

VI. Expected length of answers to different types of questions & time management :

Types of Question	Expected Length of Answer	Expected Time for each question
Long Answer (LA)	Varies from 12-20 lines	1 minute
Short Answer (SA-I) (SA-II)	3 to 5 lines	4 minutes for SA II 8 minutes for SA I
Very Short Answer (VSA)	One sentence	2 minutes

COMPUTER SCIENCE

Time Allowed : 3 Hours

Maximum Marks : 70

1. (a) Ram Krishna has brought a 2 GB pendrive. His Science teacher asked him to store the digital project files of his project on the pen drive. Which of the following is not correct about the number of files and size of each file that can be stored on the pen drive. Justify. 2
- (i) He can store 2 files of 1024 MB.
 - (ii) He can store 2 files of 1148 MB
 - (iii) He can store 2 files of 1000 KB
 - (iv) He can store 2 files of 1014 KB
- (b) (i) Expand EPIC. 1/2
- (ii) Identify the port: 6 pin ports for connecting the keyboard and mouse to PC systems. 1/2
- (c) Radhika is solving the question given below. His friend came up asking what is she doing? What type of conversion Radhika is doing? Can you guess the question? Mention it. 2
- $$2 \times 16^2 + 10 \times 16^1 + 12 \times 16^0$$
- $$2 \times 256 + 10 \times 16 + 12 \times 1$$
- $$512 + 160 + 12$$
- $$684$$

- (d) Convert $(110.01)_2$ to octal. 1
- (e) Convert $(50.50)_{10}$ to binary. 1
- (f) What is free in free software? 1
- (g) Categorize given operating system into open and proprietary operating system: 2
- (i) Windows
 - (ii) iOS
 - (iii) LINUX
 - (iv) Android
2. (a) Design a flowchart to read 10 numbers and display the numbers that have 3 as their unit's place digit. 4
- (b) Avika is a programmer in Arbiter Solutions Pvt. Ltd. She is working on a program which requires following variables : 1
- | | |
|---------------|---------------|
| Variable | Sample Values |
| Material type | Cotton / Silk |
| Cost | 450.95 |
- Suggest the data types for the variables.
- (c) Out of the following, find the identifiers which can not be used as variables / constants / functions in a C++ program. Also give reason for the same. 2
- 2great, Switch, _location, city@country

- (d) In order to generate the following output, Archit typed the given code which is not giving him the desired result.

2

CODE	OUTPUT
<pre>#include<iostream.h> void main () { int CL=24; cout<<"VariableValue"; cout<<"-----"; cout<<"CL"<<CL; }</pre>	<pre>Variable Valve ----- CL 24</pre>

Make necessary changes and underline each correction in the cout statements so that the given output can be generated.

- (e) Niva has written the following code to calculate the area of triangle, but the code has some errors. Identify the errors and mention its type (Syntax / Logical).

2

```
# include<iostream.h>
void main ( )
{
    float b;h ;
    float area=b*h;
    cout<<area;
}
```

(f) Identify the following as Finite/ Infinite loop.

1

Code A	Code B
<pre>int X1=9; while(X1%3==0) { cout<<X1; X1++; }</pre>	<pre>for (char alpha='B'; alpha<='R';) { cout<<alpha; }</pre>

3. (a) Consider the following program and write the name of the header files required for the successful execution of the following program.

2

```
void main ()
{
    clrscr ();
    int k=0;
    char str[20];
    gets (str);
    k=pow ( int (str [2 ]), 1);
    cout<<k;
}
```

- (b) Evaluate the following expressions :

2

- (i) `int a=10, b=5;`
`(a>b++)? cout<<strlen("Number\ 's"): cout<<sizeof("Number\ 's");`
- (ii) `int x=5, y=12, z=8;`
`cout<<(z && (y-z) | (!5*y < 2*z/x));`

(c) Write C++ equivalent expression for the following :

2

(i) $x^2 + b^4/c + |y|$

(ii) ch is an uppercase alphabet and is in the range from 'E' to 'X'.

(d) Give the output :

3

```
void main ( )
{
    int circle = 5 , rectangle = 0 , square = 4 , triangle = 1;
    for (int i= rectangle; i<= square; i+= triangle)
    if (i)
    {
        if (rectangle || square && (i%2 ==0))
        {
            cout<<"You can continue\n";
        }
        else if (!rectangle && square)
        {
            cout<<"Please wait \n";
        }
    }
    else
    {
        if (circle == rectangle || square == triangle)
        {
            cout<<"You need to revise\n";
        }
    }
}
```

```

    }
}

cout<<"Please exit\n";

}

```

- (e) Consider a string PASSWORD[10]. Write the function call for the following using in-built functions: 2

- (i) to display the length of the PASSWORD
- (ii) to check whether PASSWORD is "true@123"

4. (a) Consider the following code fragment 2

```

int p=10 , k=50 ;
while (p<14 )
    k=k - ++p ;

```

- (i) What will be the final value of variable k after the code is executed?
- (ii) How many times this loop will get executed?

- (b) Find the output of the following program : 2

```

int P=1;

void Total_Points (int marks)
{
    int P=2 ;
    {
        int P;
        if (marks>90)
            P=5;
        else

```

- 3

```

k++;
}

```

- (d) Write a program to read a list of numbers terminated by -1 and find the average of positive numbers entered. 3

Sample Input: 2 -7 -9 8 14 -1

Sample output : 8

- (e) Give a function prototype which accepts a default parameter with value 10 of type integer. Write two ways in which this function can be called. 2

5. (a) Find errors in the following code. Rewrite the corrected code and underline the corrections made. Assume all header files are included. 2

```

#define SUM (a, b) = a+b
typedef int INTEGER
void main ( )
{
    INTEGER X, Y ;
    L=SUM (X) ;
    cout<<L;
}

```

- (b) Observe the following program and find which output(s) out of (i) to (iv) will be expected from the program? Also write the 2

minimum and maximum value of the variable mycode. Assume all necessary header files are included.

```
void main ()
{
    int N ;

    char Encrypt [ 4 ] ={'S' , 'A' , 'V' , 'E' } ;

    randomize ( ) ;

    int mycode=random ( 2 ) +1 ;

    for ( int I=0 ;I<2 ; I++)
    {

        cout<<Encrypt [mycode] ;

    }
}
```

- (i) A@A@
- (ii) S@A@
- (iii) V@A@
- (iv) A@E@

- (c) Find the output of the following program. Assume all necessary header files are included.

2

```
void main ()
{
    char name [4] [ 6]={ "ANyA" , "MAnyA" , "tANYa" , "KAnyA" };
    strcpy (name [ 2 ] , name [ 3] );
    name [1] [ 2 ]=name [2] [ 3];
```

```

    for ( int i=0 ; i<4 ; ++i)

        if ( isupper (name [ i ] [ i ] ) )

            name [ i ] [ i ]=' * ' ;

        cout<<name [1]<<" : "<<name [ 2 ];

    }

```

- (d) Find the output of the following program code. Assume all necessary header files are included. 2

```

void changeshow ( int A[ ], int size)
{
    for ( int N=size -1 ;N>=0 ; - -N)
    {
        int n=A [N] %2;

        if (n==0)

            A [N]+=n*2 ;

        else

            A[N]+=n*3 ;

    }
}

void main ()
{
    int AR[ ] = {15, 12, 27, 3 };

    changeshow (AR, 4);

    for ( int i=0 ; i<4 ; ++i )
    {

```



```

        cout<<AR[ i ]<<' $ ';

    }

}

```

6. (a) Write a user defined function Search() which accepts an integer array and size as an argument. Generate a random number between 10 and 20. If that generated number is present in the array then replace it by its double value. 3

- (b) Write a function with the following prototype : 4

```
void func(int ARR[ ][5],int n)
```

where **ARR** is a square matrix. Replace lower triangle elements with upper triangle elements and vice versa.

Input	Output
123	147
456	258
789	369

- (c) Write a user defined function replace() which accepts a string as a parameter. Replace the first, last and middle character of the string with '*' if they are same. Also display the string. 3

If the sample input is ANAYA

Then output is *N*Y*

7. (a) Consider the following code fragment 3
- ```
struct client
```

```

{
 int id ;
 char name [20];
};

struct vendor
{
 int id;
 char name [20];
};

client C[10];

vendor V;

```

Choose the invalid statements from the following and give reason for the same.

- (i) C[2].name=V.name;
- (ii) V.id=C[6].id;
- (iii) V=C[3];
- (iv) V.name[5]=C[6].name[5];
- (v) cout<<C.id[5];

(b) Define a structure PVR with the following specification :

4

Audino, Seating Capacity, Movie, Price ,and Seats booked

Write the function definition for the following :

- (i) Input(PVR P): which accept values for all the data members.
- (ii) Display(int NoT , PVR P): Which accepts NoT(Number of Tickets) and Structure P as an argument and display the

message "Seats available" if number of tickets to be booked is less than number of seats available else display "Seats Not Available".

seats available can be calculated as:

seating Capacity - Seats booked

# COMPUTER SCIENCE

Time Allowed : 3 Hours

Maximum Marks : 70

## MARKING SCHEME / HINTS TO SOLUTIONS

(Note : Any other relevant answer, not given herein but given by the candidates, be suitably awarded. )

| S. No. | VALUE POINTS / KEY POINTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Marks Allotted to each value Point/Key Point                         | Total Marks |  |   |    |     |   |    |     |   |   |     |   |   |     |   |   |     |  |   |     |                                                                            |                                                                                                                              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| 1.     | <p>(a) 1 GB = 1024 MB<br/>2 GB = 2 X 1024 = 2048 MB</p> <p>(i) 2 files of 1024 MB =&gt; 2048 MB, hence correct</p> <p>(ii) 2 files 1148 MB =&gt; 2296 MB &gt; 2048 MB, hence incorrect</p> <p>(iii) 2 files of 1000 KB =&gt; 2000 KB &lt; 2048 MB, hence correct</p> <p>(iv) 2 files of 1014 KB =&gt; 2028 KB &lt;2048 MB, hence correct</p>                                                                                                                                                                                                                                                                                              | <p>1 Mark for correct answer and</p> <p>1 Mark for Justification</p> | 2           |  |   |    |     |   |    |     |   |   |     |   |   |     |   |   |     |  |   |     |                                                                            |                                                                                                                         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| 2.     | <p>(b) (i) Explicitly Parallel Instruction Computing</p> <p>(ii) PS/2</p> <p>(c) Hexadecimal to Decimal Conversion type<br/>(2AC)<sub>16</sub> —————&gt; (684)<sub>10</sub></p> <p>(d) (110.01)<sub>2</sub> to octal<br/>110 . 010<br/>6 2<br/>(6.2)<sub>8</sub></p> <p>(e) (50.50)<sub>10</sub> to binary</p> <table><tr><td>2</td><td>50</td><td></td></tr><tr><td>2</td><td>25</td><td>- 0</td></tr><tr><td>2</td><td>12</td><td>- 1</td></tr><tr><td>2</td><td>6</td><td>- 0</td></tr><tr><td>2</td><td>3</td><td>- 0</td></tr><tr><td>2</td><td>1</td><td>- 1</td></tr><tr><td></td><td>0</td><td>- 1</td></tr></table> <div>↑</div> | 2                                                                    | 50          |  | 2 | 25 | - 0 | 2 | 12 | - 1 | 2 | 6 | - 0 | 2 | 3 | - 0 | 2 | 1 | - 1 |  | 0 | - 1 | <p>½ Mark each</p> <p>1 Mark</p> <p>1 Mark</p> <p>1 Mark</p> <p>½ Mark</p> | 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| 2      | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | - 0                                                                  |             |  |   |    |     |   |    |     |   |   |     |   |   |     |   |   |     |  |   |     |                                                                            |                                                                                                                         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| 2      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | - 1                                                                  |             |  |   |    |     |   |    |     |   |   |     |   |   |     |   |   |     |  |   |     |                                                                            |                                                                                                                         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|        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | - 1                                                                  |             |  |   |    |     |   |    |     |   |   |     |   |   |     |   |   |     |  |   |     |                                                                            |                                                                                                                         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| S. No. | VALUE POINTS / KEY POINTS                                                                                                                                                                                                                                                                                                                                                                                  | Marks Allotted to each value Point/Key Point                                                                                                                                                                                                | Total Marks |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 2.     | $50 - (110010)_2$<br>$.50 \times 2 = 1.0 = 1$<br>$(110010.1)_2$                                                                                                                                                                                                                                                                                                                                            | ½ Mark                                                                                                                                                                                                                                      | 1           |
|        | (f) Available at no monetary cost                                                                                                                                                                                                                                                                                                                                                                          | 1 Mark                                                                                                                                                                                                                                      |             |
|        | (g) (i) Windows - Proprietary<br>(ii) iOS - Proprietary<br>(iii) LINUX - Open<br>(iv) Android - Open                                                                                                                                                                                                                                                                                                       | ½ Mark each                                                                                                                                                                                                                                 |             |
|        | (a)                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                             |             |
|        | <pre> graph TD     START([START]) --&gt; I1[I=1]     I1 --&gt; Cond1{Is I &lt;= 10?}     Cond1 -- F --&gt; STOP([STOP])     Cond1 -- T --&gt; Read[/Read Num/]     Read --&gt; DCalc[D=Num%10]     DCalc --&gt; Cond2{Is D=3?}     Cond2 -- T --&gt; Display[/Display Num/]     Display --&gt; IInc[I=I+1]     Cond2 -- F --&gt; IInc     IInc --&gt; Cond1 </pre> <p>Or<br/>Any other relevant answer</p> | ½ mark for start & stop<br><br>½ mark for initializing I<br><br>½ mark for condition<br><br>½ mark to read num<br><br>½ mark to get last digit of Num<br><br>½ mark for Printing<br>½ mark for condition<br><br>½ mark to update variable I |             |

| S. No. | VALUE POINTS / KEY POINTS                                                                                                               | Marks Allotted to each value Point/Key Point                                                     | Total Marks |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------|
| 3.     | (b) materialtype - char [ ]<br>Cost - float/double                                                                                      | ½ Mark<br><br>each                                                                               | 1           |
|        | (c) 2great- starting with a digit,<br>city@country- containing a special character                                                      | 1 mark for identification and 1 mark for suitable reason                                         | 2           |
|        | (d) #include<iostream.h><br>void main ()<br>{<br>int CL=24;<br>cout<<"Variable\tValue\n";<br>cout<<"-----\n";<br>cout<<"CL\t"<<CL;<br>} | ½ Mark<br><br>for each correction<br><br>½ mark each for identification<br>½ mark for error type | 2           |
|        | (e) Syntax Error : float b; h;<br>Logical Error : float area=b*h;                                                                       | ½ mark for each header file                                                                      | 2           |
|        | (f) Code A: Finite loop<br>Code B: Infinite loop                                                                                        | ½ Mark<br><br>each                                                                               | 1           |
|        | (a) stdio.h, math.h, iostream.h, conio.h                                                                                                |                                                                                                  | 2           |
|        | (b) (i) 8<br>(ii) 1 / true/ T                                                                                                           | 1 Mark<br><br>each                                                                               | 2           |
|        | (c) (i) x*x + pow(b,4)/c+abs(y)<br>(ii) ch>='E' && ch<='X'                                                                              | 1 Mark<br><br>each                                                                               | 2           |

| S. No. | VALUE POINTS / KEY POINTS                                                                                                                                                   | Marks Allotted to each value Point/Key Point                        | Total Marks |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------|
| 4.     | (d) Please wait<br>You can continue<br>Please wait<br>You can continue<br>Please exit                                                                                       | $\frac{1}{2}$ mark for each statement<br>$\frac{1}{2}$ for new line | 3           |
|        | (e) (i) <code>int L=strlen(PASSWORD);</code><br>(ii) <code>int a=strcmp(PASSWORD,"true@123");</code><br>or<br><code>int a=strcmpi(PASSWORD,"true@123");</code>              | 1 Mark<br>each                                                      | 2           |
|        | (a) (i) <code>k=0</code><br>(ii) 4 times                                                                                                                                    | 1 Mark<br>1 Mark                                                    | 2           |
|        | (b) 6<br>2                                                                                                                                                                  | 1 Mark<br>1 Mark                                                    | 2           |
|        | (c) <code>int star=hash=num=0;</code><br><code>char n [ ]="1234#5*";</code><br><code>int k=0;</code><br>do<br>{<br>if (n [k] == '*' )<br>star++;<br>else if (n [k] == '#' ) | $\frac{1}{2}$ Mark<br>$\frac{1}{2}$ Mark<br>$\frac{1}{2}$ Mark      |             |

| S. No. | VALUE POINTS / KEY POINTS                                                                                                                                                                                                                                                                                                                                     | Marks Allotted to each value Point/Key Point                                                                                                                                         | Total Marks |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|        | <pre>                 hash++;              else                  num++;          k++ ;     } while (n [k] ) ;     ( ½ mark will be deducted if semicolon is missing) </pre>                                                                                                                                                                                   | <p>½ Mark</p> <p>1 Mark</p>                                                                                                                                                          | <p>3</p>    |
|        | <pre> (d) #include&lt;iostream.h&gt;  void main() {     int num,sum=0, n=0;     do     {         cout&lt;&lt;"Enter number press -1 to stop";         cin&gt;&gt;num;         if  (num&gt;0)         {    sum=sum+num;             n++;         }     } while(num !=-1);     cout&lt;&lt;"Average of positive numbers         entered"&lt;&lt;sum/n; } </pre> | <p>½ mark for declaration<br/>initialisation of the variables</p> <p>½ mark for input<br/>½ mark for if<br/>½ mark for increment</p> <p>½ mark for loop</p> <p>½ mark for output</p> | <p>3</p>    |



| S. No. | VALUE POINTS / KEY POINTS                                                                                                                          | Marks Allotted to each value Point/Key Point          | Total Marks |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------|
| 5.     | (e) void Func( int a=l0);<br>Func(20);<br>Func();                                                                                                  | 1 mark for prototype<br>½ mark each for function call | 2           |
|        | (a) #define SUM (a, b) a+b<br><u>typedef int INTEGER;</u><br>void main ()<br>{<br>INTEGER X, Y;<br><u>INTEGER</u> L = SUM (X, Y);<br>cout<<L;<br>} | ½ mark for each correction                            | 2           |
|        | (b) Correct Output :<br>A@V@<br>V@A@<br>Minimum value of mycode is 1<br>Maximum value of mycode is 2                                               | 1 mark for correct output<br><br>½ Mark<br>½ Mark     | 2           |
|        | (c) M*yyA:KanyA                                                                                                                                    | ½ mark for each string                                | 2           |
|        | (d) 18\$12\$30\$6\$<br>Deduct ½ mark if \$ is missing                                                                                              | ½ mark each for 4 numbers                             | 2           |
| 6.     | (a) void Search(int A[ ], int size)<br>{<br><br>randomize();                                                                                       | ½ Mark                                                | 3           |

| S. No. | VALUE POINTS / KEY POINTS                                                                                                                                                                                                                                                                                                                   | Marks Allotted to each value Point/Key Point                                                      | Total Marks |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------|
|        | <pre> int r=random(11)+10; for(int i=0;i&lt;size;++i) {     if(r==A[i])         A[i]=A[i]*2; } } </pre>                                                                                                                                                                                                                                     | <p>1 Mark</p> <p>½ Mark</p> <p>½ Mark</p> <p>½ Mark</p>                                           | 4           |
|        | <p>(b) void func (int ARR[ ][3], int n)</p> <pre> {     for(int i=0;i&lt;n;++i)     {         for(int j=0;j&lt;n;++j)         {             if((i!=j) &amp;&amp; (!(i&gt;j)))             {                 int temp=ARR[i][j];                 ARR[i][j]=ARR[j][i];                 ARR[j][i]=temp;             }         }     } } </pre> | <p>½ Mark</p> <p>½ Mark</p> <p>½ Mark</p> <p>1 Mark</p> <p>½ Mark</p> <p>½ Mark</p> <p>½ Mark</p> |             |

| S. No. | VALUE POINTS / KEY POINTS                                                                                                                                                                           | Marks Allotted to each value Point/Key Point                   | Total Marks |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------|
| 7.     | (c) void replace(char STR[ ] )<br>{<br>int len=strlen(STR);<br>if(STR[0]==STR[len/2] && STR[0]==STR[len-1])<br>STR[0]=STR[len/2]=STR[len-1]='*';<br>}<br>cout<<STR;<br>}                            | ½ Mark<br><br><br>½ Mark<br>1 Mark<br>½ Mark<br><br>½ Mark     | 3           |
|        | (a) Invalid Statements<br>1. C[2].name=V.name; // String can not be copied using= operator<br>2. V=C[3]; // Both are different structures<br>3. cout<<C.id[5]; // id is not an array. C is an array | 1 Mark<br><br>1 Mark<br>1 Mark                                 | 3           |
|        | (b) struct PVR<br>{<br>int Audino;<br>int seatcap;<br>int movie;<br>float price;<br>int seatsbooked;<br>};<br>void input(PVR P)                                                                     | 1 Mark<br><br><br><br><br><br>1 Mark for structure declaration | 4           |
|        |                                                                                                                                                                                                     |                                                                |             |

| S. No. | VALUE POINTS / KEY POINTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Marks Allotted to each value Point/Key Point                                                         | Total Marks |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------|
|        | <pre> {     cout&lt;&lt;"\nInput Audi No.";     cin&gt;&gt;P.Audino;     cout&lt;&lt;"\nInput seating capacity";     cin&gt;&gt;P.seatcap;     cout&lt;&lt;"\nInput Movie Name";     gets(P.movie);     cout&lt;&lt;"\nInput Price";     cin&gt;&gt;P.price;     cout&lt;&lt;"\nInput Seats booked";     cin&gt;&gt;P.seatsbooked; }  void display(int NoT, PVRP) {     int seatLeft=P.seatcap-P.seatsbooked;     if(NoT&lt;seatLeft)         cout&lt;&lt;"SEATS AVAILABLE";     else         cout&lt;&lt;"SEATS NOT AVAILABLE"; } </pre> | <p>1 Mark<br/>for<br/>input<br/>function</p> <p>½ Mark</p> <p>½ Mark</p> <p>½ Mark</p> <p>½ Mark</p> |             |