Target's

20 Question Paper Set

MH-CET

For Medical Entrance Exam Aspirants

Target Publications Pvt. Ltd.

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20 Question Paper Set

MH –CET

For Medical Entrance Exam Aspirants

First Edition: March 2015

Salient Features

- Set of 20 questions papers with solutions each for Physics, Chemistry and Biology.
- Prepared as per the MH-CET syllabus prescribed by Directorate of Medical Education and Research (DMER).
- Exhaustive coverage of MCQ's from all chapters.
- Hints provided wherever necessary.
- Simple and Lucid language.
- Self-evaluative in nature

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TEID : 867

Preface

'MH-CET: 20 Question Paper Set' is a series of 20 question papers, each test containing 200 multiple choice questions which are divided into Physics, Chemistry and Biology sections. The question set is prepared keeping in mind the syllabus prescribed for MH-CET.

Each test is divided into 50 multiple choice questions each of **Physics, Chemistry, Botany and Zoology** as per the MH-CET format. While preparing the book, utmost care has been taken to include a broad range of objective questions so that no concept is left unattended and also to make it absolutely error-free.

Each question has been specifically selected to prepare the students on a competitive level. Hints have been provided for selected multiple choice questions to help the students overcome conceptual or mathematical hindrances.

Each question set will help the students to test their range of preparation and knowledge of each topic. The book will act as a guide for students at the time of revision and will provide proper and thorough practice giving the students an edge above the rest.

A specimen copy of the question booklet and answer sheet of MH-CET paper has been provided to make the students aware of the same.

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.

Please write to us on : mail@targetpublications.org

A book affects eternity; one can never tell where its influence stops.

Best of luck to all the aspirants!

Yours faithfully,
Publisher

Specimen Copy of MH-CET-2015 front page of a Question Booklet
MH-CET-2015
Subjects: Physics, Chemistry and Biology

Question Booklet Version	MH-CET-2015 Roll No.	Question Booklet Sr. No.
(Write this number on your Answer Sheet)	Answer Sheet No.	(Write this number on your Answer Sheet)

Day and Date : Thursday, 07th May, 2015

Duration : 3.00 hours.
Total Marks : 200

This is to certify that, the entries of MH-CET Roll No. and Answer Sheet No. have been correctly written and verified.

Candidate's Signature *Invigilator's Signature*

Instructions to Candidates

1. This question booklet contains 200 Objective Type Questions (Multiple Choice Question (MCQ) in the subjects of Physics (50), Chemistry (50) and Biology (100).
2. The question paper and OMR (Optical Mark Reader) Answer Sheet is issued separately at the start of the examination.
3. Choice and sequence for attempting questions will be as per the convenience of the candidate.
4. Candidate should carefully read the instructions printed on the Question Booklet and Answer Sheet and make the correct entries on the Answer Sheet. As Answer Sheets are designed to suit the OPTICAL MARK READER (OMR) SYSTEM, special care should be taken to mark the entries correctly. Special care should be taken to fill QUESTION BOOKLET VERSION, SERIAL No. and MH-CET Roll No. accurately. The correctness of entries has to be cross-checked by the invigilators. The candidate must sign on the Answer Sheet and Question Booklet.
5. Read each question carefully.
6. Determine the one correct answer from out of the four available options given for each question.
7. Fill the appropriate circle completely like this ●, for answering a particular question. Mark with Black ink ball point pen only.
8. **Each question with correct response shall be awarded one (1) mark. There shall be no negative marking. No mark shall be granted for marking two or more answers of same question, scratching or overwriting.**
9. **Use of whitener or any other material to erase/hide the circle once filled is not permitted.**
10. Avoid overwriting and/or striking of answers once marked.
11. Rough work should be done only on the blank space provided on the Question Booklet. Rough work should not be done on the Answer Sheet.
12. The required mathematical tables (Log etc.) will be provided along with the question booklet.
13. Immediately after the prescribed examination time is over, the Question Booklet and Answer sheet is to be returned to the invigilator. Confirm that both the candidate and invigilator have signed on question booklet and Answer sheet.
14. No candidate is allowed to leave the examination hall till the end of the examination.

[Source : MH-CET 2015 Brochure]

Important Instructions - How to Mark In The 'OMR Answersheet'

1. Use only BLACK ink ball point pen to darken/mark the appropriate circle.
2. Mark should be dark and should completely fill the circle.
3. Mark/darken only one circle for each entry. The answer once marked is final, any change in the option once marked, done by any method, will amount to a invalid/incorrect response.
4. **A lightly/faintly marked/darkened circle may also be treated as a incorrect/wrong method of marking and may not be read by the Optical Scanner.**
5. Marking should only be done in the space provided.
6. Please do not fold the answer sheet and do not make any stray marks on it.

Marking of Responses:-

There will be four answer options for each question. The candidate will indicate his/her response to the question by darkening the appropriate circle completely with BLACK ink ball point pen.

For example, Question No.152 in the Question Paper reads as follows:-

152. Coronary Arteries supply blood to the
(A) Lung (B) Brain (C) Heart (D) Intestine

The correct answer is 'C' Heart. The candidate will locate the place for response to Q. No.152 in the OMR Answer sheet and darken the circle where the option 'C' is printed as shown below :-

152. Ⓐ Ⓑ ● Ⓓ

Candidate should not use any other method for answering i.e. Half circle, dot, tick mark, cross etc. This may not be read by the scanner.

CHANGING AN ANSWER IS NOT ALLOWED

The candidates must fully satisfy themselves about the accuracy of the answer before darkening the appropriate circle, as no change in the Answer once marked is allowed. The answer once marked is final, any change in the option once marked, done by any method, will amount to an invalid/incorrect response.

[Source : MH-CET 2015 Brochure]

OMR Front Side - Specimen Copy

MH-CET-2015

Answer Sheet Number ☐

OMR ANSWER SHEET

(USE BLACK BALL POINT PEN ONLY)

SIDE 1

INSTRUCTIONS FOR MARKING ON SIDE 1

Method of writing MH-CET Roll Number in words : -
For e.g. 1026952 should be written as follows : - One, Zero, Two, Six, Nine, Five, Two.

MH-CET Roll Number (In Numerals): ☐

MH-CET Roll Number (In Words): ______________________

Question Booklet Version (In Numerals) : ☐☐

Question Booklet Version (In Words) : ______________________

Question Booklet Serial No. (In Numerals) : ☐

Question Booklet Serial No. (In Words) : ______________________

INSTRUCTIONS FOR MARKING ON SIDE 2

1.	Use Black Ball point to shade the appropriate circle completely.	१.	उत्तरासाठी योग्य वर्तुळ काळ्या बॉलपेनने संपूर्ण भरावे.
2.	Darken ONLY ONE CIRCLE for answering each question.	२.	प्रत्येक प्रश्नाच्या उत्तरासाठी केवळ एकच वर्तुळ भरावे.
3.	Answer once shaded is Final. No Change is permitted.	३.	एकदा दिलेले उत्तर अंतिम राहील. त्यात कोणताही बदल करता येणार नाही.
4.	Please do not make any stray mark on the answer sheet. Rough work must not be done on the answer sheet.	४.	उत्तरपत्रिकेवर इतरत्र कोठेही कोणतीही खूण करू नये.
5.	Use Space on Question paper provided for rough work.	५.	कच्चे काम उत्तरपत्रिकेवर करू नये. त्यासाठी प्रश्नपत्रिकेतील विहीत जागा वापरावी.
6.	Mark your answers like this: CORRECT METHOD Ⓐ Ⓑ ● Ⓓ WRONG METHOD ⊗ ✓ ◐ ◐	६.	उत्तरासाठी वर्तुळ असे भरावे. योग्य पद्धत Ⓐ Ⓑ ● Ⓓ चुकीची पद्धत ✓ ⊗ ◐ ◐

EXAMPLES – HOW TO FILL AND MARK ON SIDE – 2

खालील माहिती फक्त नमुन्यासाठी दिलेली आहे.

If your MH-CET Roll Number is 1026952 fill in as shown below :

1	0	2	6	9	5	2
⓪	●	⓪	⓪	⓪	⓪	⓪
●	①	①	①	①	①	①
②	②	●	②	②	②	●
③	③	③	③	③	③	③
④	④	④	④	④	④	④
⑤	⑤	⑤	⑤	⑤	●	⑤
⑥	⑥	⑥	●	⑥	⑥	⑥
⑦	⑦	⑦	⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	●	⑨	⑨

If your Question Booklet Version is 33 fill in as shown below :

3	3
11	○
22	○
33	●
44	○

If your Question Booklet Serial No. is 934567 fill in as shown below :

9	3	4	5	6	7
⓪	⓪	⓪	⓪	⓪	⓪
①	①	①	①	①	①
②	②	②	②	②	②
③	●	③	③	③	③
④	④	●	④	④	④
⑤	⑤	⑤	●	⑤	⑤
⑥	⑥	⑥	⑥	●	⑥
⑦	⑦	⑦	⑦	⑦	●
⑧	⑧	⑧	⑧	⑧	⑧
●	⑨	⑨	⑨	⑨	⑨

If your Response to Question No. 57 is (C), Please mark as shown below :

Q. No.	Response
57.	Ⓐ Ⓑ ● Ⓓ

NOTE: THIS IS AN EXAMPLE ONLY. DO NOT COPY THE SAME NUMBER ON YOUR ANSWER SHEET.

[Source : MH-CET 2015 Brochure]

OMR Backside - Specimen Copy

SIDE 2

MH-CET-2015
ROLL NUMBER

⓪	⓪	⓪	⓪	⓪	⓪	⓪
①	①	①	①	①	①	①
②	②	②	②	②	②	②
③	③	③	③	③	③	③
④	④	④	④	④	④	④
⑤	⑤	⑤	⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨	⑨

QUESTION BOOKLET SERIAL No.

⓪	⓪	⓪	⓪	⓪	⓪
①	①	①	①	①	①
②	②	②	②	②	②
③	③	③	③	③	③
④	④	④	④	④	④
⑤	⑤	⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨

QUESTION BOOKLET VERSION

11	○
22	○
33	○
44	○

PHYSICS		CHEMISTRY		BIOLOGY			
Q.No.	Answers	Q.No.	Answers	Q.No.	Answers	Q.No.	Answers
1.	ⒶⒷⒸⒹ	51.	ⒶⒷⒸⒹ	101.	ⒶⒷⒸⒹ	151.	ⒶⒷⒸⒹ
2.	ⒶⒷⒸⒹ	52.	ⒶⒷⒸⒹ	102.	ⒶⒷⒸⒹ	152.	ⒶⒷⒸⒹ
3.	ⒶⒷⒸⒹ	53.	ⒶⒷⒸⒹ	103.	ⒶⒷⒸⒹ	153.	ⒶⒷⒸⒹ
4.	ⒶⒷⒸⒹ	54.	ⒶⒷⒸⒹ	104.	ⒶⒷⒸⒹ	154.	ⒶⒷⒸⒹ
5.	ⒶⒷⒸⒹ	55.	ⒶⒷⒸⒹ	105.	ⒶⒷⒸⒹ	155.	ⒶⒷⒸⒹ
6.	ⒶⒷⒸⒹ	56.	ⒶⒷⒸⒹ	106.	ⒶⒷⒸⒹ	156.	ⒶⒷⒸⒹ
7.	ⒶⒷⒸⒹ	57.	ⒶⒷⒸⒹ	107.	ⒶⒷⒸⒹ	157.	ⒶⒷⒸⒹ
8.	ⒶⒷⒸⒹ	58.	ⒶⒷⒸⒹ	108.	ⒶⒷⒸⒹ	158.	ⒶⒷⒸⒹ
9.	ⒶⒷⒸⒹ	59.	ⒶⒷⒸⒹ	109.	ⒶⒷⒸⒹ	159.	ⒶⒷⒸⒹ
10.	ⒶⒷⒸⒹ	60.	ⒶⒷⒸⒹ	110.	ⒶⒷⒸⒹ	160.	ⒶⒷⒸⒹ
11.	ⒶⒷⒸⒹ	61.	ⒶⒷⒸⒹ	111.	ⒶⒷⒸⒹ	161.	ⒶⒷⒸⒹ
12.	ⒶⒷⒸⒹ	62.	ⒶⒷⒸⒹ	112.	ⒶⒷⒸⒹ	162.	ⒶⒷⒸⒹ
13.	ⒶⒷⒸⒹ	63.	ⒶⒷⒸⒹ	113.	ⒶⒷⒸⒹ	163.	ⒶⒷⒸⒹ
14.	ⒶⒷⒸⒹ	64.	ⒶⒷⒸⒹ	114.	ⒶⒷⒸⒹ	164.	ⒶⒷⒸⒹ
15.	ⒶⒷⒸⒹ	65.	ⒶⒷⒸⒹ	115.	ⒶⒷⒸⒹ	165.	ⒶⒷⒸⒹ
16.	ⒶⒷⒸⒹ	66.	ⒶⒷⒸⒹ	116.	ⒶⒷⒸⒹ	166.	ⒶⒷⒸⒹ
17.	ⒶⒷⒸⒹ	67.	ⒶⒷⒸⒹ	117.	ⒶⒷⒸⒹ	167.	ⒶⒷⒸⒹ
18.	ⒶⒷⒸⒹ	68.	ⒶⒷⒸⒹ	118.	ⒶⒷⒸⒹ	168.	ⒶⒷⒸⒹ
19.	ⒶⒷⒸⒹ	69.	ⒶⒷⒸⒹ	119.	ⒶⒷⒸⒹ	169.	ⒶⒷⒸⒹ
20.	ⒶⒷⒸⒹ	70.	ⒶⒷⒸⒹ	120.	ⒶⒷⒸⒹ	170.	ⒶⒷⒸⒹ
21.	ⒶⒷⒸⒹ	71.	ⒶⒷⒸⒹ	121.	ⒶⒷⒸⒹ	171.	ⒶⒷⒸⒹ
22.	ⒶⒷⒸⒹ	72.	ⒶⒷⒸⒹ	122.	ⒶⒷⒸⒹ	172.	ⒶⒷⒸⒹ
23.	ⒶⒷⒸⒹ	73.	ⒶⒷⒸⒹ	123.	ⒶⒷⒸⒹ	173.	ⒶⒷⒸⒹ
24.	ⒶⒷⒸⒹ	74.	ⒶⒷⒸⒹ	124.	ⒶⒷⒸⒹ	174.	ⒶⒷⒸⒹ
25.	ⒶⒷⒸⒹ	75.	ⒶⒷⒸⒹ	125.	ⒶⒷⒸⒹ	175.	ⒶⒷⒸⒹ
26.	ⒶⒷⒸⒹ	76.	ⒶⒷⒸⒹ	126.	ⒶⒷⒸⒹ	176.	ⒶⒷⒸⒹ
27.	ⒶⒷⒸⒹ	77.	ⒶⒷⒸⒹ	127.	ⒶⒷⒸⒹ	177.	ⒶⒷⒸⒹ
28.	ⒶⒷⒸⒹ	78.	ⒶⒷⒸⒹ	128.	ⒶⒷⒸⒹ	178.	ⒶⒷⒸⒹ
29.	ⒶⒷⒸⒹ	79.	ⒶⒷⒸⒹ	129.	ⒶⒷⒸⒹ	179.	ⒶⒷⒸⒹ
30.	ⒶⒷⒸⒹ	80.	ⒶⒷⒸⒹ	130.	ⒶⒷⒸⒹ	180.	ⒶⒷⒸⒹ
31.	ⒶⒷⒸⒹ	81.	ⒶⒷⒸⒹ	131.	ⒶⒷⒸⒹ	181.	ⒶⒷⒸⒹ
32.	ⒶⒷⒸⒹ	82.	ⒶⒷⒸⒹ	132.	ⒶⒷⒸⒹ	182.	ⒶⒷⒸⒹ
33.	ⒶⒷⒸⒹ	83.	ⒶⒷⒸⒹ	133.	ⒶⒷⒸⒹ	183.	ⒶⒷⒸⒹ
34.	ⒶⒷⒸⒹ	84.	ⒶⒷⒸⒹ	134.	ⒶⒷⒸⒹ	184.	ⒶⒷⒸⒹ
35.	ⒶⒷⒸⒹ	85.	ⒶⒷⒸⒹ	135.	ⒶⒷⒸⒹ	185.	ⒶⒷⒸⒹ
36.	ⒶⒷⒸⒹ	86.	ⒶⒷⒸⒹ	136.	ⒶⒷⒸⒹ	186.	ⒶⒷⒸⒹ
37.	ⒶⒷⒸⒹ	87.	ⒶⒷⒸⒹ	137.	ⒶⒷⒸⒹ	187.	ⒶⒷⒸⒹ
38.	ⒶⒷⒸⒹ	88.	ⒶⒷⒸⒹ	138.	ⒶⒷⒸⒹ	188.	ⒶⒷⒸⒹ
39.	ⒶⒷⒸⒹ	89.	ⒶⒷⒸⒹ	139.	ⒶⒷⒸⒹ	189.	ⒶⒷⒸⒹ
40.	ⒶⒷⒸⒹ	90.	ⒶⒷⒸⒹ	140.	ⒶⒷⒸⒹ	190.	ⒶⒷⒸⒹ
41.	ⒶⒷⒸⒹ	91.	ⒶⒷⒸⒹ	141.	ⒶⒷⒸⒹ	191.	ⒶⒷⒸⒹ
42.	ⒶⒷⒸⒹ	92.	ⒶⒷⒸⒹ	142.	ⒶⒷⒸⒹ	192.	ⒶⒷⒸⒹ
43.	ⒶⒷⒸⒹ	93.	ⒶⒷⒸⒹ	143.	ⒶⒷⒸⒹ	193.	ⒶⒷⒸⒹ
44.	ⒶⒷⒸⒹ	94.	ⒶⒷⒸⒹ	144.	ⒶⒷⒸⒹ	194.	ⒶⒷⒸⒹ
45.	ⒶⒷⒸⒹ	95.	ⒶⒷⒸⒹ	145.	ⒶⒷⒸⒹ	195.	ⒶⒷⒸⒹ
46.	ⒶⒷⒸⒹ	96.	ⒶⒷⒸⒹ	146.	ⒶⒷⒸⒹ	196.	ⒶⒷⒸⒹ
47.	ⒶⒷⒸⒹ	97.	ⒶⒷⒸⒹ	147.	ⒶⒷⒸⒹ	197.	ⒶⒷⒸⒹ
48.	ⒶⒷⒸⒹ	98.	ⒶⒷⒸⒹ	148.	ⒶⒷⒸⒹ	198.	ⒶⒷⒸⒹ
49.	ⒶⒷⒸⒹ	99.	ⒶⒷⒸⒹ	149.	ⒶⒷⒸⒹ	199.	ⒶⒷⒸⒹ
50.	ⒶⒷⒸⒹ	100.	ⒶⒷⒸⒹ	150.	ⒶⒷⒸⒹ	200.	ⒶⒷⒸⒹ

SIGNATURE OF THE CANDIDATE
(with date)

IMPORTANT INSTRUCTION : Before signing, please make sure that the candidate has filled his MH-CET Roll No., Question Booklet Version and Question Booklet Serial No. correctly.

SIGNATURE OF THE INVIGILATOR
(with date)

[Source : MH-CET 2015 Brochure]

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MODEL TEST PAPER - 01

PHYSICS

1. A glass tube of internal diameter 3.5 cm and thickness 0.5 cm is held vertically with its lower end immersed in water. The downward pull on the tube due to surface tension (S.T. of water = 0.074 N/m) is

(A) 1.86 N (B) 1.86×10^{-1} N
(C) 1.86×10^{-2} N (D) 1.86×10^{-3} N

2. The gas equation $\frac{PV}{T}$ = constant is true for a constant mass of an ideal gas undergoing

(A) Isothermal change
(B) Adiabatic change
(C) Isobaric change
(D) Any type of change

3. A 10 ohm resistance, 5 mH coil and 10 μF capacitor are joined in series. When a suitable frequency alternating current source is joined to this combination, the circuit resonates. If the resistance is halved, the resonance frequency

(A) is halved.
(B) is doubled.
(C) remains unchanged.
(D) is quadrupled.

4. The buckling of a beam is found to be more if _______.

(A) the breadth of the beam is large.
(B) the beam material has large value of Young's modulus.
(C) the length of the beam is small.
(D) the depth of the beam is small.

5. In AM, the centpercent modulation is achieved when _______.

(A) carrier amplitude = signal amplitude
(B) carrier amplitude ≠ signal amplitude
(C) carrier frequency = signal frequency
(D) carrier frequency ≠ signal frequency

6. A potentiometer wire of length 100 cm has a resistance of 10 Ω. It is connected in series with a resistance and an accumulator of e.m.f 2 V and of negligible internal resistance. A source of e.m.f 10 mV is balanced against a 40 cm length of the potentiometer wire. The value of the external resistance is

(A) 395 Ω (B) 790 Ω
(C) 405 Ω (D) 810 Ω

7. For stationary waves in the medium,

(A) phase of SHM of particles at any time is same, between two successive nodes.
(B) phase of SHM of particles increases as path increases.
(C) the amplitude of vibration is same for each point.
(D) phase of all points between two successive antinodes is same.

8. To increase the range of voltmeter the series resistance should be _______.

(A) increased (B) decreased
(C) constant (D) low

9. The moment of inertia of a sphere is 20 $kg–m^2$ about the diameter. The moment of inertia about any tangent is

(A) 25 $kg\text{-}m^2$ (B) 50 $kg\text{-}m^2$
(C) 70 $kg\text{-}m^2$ (D) 80 $kg\text{-}m^2$

10. The limit of resolution of 100 cm telescope for λ = 5000 Å is approximately equal to

(A) 0.13″ (B) 0.3″
(C) 1″ (D) 1.4″

11. 'Half-life' of a radioactive substance accounts for

(A) time required for complete disintegration of radioactive substance.
(B) time required for two-third disintegration of radioactive substance.
(C) time required for the disintegration of half the radioactive substance.
(D) time required for one-third disintegration of radioactive substance.

12. According to Huygen's principle,
   (A) each point on the wavefront is in different phase.
   (B) each point on the wavefront is centre of a new disturbance and emits secondary waves.
   (C) the tangent to wavefront is the direction of the propagation of the wave.
   (D) the wave is transverse.

13. Gyromagnetic ratio is a ratio of magnetic dipole moment to
   (A) mass of electron.
   (B) momentum of electron.
   (C) radius of electron.
   (D) angular momentum of electron.

14. An air column, closed at one end and open at the other resonates with a tuning fork of frequency ν, when its length is 45 cm, 99 cm and at two other lengths in between these values. The wavelength of sound in air column is
   (A) 180 cm (B) 108 cm
   (C) 54 cm (D) 36 cm

15. The angle of incidence at which reflected light is totally polarized for reflection from air to glass (refraction index n) is
   (A) $\sin^{-1}(n)$ (B) $\sin^{-1}\left(\frac{1}{n}\right)$
   (C) $\tan^{-1}\left(\frac{1}{n}\right)$ (D) $\tan^{-1}(n)$

16. Due to propagation of longitudinal wave in a medium, the following quantities also propagate in the same direction
   (A) Energy, momentum and mass
   (B) Energy
   (C) Energy and mass
   (D) Energy and linear momentum

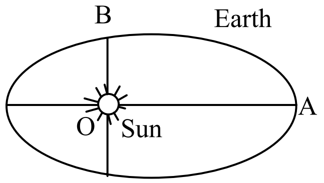
17. In a potentiometer experiment, a balance point is obtained, when
   (A) The e.m.f of the battery becomes equal to the e.m.f of the experimental cell.
   (B) The potential difference of the wire between the +ve end to jockey becomes equal to the e.m.f of the experimental cell.
   (C) The potential difference of the wire between +ve point and jockey becomes equal to the e.m.f of the battery.
   (D) The potential difference across the potentiometer wire becomes equal to the e.m.f of the battery.

18. A gas in an enclosure has a pressure P and the temperature T K. Another gas enclosed in a container of the same volume has a pressure 2P and the temperature T/2 K. The ratio of the average kinetic energy per molecule of the two gases is
   (A) 4 : 1 (B) 2 : 1
   (C) 1 : 2 (D) 1 : 4

19. Lenz's law gives
   (A) the magnitude of the induced e.m.f.
   (B) the direction of the induced current.
   (C) both the magnitude and direction of the induced current.
   (D) the magnitude of the induced current.

20. A transverse wave is described by the equation, $y = y_0 \sin 2\pi\left(ft - \frac{x}{\lambda}\right)$. The maximum particle velocity is equal to four times the wave velocity if
   (A) $\lambda = \frac{\pi y_0}{4}$ (B) $\lambda = \frac{\pi y_0}{2}$
   (C) $\lambda = \pi y_0$ (D) $\lambda = 2\pi y_0$

21. The earth moves around the sun in an elliptical orbit as shown in the figure. The ratio, $\frac{OA}{OB} = x$. The ratio of the speed of the earth at B and at A is



   (A) $\sqrt{x}$ (B) x
   (C) $x\sqrt{x}$ (D) x^2

22. When a body moves with a constant speed along a circle,
   (A) no work is done on it.
   (B) no acceleration is produced in the body.
   (C) no force acts on the body.
   (D) its velocity remains constant.

23. The graph between restoring force and time in case of S.H.M is
   (A) a straight line (B) a circle
   (C) a parabola (D) a sine curve

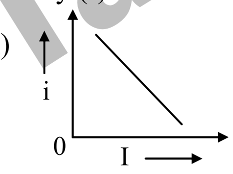
24. A capacitor of capacitance 2 μF is charged to a potential of 100 V and another capacitance 6 μF is charged to a potential of 300 V. These capacitors are joined, with plates of like charges connected together, the total charge is
(A) 16×10^{-4} C (B) 18×10^{-4} C
(C) 20×10^{-4} C (D) 24×10^{-4} C

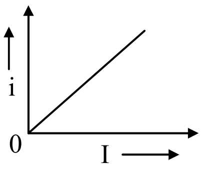
25. According to de Broglie, wave is associated with matter
(A) when it is stationary.
(B) when it is in motion with the velocity of light only.
(C) when it is in motion with any velocity.
(D) none of the above

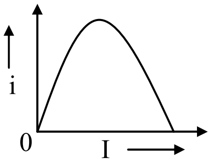
26. The moment of inertia of a body does not depend upon
(A) the mass of the body.
(B) the distribution of the mass in the body.
(C) the axis of rotation of the body
(D) the angular velocity of the body.

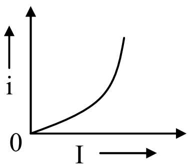
27. In insulators,
(A) The valence band is partially filled with electrons.
(B) The conduction band is partially filled with electrons.
(C) The conduction band is filled with electrons and valence band is empty.
(D) The conduction band is empty and valence band is filled with electrons.

28. Which one of the following graphs represents the variation of photoelectric current (i) with intensity (I) of the incident light?

(A)


(B)


(C)


(D)


29. To produce constructive interference at a point the path difference between two waves superposing at a point should be
(A) x = 0, λ, 2λ, 3λ, …., nλ
(B) x = λ, 3λ, 5λ ,…., (2n – 1)λ
(C) $x = 0, \frac{\lambda}{2}, \lambda, \frac{3\lambda}{2}$
(D) $x = \frac{\lambda}{2}, \frac{3\lambda}{2}, \frac{5\lambda}{2}, \ldots, (2n-1)\frac{\lambda}{2}$

30. If a body weighing 40 kg-wt is taken inside the earth to a depth to $\frac{1}{2}$ th radius of the earth, then the weight of the body at that point is
(A) 40 kg-wt (B) 20 kg-wt
(C) 30 kg-wt (D) zero

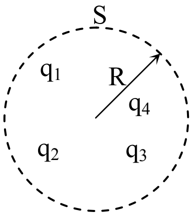
31. Two similar wires A and B are made of different materials. A is twice more elastic than B. When same force is applied, the ratio of elongation of B to A is
(A) 1 : 1 (B) 1 : 4
(C) 2 : 1 (D) 4 : 1

32. If two identical mercury drops are combined to form a single drop, then its temperature will
(A) decrease.
(B) increase.
(C) remain the same.
(D) depend upon surrounding temperature.

33. If temperature of a black body increases from 7 ºC to 287 ºC, then the rate of energy radiation increases by
(A) $\left(\frac{287}{7}\right)^4$ (B) 16
(C) 4 (D) 2

34. Gaussian surface cannot pass through discrete charge because
(A) its an imaginary surface.
(B) electric field is not defined at the location of charge.
(C) electric field is normal at that point.
(D) electric field is tangential at that point.

35. q_1, q_2, q_3 and q_4 are point charges located at points as shown in the figure and S is a spherical gaussian surface of radius R. Which of the following is true according to the Gauss' law?



(A) $\text{T.N.E.I} = \frac{q_1 + q_2 + q_3}{2\varepsilon_0}$

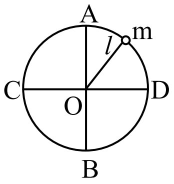
(B) T.N.E.I = $\frac{(q_1 + q_2 + q_3)}{\varepsilon_0}$

(C) T.N.E.I = $\frac{(q_1 + q_2 + q_3 + q_4)}{\varepsilon_0}$

(D) T.N.E.I = $q_1 + q_2 + q_3 + q_4$

36. In an npn transistor circuit, the collector current is 10 mA. If 90% of the electrons emitted reach the collector, the emitter current (I_E) and base current (I_B) are given by
(A) $I_E = -1$ mA, $I_B = 9$ mA
(B) $I_E = 9$ mA, $I_B = -1$ mA
(C) $I_E = 1$ mA, $I_B = 11$ mA
(D) $I_E = 11$ mA, $I_B = 1$ mA

37. A small sphere is attached to a cord and rotates in a vertical circle about a point O. If the average speed of the sphere is increased, the cord is most likely to break at the orientation when the mass is at



(A) Bottom point B (B) The point C
(C) The point D (D) Top point A

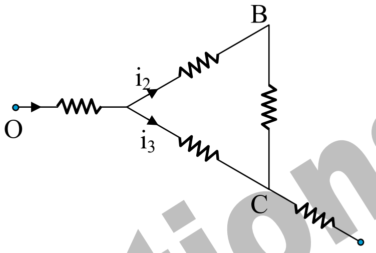
38. An alternating e.m.f, e = 300 sin (100πt) volt is applied to a pure resistance of 100 ohm. Calculate r.m.s current through the circuit.
(A) 2.121 A (B) 3.121 A
(C) 4.121 A (D) 1.121 A

39. When equal forces are applied at different points of objects of same material but of different shapes, the same strain is not produced because
(A) the external force causes different strains.
(B) the property of matter at every point is not same.
(C) the coefficient of elasticity of the same material is not constant.
(D) the nature of external force changes.

40. In Bohr's model of hydrogen atom, which of the following pairs of quantities are quantized?
(A) Energy and linear momentum.
(B) Linear and angular momentum.
(C) Energy and angular momentum.
(D) Energy but not the angular momentum.

41. ϕ_1 and ϕ_2 ($\phi_1 > \phi_2$) are the work functions of metals A and B. When light of same wavelength is incident on A and B, the fastest emitted electrons from A are _____ those emitted from B.
(A) more energetic than
(B) less energetic than
(C) of the same energy as
(D) data insufficient

42. The current in the arm CD of the circuit will be

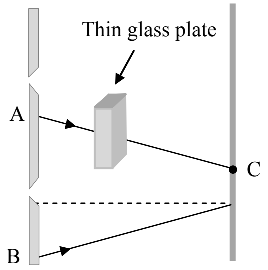


(A) $i_1 + i_2$ (B) $i_2 + i_3$
(C) $i_1 + i_3$ (D) $i_1 - i_2 + i_3$

43. Out of following, the only correct statement about satellites is
(A) A satellite cannot move in a stable orbit in a plane passing through the earth's centre.
(B) Geostationary satellites are launched in the equatorial plane.
(C) We can use just one geostationary satellite for global communication around the globe.
(D) The speed of satellite increases with an increase in the radius of its orbit.

44. The first line of Balmer series has wavelength 6563 Å. What will be the wavelength of the first member of Lyman series?
(A) 1215.4 Å (B) 2500 Å
(C) 7500 Å (D) 600 Å

45. In Young's experiment, monochromatic light is used to illuminate the two slits A and B. Interference fringes are observed on a screen placed in front of the slits. Now if a thin glass plate is placed normally in the path of the beam coming from the slit



(A) the fringes will disappear.
(B) the fringe width will increase.
(C) the fringe width will decrease.
(D) there will be no change in the fringe width but the pattern shifts.

46. The line integral of magnetic field $(\vec{B})$ around any closed path through which current I is flowing is given by $\oint_c \vec{B}\, \vec{dl} =$
(A) $\mu_0 I^2$
(B) $\frac{\mu_0}{I}$
(C) $\mu_0 I$
(D) $\frac{I}{\mu_0}$

47. If I_1 is the moment of inertia of a thin rod about an axis perpendicular to its length and passing through its centre of mass and I_2 is the moment of inertia of the ring formed by bending the rod about an axis perpendicular to the plane, the ratio of I_1 and I_2 is
(A) $I_1 : I_2 = 1 : 1$
(B) $I_1 : I_2 = \pi^2 : 3$
(C) $I_1 : I_2 = \pi : 4$
(D) $I_1 : I_2 = 3 : 5$

48. In remote controlled receivers, the sensor are,
(A) LEDs
(B) Solar cells
(C) Photodiodes
(D) Zener diodes

49. The potential energy of a particle executing S.H.M is 2.5 J, when its displacement is half of amplitude. The total energy of the particle is
(A) 2.5 J
(B) 10 J
(C) 12 J
(D) 20 J

50. A long straight wire carries a current of π A. The magnetic field due to it will be 5×10^{-5} weber/m^2 at what distance from the wire? [μ_0 = permeability of air]
(A) $10^4\ \mu_0$ metre
(B) $\frac{10^4}{\mu_0}$ metre
(C) $10^6\ \mu_0$ metre
(D) $\frac{10^6}{\mu_0}$ metre

CHEMISTRY

51. Conductivity of 0.1 M nitric acid is $6.3 \times 10^{-2}\ \text{ohm}^{-1}\text{cm}^{-1}$. The molar conductivity of solution is _______.
(A) $630\ \text{ohm}^{-1}\text{cm}^2\text{mole}^{-1}$
(B) $315\ \text{ohm}^{-1}\text{cm}^2\text{mole}^{-1}$
(C) $100\ \text{ohm}^{-1}\text{cm}^2\text{mole}^{-1}$
(D) $6300\ \text{ohm}^{-1}\text{cm}^2\text{mole}^{-1}$

52. In the linear packing arrangement in one dimension, the coordination number is ________.
(A) 1
(B) 2
(C) 3
(D) 4

53. The difference between heats of reaction at constant pressure and at constant volume for the reaction
$2C_6H_{6(l)} + 15O_{2(g)} \longrightarrow 12CO_{2(g)} + 6H_2O_{(l)}$
at 25°C in kJ is _______.
(A) – 7.43
(B) + 3.72
(C) – 3.72
(D) + 7.43

54. The atomic number of third member of the nitrogen family is _______.
(A) 23
(B) 15
(C) 33
(D) 43

55. An alkyl halide may be converted into an alcohol by _______.
(A) addition
(B) substitution
(C) dehydrohalogenation
(D) elimination

56. The drug which binds to receptor site and stops communication process of cell is called _______.
(A) antagonists
(B) agonists
(C) target
(D) enzyme

57. C_3H_9N represents _______.
(A) primary amine
(B) secondary amine
(C) tertiary amine
(D) all of these

58. Sugar dissolved in water is a type of _______ solution.
(A) solid in solid
(B) solid in gas
(C) solid in liquid
(D) gas in solid

59. Calculate standard free energy change for the reaction

$$\frac{1}{2}Cu(s) + \frac{1}{2}Cl_2(g) \rightleftharpoons \frac{1}{2}Cu^{2+} + Cl^-$$

taking place at 25 °C in a cell whose standard e.m.f. is 1.02 volts.

(A) – 98430 J   (B) 98430 J
(C) 96500 J   (D) – 49215 J

60. Which of the following metal is found exclusively in free state?

(A) Iron   (B) Platinum
(C) Aluminium   (D) Zinc

61. The formation of the complex ion $[Co(NH_3)_6]^{3+}$ involves the d^2sp^3 hybridization of Co^{3+} and so, the complex ion should have _______ geometry.

(A) an octahedral   (B) a tetrahedral
(C) a square-planar   (D) a triangular

62. If acetaldehyde is treated with Fehling's solution, the change that occurs in the system is _______.

(A) $Ag^+ \rightarrow Ag^\circ$ (B) $Cu+^2 \rightarrow Cu^\circ$
(C) $Cu^{+2} \rightarrow Cu^+$ (D) $Na^+ \rightarrow Na^\circ$

63. $CH_3CH_2OCH_2CH_2CH_3$ in IUPAC is known as _______.

(A) 1-Propoxyethane   (B) 1-Ethoxypropane
(C) 3-Ethoxypropane   (D) 3-Propoxyethane

64. Empirical formula of PAN is same as empirical formula of _______.

(A) vinyl chloride
(B) vinyl cyanide
(C) tetrafluoroethylene
(D) propylene

65. All of the following are diamagnetic materials EXCEPT _______.

(A) water   (B) NaCl
(C) benzene   (D) CuO

66. A gaseous hypothetical chemical equation $2A \rightleftharpoons 4B + C$ is carried out in a closed vessel. The concentration of B is found to increase by 5×10^{-3} mol L^{-1} in 10 second. The rate of appearance of B is _______.

(A) 5×10^{-4} mol L^{-1}sec^{-1}
(B) 5×10^{-5} mol L^{-1}sec^{-1}
(C) 6×10^{-5} mol L^{-1} sec^{-1}
(D) 4×10^{-4} mol L^{-1} sec^{-1}

67. The vapour pressure of pure solvent and solution are 120 mm Hg and 108 mm Hg respectively. The mole fraction of the solvent in the solution is _______.

(A) 0.1   (B) 0.9
(C) 1.2   (D) 1.08

68. Chemical reaction taking place at cathode is _______.

(A) reduction   (B) oxidation
(C) ionization   (D) dissociation

69. Tetragonal crystal system has the following unit cell dimensions:

(A) $a = b = c$ and $\alpha = \beta = \gamma = 90^\circ$
(B) $a = b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$
(C) $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$
(D) $a = b \neq c$ and $\alpha = \beta = 90^\circ, \gamma = 120^\circ$

70. $\left[Pt(NH_3)_4Cl_2\right]Br_2$ and $\left[Pt(NH_3)_4Br_2\right]Cl_2$ are related to each other as _______ isomers.

(A) optical   (B) coordination
(C) ionization   (D) linkage

71. Acetone reacts with iodine (I_2) to form iodoform, in the presence of _______.

(A) K_2SO_4 (B) NaOH
(C) $CaCO_3$ (D) $MgCO_3$

72. The oxidation state of oxygen in H_2O_2 is _______.

(A) +1   (B) 0
(C) –1   (D) –2

73. Which of the following property is NOT expected to be shown by copper?

(A) High thermal conductivity
(B) Low electrical conductivity
(C) Ductility
(D) Malleability

74. In thermodynamics, which one of the following is NOT an intensive property?

(A) Melting point   (B) Density
(C) Volume   (D) Temperature

75. The rate constant of a reaction has same units as the rate of reaction. The reaction is of _______.

(A) zero order   (B) first order
(C) second order   (D) none of these

76. The emf of the cell involving the cell reaction, $2Ag^+ + H_2 \rightleftharpoons 2Ag + 2H^+$ is 0.80 V. The standard oxidation potential of Ag electrode is _______.

(A) +0.80 V (B) –0.80 V
(C) +0.40 V (D) –0.40 V

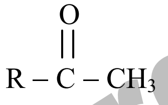
77. The molecular mass of acetic acid dissolved in water is 60 g/mol and when dissolved in benzene it is 120 g/mol. This difference in behaviour of CH_3 COOH is because _______.

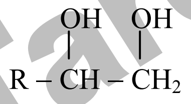
(A) acetic acid molecules associate to form dimers in benzene
(B) acetic acid does not fully dissolve in water
(C) acetic acid fully dissolves in benzene
(D) acetic acid molecules dissociates in benzene

78. Which of the following hydrogen halide is a low boiling liquid at 25 °C?

(A) Hydrogen iodide
(B) Hydrogen bromide
(C) Hydrogen chloride
(D) Hydrogen fluoride

79. Alkene $R - CH = CH_2$ reacts with B_2H_6 in the presence of dilute H_2O_2, to give _______.

(A) 
$R - \overset{\overset{O}{||}}{C} - CH_3$

(B) 
$R - \overset{\overset{OH}{|}}{C}H - \overset{\overset{OH}{|}}{C}H_2$

(C) $R - CH_2 - CHO$
(D) $R - CH_2 - CH_2 - OH$

80. Which pair of bases is present both in DNA and RNA?

(A) Adenine, uracil, thymine
(B) Adenine, guanine, cytosine
(C) Adenine, guanine, uracil
(D) Adenine, guanine, thymine

81. The IUPAC name of $Fe(CO)_5$ is _______.

(A) pentacarbonylferrate (0)
(B) pentacarbonylferrate (III)
(C) pentacarbonyliron (0)
(D) pentacarbonyliron (II)

82. The standard heats of formation for $CCl_{4(g)}$, $H_2O_{(g)}$, $CO_{2(g)}$ and $HCl_{(g)}$ are – 25.5, –57.8, – 94.1 and – 22.1 kcal, respectively. ΔH for the reaction $CCl_{4(g)} + 2H_2O_{(g)} \longrightarrow CO_{2(g)} + 4HCl_{(g)}$ at 298 K is _______.

(A) –265.8 kcal (B) –199.5 kcal
(C) –32.9 kcal (D) – 41.4 kcal

83. In which one of the following conversions, phosphorus pentachloride is used as a reagent?

(A) $H_2C = CH_2 \rightarrow CH_3CH_2Cl$
(B) $C_2H_6 \rightarrow C_2H_5Cl$
(C) $CH_3CH_2OH \rightarrow CH_3CH_2Cl$
(D) $C_6H_6 \rightarrow C_6H_5Cl$

84. Amine that CANNOT be prepared by Gabriel phthalimide synthesis is _______.

(A) Aniline (B) Benzylamine
(C) Methylamine (D) iso-Butylamine

85. The bond that undergoes cleavage in ethyl alcohol to give its acidic properties is _______.

(A) C – C (B) C – O
(C) C – H (D) O – H

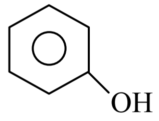
86. For a reversible spontaneous change, ΔS is______.

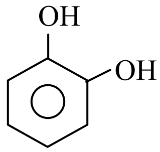
(A) $\frac{\Delta U}{T}$ (B) $\frac{P\Delta V}{T}$
(C) $\frac{q}{T}$ (D) $RT \log_e K$

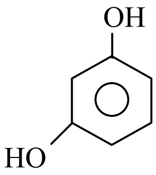
87. In hydrides of group 16 elements, the order of H–M–H bond angle is _______.
(where M = O, S, Se and Te)

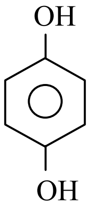
(A) $H_2O < H_2S < H_2Se < H_2Te$
(B) $H_2O > H_2S > H_2Se > H_2Te$
(C) $H_2O > H_2Se > H_2S > H_2Te$
(D) $H_2O < H_2Se < H_2S < H_2Te$

88. Which of the following is resorcinol?

(A) 

(B) 

(C) 

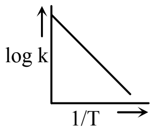
(D) 

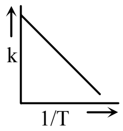
89. Ribose is an example of _______.
(A) ketohexose (B) aldopentose
(C) disaccharide (D) aldohexose

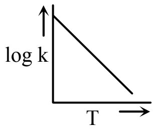
90. The number of possible optical isomers is given by the formula _______.
(A) 4^n (B) 3^n
(C) 1^n (D) 2^n

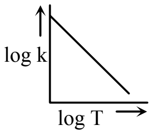
91. $C_6H_5CH_2Cl + KCN(alc) \rightarrow X + Y$
Compounds X and Y are _______.
(A) C_6H_6, KCl
(B) $C_6H_5CH_2CN$, KCl
(C) $C_6H_5CH_3$, KCl
(D) CH_3Cl, KCl

92. Which of the following plots is in accordance with the Arrhenius equation?

(A)


(B)


(C)


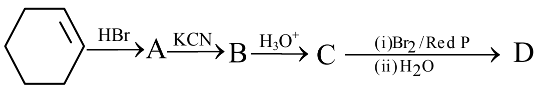
(D)


93. Which of the following belongs to the actinides series?
(A) Ce (B) Pu
(C) Ca (D) Cs

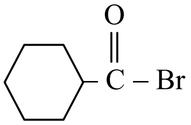
94. Which of the following statement is FALSE?
(A) Vapour phase nitration of higher alkanes involves substitution as well as C–C bond fissions.
(B) Liquid phase nitration yields large number of polynitro compounds.
(C) Temperature maintained during vapour phase nitration is about 423K to 698K.
(D) Methane on nitration gives nitromethane.

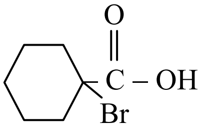
95. Which of the following is used in the preparation of chlorine by the oxidation of HCl?
(A) NaCl (B) $CaSO_4$
(C) $MnCl_2$ (D) PbO_2

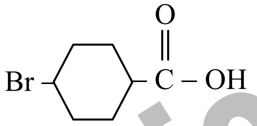
96. The general formula of aliphatic monocarboxylic acid is _______.
(A) $C_nH_{2n+1}COOH$
(B) $C_nH_{2n}O_2$
(C) $C_nH_{2n-2}COOH$
(D) Both (A) and (B)

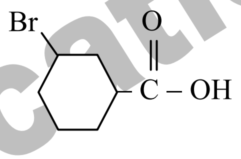
97.


Identify the compound 'D' in the above mentioned series of reactions.

(A)


(B)


(C)


(D)


98. Helium and oxygen mixture is used by deep sea divers instead of air because _______.
(A) helium less soluble in blood than nitrogen under high pressure
(B) helium is lighter than nitrogen
(C) helium is readily miscible in oxygen
(D) helium is less poisonous than nitrogen

99. In the preparation of $K_2Cr_2O_7$, sodium sulphate formed during conversion of sodium chromate to sodium dichromate, is removed by _______.
(A) crystallization and filteration
(B) dissolving it in water
(C) sublimation
(D) treating it with KCl

100. During preparation of diazonium salts, temperature is maintained at/between _______.
(A) 273 K – 278 K
(B) 373 K
(C) 413 K
(D) 523 K – 723 K

BIOLOGY:

101. Which of the following group of microbes can be used for SCP production?
(A) *Chlorella and Agrobacterium*
(B) *Spirulina, Chlorella and Methylophilus methylotrophus*
(C) *Pseudomonas and Streptococcus*
(D) *Streptococcus, Candida utilis and Staphylococcus*

102. Primary succession is the development of communities on
(A) newly exposed habitat.
(B) cleared forest area.
(C) freshly harvested crop field.
(D) pond filled after a dry season.

103. Chiropterophily is the process of pollination by
(A) Water (B) Bat
(C) Insect (D) Bird

104. In cattles, when red one is crossed with white, an intermediate roan coloured offspring is formed in F_1 generation. When selfing of F_1 generation was carried, the result obtained was
(A) 2 Red, 1 Roan, 1 White
(B) 1 Red, 2 Roan, 1 White
(C) 1 Red, 2 Roan, 2 White
(D) 1 Red, 1 Roan, 1 White

105. The central dogma of protein synthesis is
(A) $\text{DNA} \xrightarrow{\text{Translation}} \text{m} - \text{RNA} \xrightarrow{\text{Transcription}} \text{protein}$
(B) $\text{DNA} \xrightarrow{\text{Transcription}} \text{m-RNA} \xrightarrow{\text{Translation}} \text{protein}$
(C) $\text{RNA} \xrightarrow{\text{Replication}} \text{DNA} \xrightarrow{\text{Transcription}} \text{protein}$
(D) $\text{RNA} \xrightarrow{\text{Transcription}} \text{m-RNA} \xrightarrow{\text{Translation}} \text{Protein}$

106. Plant germplasm is represented by
(A) various plant propagules.
(B) living tissue from which new plants can be regenerated.
(C) plant cells containing germs of diseases.
(D) both (A) and (B)

107. The amount of water molecules required to form one molecule of glucose in a photosynthetic reaction is
(A) 6 (B) 10
(C) 1 (D) 12

108. Which one is a biofertilizer?
(A) NPK mixture.
(B) *Rhizobia* in legume roots.
(C) *Rhizobia* in farmyard manure.
(D) Green manure.

109. End products of an electron transport chain are
(A) H_2O + ATP
(B) CO_2 + ATP
(C) Pyruvic acid + CO_2
(D) Pyruvic acid + ATP

110. *Kalanchoe* produces adventitious buds on _______ for vegetative propagation.
(A) tuberous roots (B) stem tubers
(C) leaves (D) stolon

111. Role of bacteria in carbon cycle is
(A) breakdown of organic matter
(B) photosynthesis
(C) as reservoir
(D) chemosynthesis

112. What is the probability of production of dwarf offsprings in a cross between two heterozygous tall pea plants?
(A) Zero (B) 50%
(C) 25% (D) 100%

113. VAM is
(A) Vesicular Arbuscular Mycorrhiza
(B) Variable Adenine Mutation
(C) Variable Associative Mutualism
(D) Vitamins And Minerals

114. In a tissue culture technique, explant is
(A) plant collected after harvesting.
(B) diseased part of a plant.
(C) small part of the plant meant for tissue culture.
(D) uprooted plant for transplantation.

115. Which enzyme is responsible for ripening of tomatoes?
(A) β-galactosidase
(B) polygalactouranase
(C) transferase
(D) proteolase

116. Backbone of DNA molecule is formed by
(A) alternate sugar – PO_4 – sugar component joined by phosphodiester bond
(B) alternate sugar – PO_4 – sugar component joined by alternate glycosidic bond

(C) alternate sugar – PO_4 – sugar component joined by alternate peptide – sulphate bond
(D) polypeptide linkage

117. Polyblend developed by Ahmed Khan is
(A) a type of rubber.
(B) a type of cement.
(C) a fine powder of recycled and modified plastic.
(D) an artificial fibre.

118. In fertilization process, when male gametes are carried in a pollen tube it is called
(A) karyogamy (B) siphonogamy
(C) zooidogamy (D) plasmogamy

119. Glycolysis is
(A) 10 step enzymatic reaction leading to formation of five carbon pyruvate.
(B) 8 step enzymatic reaction leading to formation of four carbon pyruvate.
(C) 10 step enzymatic reaction leading to formation of three carbon pyruvate.
(D) 5 step enzymatic reaction leading to formation of three carbon pyruvate.

120. First carbohydrate formed in Calvin cycle is
(A) erythrose–4–phosphate
(B) sucrose
(C) glucose
(D) fructose 1, 6–diphosphate

121. Cross XXYy × xxYy yields XxYY:XxYy:Xxyy:xxyy offsprings in the ratio of
(A) 0 : 3 : 1 : 1 (B) 1 : 2 : 1 : 0
(C) 1 : 1 : 1 : 1 (D) 1 : 2 : 1 : 1

122. A treated sewage water has
(A) maximum BOD (B) moderate BOD
(C) low BOD (D) least BOD

123. Length of DNA of λ-phage is
(A) 10 kbp (B) 20 kbp
(C) 48.5 kbp (D) 55 kbp

124. The replication of DNA is brought out by an enzyme known as
(A) oxidase (B) reductase
(C) kinase (D) polymerase

125. Pollination by wind is called
(A) Geitonogamy
(B) Anemophily
(C) Autogamy
(D) None of the above

126. If fermentation is allowed to proceed in a closed vessel
(A) gas pressure will develop because of excess of oxygen.
(B) gas pressure will develop because of excess of carbon dioxide.
(C) vacuum will be created.
(D) no change will take place.

127. The pyramid that cannot be inverted in a stable ecosystem, is pyramid of
(A) number (B) energy
(C) biomass (D) all the above

128. Mendel crossed a pure white-flowered recessive pea plant with a dominant pure red-flowered plant. The first generation of hybrids from the cross should show
(A) 50% white-flowered and 50% red-flowered plants.
(B) All red-flowered plants.
(C) 75% red-flowered and 25% white-flowered plants.
(D) All white-flowered plants.

129. Which of the following is the last step of biogas production?
(A) Hydrolytic stage
(B) Acetogenic stage
(C) Methanogenic stage
(D) Aerobic stage

130. Chlorophyll is present
(A) on the outer membrane of chloroplasts.
(B) in the stroma of chloroplasts.
(C) in the grana of chloroplasts.
(D) throughout the chloroplasts.

131. If CO_2 is given out in respiration, why does the amount of CO_2 in the atmosphere remains relatively constant?
(A) Because CO_2 forms carbonate rocks.
(B) Because CO_2 is buffer.
(C) Because CO_2 is converted to carbohydrates in photosynthesis.
(D) Because CO_2 splits up during photosynthesis.

132. A purple coloured, non–photosynthetic phycobilin present in flower is
(A) phycocyanins (B) phycoerythrins
(C) anthocyanin (D) carotene

133. The study of inter-relationship between living organisms and their environment is called
(A) ecosystem (B) phytogeography
(C) ecology (D) phytosociology

134. An example of a naturally occurring parthenocarpic fruit is
(A) Guava (B) Mango
(C) Banana (D) Apple

135. Characters are determined by two or more gene pairs and they have additive or cumulative effect such genes are called
(A) polygenes (B) pleiotropic genes
(C) multiple alleles (D) incomplete genes

136. In a DNA molecule, which among the following pairs of nitrogen bases are represented correctly?
(A) $A = T, C = G$ (B) $A = T, C \equiv G$
(C) $A = C, T = G$ (D) $A = G, C = T$

137. In sunflower, self pollination is avoided by
(A) Protogyny (B) hydrophily
(C) Protandry (D) self incompatibility

138. Primers used in PCR technique are
(A) denatured DNA segments.
(B) synthetic oligonucleotides.
(C) amplified genes.
(D) restriction enzymes.

139. Okazaki fragments are formed in
(A) prokaryotes only (B) $3' \rightarrow 5'$ direction
(C) m-RNA (D) $5' \rightarrow 3'$ direction

140. In incomplete dominance, one could get 1 : 2 : 1 ratio in
(A) test cross (B) F_2 generation
(C) F_1 generation (D) R cross

141. A linear tetrad of 4 cells lying in an axial row is formed during the development of
(A) embryo sac (B) ovary
(C) pollen grains (D) ovule

142. The net gain of ATP from each molecule of $FADH_2$ is
(A) three (B) two
(C) eight (D) one

143. Light reaction of photosynthesis is dependent on dark reaction for
(A) ATP, $NADPH_2$ (B) sugar
(C) ADP, NADP (D) O_2

144. DNA replication in eukaryotes is
(A) continuous and conservative.
(B) continuous and semi conservative.
(C) discontinuous and semi conservative.
(D) continuous and dispersive.

145. When both the parents are of blood group AB, children would be of blood group
(A) A, B, AB and O (B) A, B and AB
(C) A and B (D) A, AB and O

146. Match Column – I with Column – II and select the correct option from the codes given below.

	Column – I		**Column – II**
a.	Griffith	i.	Lac operon
b.	Hershey and Chase	ii.	Semi-conservative DNA replication
c.	Messelson and Stahl	iii.	Transduction
d.	Jacob and Monod	iv.	Transformation

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

147. Microsporogenesis is a synonym for
(A) Spermatogenesis.
(B) Formation of pollen.
(C) Formation of megaspore.
(D) Development of female gametophyte.

148. Temporary suspension of growth is called
(A) dormancy (B) viability
(C) dispersal (D) dessication

149. m-RNA is called as messenger RNA because
(A) it carries information for protein synthesis from DNA to ribosomes.
(B) it carries information for DNA replication.
(C) it carries information for synthesis of fatty acids.
(D) Both (B) and (C).

150. *Lactobacillus* mediated conversion of milk to curd results because of
(A) Coagulation and partial digestion of milk fats.
(B) Coagulation and partial digestion of milk proteins.
(C) Coagulation of milk proteins and complete digestion of milk fats.
(D) Coagulation of milk fats and complete digestion of milk proteins.

151. The term 'evolution' in biology means that
(A) fossils are old
(B) life began in sea
(C) living things constantly change
(D) man descended from apes

152. The fertilized egg divides by the process of
(A) regeneration (B) oogenesis
(C) cleavage (D) invagination

153. Which one of the following insect produces honey?
(A) *Herpedon* (B) *Apis indica*
(C) *Tacchardia lacca* (D) *Bombyx mori*

154. The inheritance or transmission of characters from one generation to next is called
(A) variation (B) transformation
(C) heredity (D) genetics

155. Calcitonin lowers the calcium level in the blood. This is secreted by
(A) parathyroid (B) hypothalamus
(C) adrenal (D) thyroid

156. VNTR is
(A) Variable Number of Thymine Repeats
(B) Variable Number of Transcription repeats
(C) Variable Number of Tandem repeats
(D) Variable Nucleotide of Tandem repeats

157. Passive immunity can be obtained by injecting
(A) antibodies (B) antigens
(C) antibiotics (D) vaccination

158. Blood is
(A) not a tissue
(B) a tissue
(C) a liquid connective tissue
(D) a liquid ground tissue

159. The main nitrogenous waste of *Hydra* is
(A) ammonia only. (B) urea only.
(C) uric acid only. (D) both (A) and (C)

160. Gemmule formation in sponges is helpful in
(A) parthenogenesis
(B) sexual reproduction
(C) only dissemination
(D) asexual reproduction

161. _______ has adapted for arboreal adaptation.
(A) Camel (B) Monkey
(C) *Labeo* (D) Pigeon

162. The ventricles of the brain are filled with
(A) Cerebrospinal fluid
(B) Lymph
(C) Blood
(D) Amniotic fluid

163. Coacervates
(A) are colloid droplets
(B) contain nucleoprotein
(C) are both (A) and (B)
(D) protobiont

164. To ensure effectiveness of reproduction in mammals, which of the following is important?
(A) Formation of yolk sac
(B) Retention of yolk sac
(C) Reduced number of egg
(D) Formation of placenta

165. Tendency of genes to get inherited together is called
(A) differential inheritance
(B) pleotropism
(C) linkage
(D) cumulative inheritance

166. Amniocentesis is a process to
(A) determine any disease in heart
(B) determine any hereditary disease in the embryo
(C) know about the disease of brain
(D) all of these

167. A person with antigen 'B' on RBCs and antibody 'a' in the plasma belongs to the blood group
(A) A (B) B
(C) AB (D) O

168. Neutrophils serve as
(A) mopping up (B) histocytes
(C) macrophages (D) shock troops

169. Loop of Henle is meant for absorption of
(A) potassium (B) glucose
(C) water (D) CO_2

170. Cauda epididymis leads to
(A) vas efferens (B) vas deferens
(C) ejaculatory duct (D) rete testis

171. If the strong partner is benefitted and the weak partner is damaged, it is known as
(A) amensalism (B) symbiosis
(C) predation (D) allotrophy

172. _______ nerve is also called as Dentists nerve.
(A) hypoglossal (B) trigeminal
(C) glossopharyngeal (D) olfactory

173. Homologous organs are similar in
(A) structure (B) function
(C) development (D) behaviour

174. Which method of animal breeding was used to develop Hisardale?
(A) Out-crossing
(B) Cross-breeding
(C) Out-breeding
(D) Interspecific hybridization

175. Haemophilic man marries a normal woman. Their offsprings will be
(A) all girls haemophilic
(B) all normal
(C) all haemophilic
(D) all boys haemophilic

176. Insulin extracted and purified from the pancreas of cattle and pigs functions well in the human body because
(A) the chemical structure of insulin in these animals is only slightly different from human insulin.
(B) the structure of cells of pancreas of these animals and human are same.
(C) both (A) and (B)
(D) none of these

177. Oocyst of malarial parasite is produced in
(A) human erythrocytes
(B) human liver cells
(C) stomach wall of mosquito
(D) salivary glands of mosquito

178. Human heart is enclosed in a double walled sac called
(A) Peritome (B) Pericardium
(C) Pericardial sinus (D) Perineural sinus

179. The vessel leading blood (containing nitrogenous waste) into the Bowman's capsule is known as
(A) afferent arteriole (B) efferent arteriole
(C) renal artery (D) renal vein

180. Fimbriated funnel is
(A) Proximal part of oviduct
(B) Uterus part
(C) Urinary bladder part
(D) Ureter part

181. In 1984, the Bhopal gas tragedy took place because methyl isocyanate
(A) reacted with CO_2.
(B) reacted with water.
(C) reacted with DDT.
(D) reacted with ammonia.

182. Acetylcholine is a/an
(A) chemical messenger.
(B) chemical transmitter across the synapse.
(C) antistress hormone.
(D) digestive enzyme.

183. Hardy-Weinberg principle explains
(A) chromosomal aberration
(B) genetic drift
(C) genetic equilibrium
(D) all of these

184. Turner's syndrome in humans is caused by
(A) Autosomal aneuploidy
(B) Sex chromosome non-disjunction
(C) Polyploidy
(D) Point mutation

185. Cancer is related to
(A) uncontrolled growth of tissues
(B) non-malignant tumor
(C) controlled division of tissues
(D) none of these

186. Endocrine glands
(A) do not possess ducts.
(B) sometimes do not have ducts.
(C) pour their secretion into blood through ducts.
(D) always have ducts.

187. Circulation in humans is
(A) pulmonary circulation
(B) systemic circulation
(C) single circulation
(D) double circulation

188. Acute kidney injury (AKI) is characterized by
(A) anuria (B) polyuria
(C) oliguria (D) proteinuria

189. Prepuberal period refers to a stage of
(A) growth, enlargement of organ systems and maturation of reproductive mechanisms
(B) initiation of gonads
(C) initiation of organs
(D) maturation of gonads alone

190. Odd pollutant amongst the following is
(A) SO_2 (B) CO_2
(C) CO (D) Acid rain

191. Tree of life is
(A) Arbor vitae (B) Pons varolii
(C) Origin of corti (D) Diencephalon

192. Connecting link between ape and man is
    (A) Cro Magnon Man
    (B) *Australopithecus*
    (C) Neanderthal Man
    (D) Lemur

193. Chemically, Heroin is called
    (A) diethylamides (B) dopamine
    (C) diacetylmorphine (D) ethylamide

194. Anginal pain usually starts in the centre of the chest and spreads
    (A) towards lower abdomen
    (B) down the left hind limb
    (C) down the left arm
    (D) down the right arm

195. The placenta is fully formed by the end of the _______ month and lasts throughout pregnancy.
    (A) 1st (B) 2nd
    (C) 3rd (D) 4th

196. Recent reports of acid rain in some industrial cities are due to the effect of atmospheric pollution by
    (A) excessive release of CO_2 by burning of fuels like wood and charcoal, cutting of forests and increased animal population.
    (B) excessive release of NO_2 and SO_2 in atmosphere by burning of fossil fuels.
    (C) excessive release of NH_3 by industrial plants and coal gas.
    (D) excessive release of CO in atmosphere by incomplete combustion of coke, charcoal and other carbonaceous fuel in paucity of oxygen.

197. Viability of human egg is
    (A) 10-12 hrs (B) 15-18 hrs
    (C) 20-25 hrs (D) 24-48 hrs

198. Olfactoreceptors are
    (A) touch receptors
    (B) pain receptors
    (C) smell receptors
    (D) pressure receptors

199. ‘Inland fisheries’ is referred to as
    (A) culturing fish in fresh water
    (B) trapping and capturing fishes from sea coast
    (C) deep sea fishing
    (D) extraction of oil from fishes

200. An immediate impact of HGP was
    (A) identification of genes associated with human diseases.
    (B) development of new strategies for disease detection.
    (C) development of innovative therapies for treatment of disease.
    (D) all of the above

ANSWER KEYS

TO

MODEL TEST PAPERS

Model Test Paper - 01

1. (C)	2. (D)	3. (C)	4. (D)	5. (A)	6. (B)	7. (A)	8. (A)	9. (C)	10. (A)
11. (C)	12. (B)	13. (D)	14. (D)	15. (D)	16. (D)	17. (B)	18. (B)	19. (B)	20. (B)
21. (B)	22. (A)	23. (D)	24. (C)	25. (C)	26. (D)	27. (D)	28. (B)	29. (A)	30. (B)
31. (C)	32. (B)	33. (B)	34. (C)	35. (D)	36. (D)	37. (A)	38. (A)	39. (A)	40. (C)
41. (B)	42. (B)	43. (B)	44. (A)	45. (D)	46. (C)	47. (B)	48. (C)	49. (B)	50 (A)
51. (A)	52. (B)	53. (A)	54. (C)	55. (B)	56. (A)	57. (D)	58. (C)	59. (A)	60. (B)
61. (A)	62. (C)	63. (B)	64. (B)	65. (D)	66. (A)	67. (B)	68. (A)	69. (B)	70. (C)
71. (B)	72. (C)	73. (B)	74. (C)	75. (A)	76. (B)	77. (A)	78. (D)	79. (D)	80. (B)
81. (C)	82. (D)	83. (C)	84. (A)	85. (D)	86. (C)	87. (B)	88. (C)	89 (B)	90. (D)
91. (B)	92. (A)	93. (B)	94. (D)	95. (D)	96. (D)	97. (B)	98. (A)	99. (A)	100. (A)
101. (B)	102. (A)	103. (B)	104. (B)	105. (B)	106. (D)	107. (D)	108. (B)	109. (A)	110. (C)
111. (A)	112. (C)	113. (A)	114. (C)	115. (B)	116. (A)	117. (C)	118. (B)	119. (C)	120. (D)
121. (B)	122. (D)	123. (C)	124. (D)	125. (B)	126. (B)	127. (B)	128. (B)	129. (C)	130. (C)
131. (C)	132. (C)	133. (C)	134. (C)	135. (A)	136. (B)	137. (C)	138. (B)	139. (D)	140. (B)
141. (A)	142. (B)	143. (C)	144. (C)	145. (B)	146. (A)	147. (B)	148. (A)	149. (A)	150. (B)
151. (C)	152. (C)	153. (B)	154. (C)	155. (D)	156. (C)	157. (A)	158. (C)	159. (A)	160. (D)
161. (B)	162. (A)	163. (C)	164. (D)	165. (C)	166. (B)	167. (B)	168. (C)	169. (C)	170. (B)
171. (C)	172. (B)	173. (A)	174. (B)	175. (B)	176. (A)	177. (C)	178. (B)	179. (A)	180. (A)
181. (B)	182. (B)	183. (C)	184. (B)	185. (A)	186. (A)	187. (D)	188. (C)	189. (A)	190. (D)
191. (A)	192. (B)	193. (C)	194. (C)	195. (C)	196. (B)	197. (D)	198. (C)	199. (A)	200. (D)

Model Test Paper - 02

1. (A)	2. (A)	3. (D)	4. (D)	5. (A)	6. (D)	7. (B)	8. (A)	9. (D)	10. (D)
11. (C)	12. (A)	13. (B)	14. (B)	15. (B)	16. (B)	17. (A)	18. (B)	19. (D)	20. (B)
21. (A)	22. (C)	23. (D)	24. (D)	25. (D)	26. (A)	27. (C)	28. (D)	29. (C)	30. (C)
31. (A)	32. (B)	33. (A)	34. (D)	35. (B)	36. (B)	37. (C)	38. (C)	39. (A)	40. (B)
41. (C)	42. (B)	43. (C)	44. (A)	45. (C)	46. (A)	47. (D)	48. (B)	49. (B)	50. (B)
51. (A)	52. (D)	53. (A)	54. (D)	55. (A)	56. (B)	57. (C)	58. (A)	59. (A)	60. (D)
61. (D)	62. (D)	63. (B)	64. (D)	65. (A)	66. (C)	67. (D)	68. (B)	69. (B)	70. (C)
71. (A)	72. (A)	73. (B)	74. (D)	75. (A)	76. (A)	77. (B)	78. (C)	79. (C)	80. (A)
81. (A)	82. (D)	83. (C)	84. (D)	85. (B)	86. (A)	87. (C)	88. (C)	89. (D)	90. (C)
91. (C)	92. (B)	93. (B)	94. (B)	95. (B)	96. (C)	97. (A)	98. (B)	99. (B)	100. (C)
101. (D)	102. (C)	103. (C)	104. (D)	105. (B)	106. (B)	107. (D)	108. (B)	109. (A)	110. (D)
111. (C)	112. (A)	113. (D)	114. (B)	115. (D)	116. (D)	117. (C)	118. (B)	119. (A)	120. (B)
121. (C)	122. (B)	123. (C)	124. (A)	125. (A)	126. (B)	127. (A)	128. (B)	129. (C)	130. (A)
131. (B)	132. (B)	133. (C)	134. (C)	135. (B)	136. (A)	137. (B)	138. (B)	139. (C)	140. (C)
141. (B)	142. (D)	143. (B)	144. (D)	145. (A)	146. (D)	147. (D)	148. (A)	149. (A)	150. (B)
151. (B)	152. (C)	153. (A)	154. (D)	155. (C)	156. (B)	157. (C)	158. (D)	159. (D)	160. (A)
161. (A)	162. (A)	163. (B)	164. (C)	165. (B)	166. (A)	167. (D)	168. (A)	169. (D)	170. (A)
171. (A)	172. (B)	173. (C)	174. (C)	175. (D)	176. (C)	177. (A)	178. (D)	179. (B)	180. (B)
181. (B)	182. (A)	183. (C)	184. (B)	185. (D)	186. (A)	187. (B)	188. (C)	189. (D)	190. (D)
191. (B)	192. (C)	193. (A)	194. (B)	195. (B)	196. (A)	197. (A)	198. (B)	199. (B)	200. (C)

HINTS

TO

MODEL TEST PAPERS

32. Due to decrease in surface area, there is decrease in surface energy. So, energy is evolved.

33. For a black body, rate of energy radiation

$$\frac{Q}{t} = P = A\sigma T^4 \quad \text{or} \quad P \propto T^4$$

$$\therefore \quad \frac{P_1}{P_2} = \left(\frac{T_1}{T_2}\right)^4 = \left\{\frac{(273+7)}{(273+287)}\right\}^4 = \frac{1}{16}$$

$$\therefore \quad P_2 = 16P_1$$

35. $\text{T.N.E.I} = \sum q_i$

36. $I_C = \frac{90}{100} \times I_E \Rightarrow 10 = 0.9 \times I_E$

$$\therefore \quad I_E = \frac{10}{0.9} = 11 \text{ mA}$$

Also $I_E = I_B + I_C \Rightarrow I_B = 11 - 10 = 1$ mA.

37. The tension in the string is largest and equal to $\frac{mv^2}{r}$ + mg at the bottom.

38. $E = E_0 \sin \omega t$ and $E_0 = 300$ V

$$I_0 = \frac{E_0}{R} = \frac{300}{100} = 3 \text{ A}$$

From formula,

$$I_{rms} = \frac{3}{\sqrt{2}} = \frac{3\sqrt{2}}{2} = 1.5 \times \sqrt{2} = 1.5 \times 1.414$$

$$\therefore \quad I_{rms} = 2.121 \text{ A}$$

39. Original dimensions of objects are different. Also, change in their dimensions may not be same. This results into different strain caused in the objects after the same force is applied.

41. $(K.E.)_A = h\nu - \phi_1$

$(K.E.)_B = h\nu - \phi_2$

As $\phi_1 > \phi_2 \Rightarrow (K.E.)_A < (K.E.)_B$

42. According to Kirchhoff's law,

$$i_{CD} = i_2 + i_3$$

43. Orbital speed, $v_0 = \sqrt{\frac{GM}{r}}$; so speed of satellite decreases with the increase in the radius of its orbit. We need more than one satellite for global communication. For stable orbit it must pass through the centre of earth. So only (B) is correct.

44. $$\frac{1}{\lambda_{\text{Balmer}}} = R_H\left[\frac{1}{2^2} - \frac{1}{3^2}\right] = \frac{5R_H}{36}$$

$$\therefore \quad \frac{1}{\lambda_{\text{Lyman}}} = R_H\left[\frac{1}{1^2} - \frac{1}{2^2}\right] = \frac{3R_H}{4}$$

$$\therefore \quad \lambda_{\text{Lyman}} = \lambda_{\text{Balmer}} \times \frac{5}{27} = 1215.4 \text{ Å}$$

45. In the presence of thin glass plate, the fringe pattern shifts, without any change in fringe width.

46. From Ampere circuital law, $\oint_c \vec{B}.\ \overline{dl} = \mu_0 I$

where I is the current enclosed by circuit.

47. M.I. of thin rod $I_1 = ML^2/12$ .....(i)

M.I. of ring $I_2 = MR^2$ .....(ii)

The rod is bend to form a ring, $L = 2\pi R$

From equation (i) and equation (ii) we get,

$$\frac{I_1}{I_2} = \frac{ML^2}{12} \times \frac{1}{MR^2}$$

$$= \frac{M(2\pi R)^2}{12} \times \frac{1}{MR^2} = \frac{4M\pi^2R^2}{12MR^2} = \frac{\pi^2}{3}$$

49. $\text{P.E.} = \frac{1}{2} m\omega^2 x^2 = 2.5$ J

As $x = \frac{A}{2}$

$$\frac{1}{2} m\omega^2 \left(\frac{A}{2}\right)^2 = 2.5$$

$$\therefore \quad \frac{1}{2} m\omega^2 \frac{A^2}{4} = 2.5 \qquad \therefore \quad \frac{1}{2} m\omega^2 A^2 = 10 \text{ J}$$

Total energy of system = $\frac{1}{2} m\omega^2 A^2 = 10$ J

50 $B = \frac{\mu_0}{2\pi}\frac{I}{r} \qquad \therefore \quad 5 \times 10^{-5} = \frac{\mu_0}{2\pi} \times \frac{\pi}{r}$

$$\therefore \quad r = 10^4 \mu_0 \text{ metre}$$

51. $$\wedge = \frac{k \times 1000}{C} = \frac{6.3 \times 10^{-2} \text{ohm}^{-1}\text{cm}^{-1}}{0.1 \text{mol}/1000 \text{cm}^3}$$

$$= \frac{6.3 \times 10^{-2} \text{ohm}^{-1} \text{cm}^{-1} \times 1000 \text{cm}^3}{0.1 \text{mole}}$$

$$= 630 \text{ ohm}^{-1} \text{ cm}^2 \text{ mole}^{-1}$$

53. $\Delta H - \Delta U = \Delta nRT = -3 \times 8.314 \times 298$

$$= -7432 \text{ J} = -7.43 \text{ kJ}$$

54. The atomic number of third member of the nitrogen family is 33 which represents arsenic. (i.e., 7 + 8 + 18 = 33)

Model Test Paper -

1. $F = T \times (2\pi r_1 + 2\pi r_2)$
$= T \times 2\pi \times (1.75 + 2.25) \times 10^{-2}$
$= 0.074 \times 2 \times 3.14 \times 4 \times 10^{-2}$
$= 1.86 \times 10^{-2}$ N

3. Resonant frequency $= \frac{1}{2\pi\sqrt{LC}}$ does not depend on resistance.

6. $I = \frac{2}{R+10}$
∴ $V = I R_{AB} = \frac{2}{R+10} \times 10 = \frac{20}{R+10}$
∴ $\frac{V}{L} = \frac{20}{(R+10)} = \frac{20}{R+10}$
$E_1 = l\left(\frac{V}{L}\right)$
∴ $10 \times 10^{-3} = 0.4\left(\frac{20}{R+10}\right)$
∴ $R + 10 = \frac{8}{10^{-2}} = 800$
∴ $R = 790\ \Omega$.

8. If we increase the series resistance, range of voltmeter is increased.

9. MI of sphere about the diameter $= \frac{2}{5}MR^2$
i.e. $\frac{2}{5}MR^2 = 20$ or $MR^2 = 50$
M.I. about the tangent (acc. to theorem of ∥ axis)
$= \frac{2}{5}MR^2 + MR^2 = \frac{7}{5}MR^2 = \frac{7}{5} \times 50 = 70$ kg–m^2

10. $d\theta = \frac{1.22\lambda}{d} = \frac{1.22 \times 5 \times 10^{-7}}{1} = 61 \times 10^{-8}$ rad
∴ $d\theta = 61 \times \frac{180 \times 60 \times 60}{3.14} \times 10^{-8}$ s ≈ 0.13 s

14. $l = 45 = 5 \times 9$
$l' = 99 = 11 \times 9$
So other lengths between these values are,
$l_1 = 7 \times 9 = 63$ cm
$l_2 = 9 \times 9 = 81$ cm
So fundamental length is 9 cm.
∴ $9 = \frac{\lambda}{4}$
∴ $\lambda = 9 \times 4 = 36$ cm.

15. $\mu = \tan i_P \Rightarrow i_P = \tan^{-1} n$

18. The average kinetic energy, $K = \frac{3}{2}kT$
∴ $K \propto T$
∴ $\frac{K_1}{K_2} = \frac{T_1}{T_2} = \frac{T}{\frac{T}{2}} = \frac{2}{1}$
∴ $K_1 : K_2 = 2 : 1$

20. $y = y_0 \sin 2\pi\left(ft - \frac{x}{\lambda}\right)$
∴ $\frac{dy}{dt} = y_0\, 2\pi f \cos 2\pi\left(ft - \frac{x}{\lambda}\right)$
∴ $\left|\frac{dy}{dt}\right|_{max} = y_0\, 2\pi f$
∵ Wave velocity $= f\lambda$
According to the given condition, $y_0\, 2\pi f = 4f\lambda$
∴ $\lambda = \frac{\pi y_0}{2}$

21. According to law of conservation of angular momentum; $mv_A \times OA = mv_B \times OB$;
∴ $v_B / v_A = OA / OB = x$

23. $F = Ma = M\omega^2 x = M\omega^2 A \sin \omega t$
Hence graph between F and t is a sine curve.

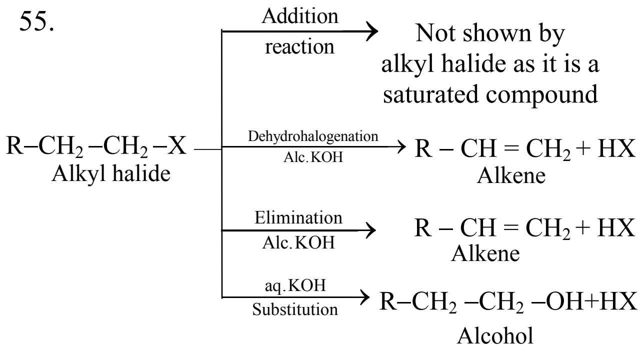
24. Total charge $Q = Q_1 + Q_2$
$= C_1V_1 + C_2V_2$
$= 2 \times 10^{-6} \times 100 + 6 \times 10^{-6} \times 300$
$= 200 \times 10^{-6} + 1800 \times 10^{-6}$
$= 2000 \times 10^{-6}$ C $= 20 \times 10^{-4}$ C.

28. Photoelectric current ∝ Intensity.

30. $g' = g\left(1 - \frac{h}{R}\right)$ As $h = \frac{R}{2} \Rightarrow \frac{h}{R} = \frac{1}{2}$
$g' = g\left(\frac{1}{2}\right)$
$\Rightarrow W' = mg' = mg\left(\frac{1}{2}\right) = 40\left(\frac{1}{2}\right) = 20$ kg-wt.

31. $\frac{E_A}{E_B} = 2,\ l_A = l_B$
$F_A = F_B$
$\Rightarrow E_A \cdot \frac{F_A}{\text{Area}} \times \frac{\Delta l_A}{l_A} = E_B \cdot \frac{F_B}{\text{Area}} \times \frac{\Delta l_B}{l_B}$
$\Rightarrow \frac{\Delta l_B}{\Delta l_A} = \frac{E_A}{E_B} = 2:1$

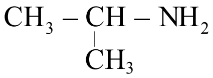
55.



57. C_3H_9N can form all the three types viz., primary, secondary and tertiary aliphatic amines.

$CH_3–CH_2–CH_2–NH_2$

n-Propylamine or
Propan-1-amine
(Primary amine)

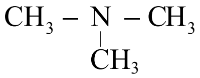


$CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - NH_2$

sec-Propylamine or
Isopropylamine or
Propan-2-amine
(Primary amine)

$CH_3–CH_2–NH–CH_3$

Ethylmethylamine or
N-Methylethanamine
(Secondary amine)



$CH_3 - \underset{\displaystyle CH_3}{\underset{|}{N}} - CH_3$

Trimethylamine or
N,N-Dimethylmethanamine
(Tertiary amine)

58. The physical state of the solute i.e., sugar is solid and that of the solvent i.e., water is liquid. Hence, sugar dissolved in water is a type of solid in liquid solution.

59. $\Delta G° = –nFE° = – 1×96500 ×1.02 = – 98430$ J.

60. Metals which are not highly reactive towards air, water, carbon dioxide and non-metals occur in free or native state. Examples of such metals include, gold and platinum which occur exclusively in their native state. Whereas metals like iron, aluminium and zinc occur in the combined form.

61. The geometry of the complex ion and the type of hybridisation are as given below:

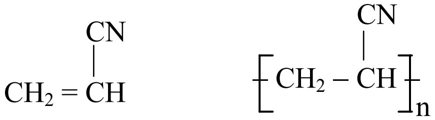
Geometry	Type of hybridisation
Triangular	sp^2
Square planar	dsp^2
Tetrahedral	sp^3
Octahedral	d^2sp^3

63. The general form of the IUPAC name of ether is alkoxyalkane where the alkyl with larger number of carbons is considered as parent.

$$C_2H_5 – O – \overset{1}{C}H_2 – \overset{2}{C}H_2 – \overset{3}{C}H_3$$

∴ 1–Ethoxypropane is the IUPAC name.

64. All the atoms of monomer vinyl cyanide are present in the addition polymer PAN, hence they both have the same empirical formula.



$CH_2 = \overset{\displaystyle CN}{\overset{|}{C}H}$ $\left[CH_2 - \overset{\displaystyle CN}{\overset{|}{C}H} \right]_n$

Vinyl cyanide

Poly acrylonitrile (PAN)

Empirical formula: C_3H_3N Empirical formula: C_3H_3N

65. CuO contains unpaired electrons. Hence, it is paramagnetic. In water, NaCl and benzene, electrons are paired. Hence they are diamagnetic.

66. Increase in concentration of B
$= 5\times10^{-3}\,\text{mol L}^{-1}$; Time $= 10$ sec

Rate of appearance of B

$$= \frac{\text{Increase in the concentration of B}}{\text{Time taken}}$$

$$= \frac{5\times10^{-3}\,\text{mol L}^{-1}}{10\text{ sec}} = 5\times10^{-4}\,\text{mol L}^{-1}\text{ sec}^{-1}$$

67. The vapour pressure of pure solvent $= p_1^o = 120$ mm Hg

The vapour pressure of solution $= p = 108$ mm Hg

Mole fraction of solute $= x_2$

According to Raout's law, $\frac{p_1^o - p}{p_1^o} = x_2$

$$\frac{120-108}{120} = x_2 = 0.1$$

Mole fraction of solvent $= 1– x_2 = 1– 0.1 = 0.9$

69. Tetragonal system has the unit cell dimensions $a = b \neq c, \alpha = \beta = \gamma = 90°$.

70. Both $\left[Pt(NH_3)_4Cl_2\right]Br_2$ and $\left[Pt(NH_3)_4Br_2\right]Cl_2$ have same formula but give different ions in the solution. Hence, they are ionization isomers.

73. Copper is a good conductor of electricity, because it is a transition element and contains unpaired electrons. Hence, copper shows high electrical conductivity.

74. Melting point, density and temperature are intensive properties as their magnitudes are independent of the amount of matter present in the system while volume is an extensive property as its magnitude depends on the amount of matter present in the system.

75. For a zero order reaction, the rate law is

$$\text{rate} = k\,[A]^0 = k = -\frac{d[A]}{dt}$$

Hence for zero order reaction, the units of the rate constant and the rate of the reaction are same.

76. In the above cell, silver undergoes reduction and hydrogen undergoes oxidation.

$$\therefore \quad E^0_{\text{cell}} = E^0_{\text{oxi}} + E^0_{\text{red}}$$

$$0.80 = E^0_{H_2|H^+_{\text{oxi}}} + E^0_{Ag^+|Ag}$$

$$\therefore \quad 0.80 = 0.0 + E^0_{Ag^+|Ag}$$

$$\because \quad E^0_{H_2|H^+} = 0.0 \text{ V} \qquad \therefore \quad E^0_{Ag^+|Ag} = 0.80 \text{ V}$$

$$\therefore \quad E^0_{Ag/Ag^+} = -0.80 \text{ V}$$

77. The molecular mass of monomer of acetic acid is 60 g/mol. The molecular mass of dimer of acetic acid is 120 g/mol. In water, only monomer is present. In benzene, association of two monomers of acetic acid through hydrogen bonding results in formation of a dimer.

79.

$$\underset{\text{Alkene}}{6R{-}CH = CH_2} + \underset{\text{Diborane}}{B_2H_6} \longrightarrow \underset{\text{Trialkylborane}}{2(R{-}CH_2 - CH_2)_3B}$$

$$\underset{\text{Trialkylborane}}{(R - CH_2 - CH_2)_3B} + 3H_2O_2 \xrightarrow{OH^-} \underset{\text{Alcohol}}{3R - CH_2 - CH_2OH} + B(OH)_3$$

82. At 298 K, ΔH is ΔH^0, i.e. standard heat of formation

For, $CCl_{4(g)} + 2H_2O_{(g)} \longrightarrow CO_{2(g)} + 4HCl_{(g)}$, $\Delta H^0 = ?$

$$\Delta H^0_{\text{Reaction}} = \Delta H^0_{\text{Products}} - \Delta H^0_{\text{Reactants}}$$

$$= \Delta H^0_{f_{CO_2}} + 4 \times \Delta H^0_{f_{HCl}} - \Delta H^0_{f_{CCl_4}} - 2 \times \Delta H^0_{f_{H_2O}}$$

$$= -94.1 + 4 \times (-22.1) - (-25.5) - 2 \times (-57.8)$$

$$= -41.4 \text{ kcal}$$

83.

$$\underset{\text{Ethyl alcohol}}{CH_3 - CH_2 - OH} + PCl_5 \xrightarrow{\Delta} \underset{\text{Ethyl chloride}}{CH_3 - CH_2 - Cl} + \underset{\text{Phosphorus oxychloride}}{POCl_3} + HCl$$

84. By Gabriel phthalimide method only primary aliphatic amine can be prepared but aniline is aromatic amine.

87. In hydrides, the central atom is sp^3 hybridized which results in angular structure. The order of H–M–H bond angle is:

$$\underset{104.5^\circ}{H_2O} > \underset{92.1^\circ}{H_2S} > \underset{91^\circ}{H_2Se} > \underset{90^\circ}{H_2Te}$$

On moving down the group, the atomic size increases and the electronegativity decreases. The electron density around central atom decreases and the repulsion between the electron pair decreases, thus resulting in the decrease in the bond angle.

89. Ribose is a five carbon monosaccharide containing an aldehydic group. Thus, it is an aldopentose.

91.

$$\underset{\text{Benzyl chloride}}{C_6H_5 - CH_2{-}Cl} + \underset{\text{(alc)}}{KCN} \longrightarrow \underset{\text{Benzyl cyanide}}{C_6H_5 - CH_2 - C \equiv N} + KCl$$

92. Arrhenius equation is $\log k = \log A - \dfrac{E_a}{2.303\,RT}$.

When log k is plotted against $\dfrac{1}{T}$, a straight line with negative slope is obtained.

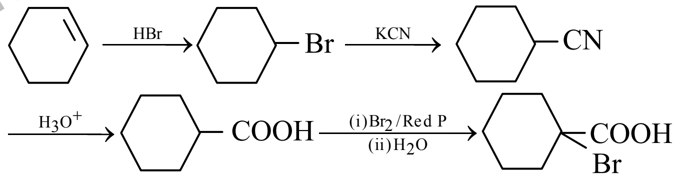
93. Ce-lanthanide, Cs-alkali metal, Pu-actinide, Ca-alkaline earth metal.

94. Methane does not undergo nitration.

95. PbO_2 reacts with HCl to give chlorine.

$$\underset{\text{Lead dioxide}}{PbO_2} + \underset{\text{Hydrochloric acid}}{4HCl} \longrightarrow \underset{\text{Lead dichloride}}{PbCl_2} + \underset{\text{Chlorine}}{Cl_2} + \underset{\text{Water}}{2H_2O}$$

97.



98. A mixture of helium and oxygen is used for the respiration in deep sea diving instead of air because helium is less soluble in the blood than nitrogen under high pressure.

99. In the preparation of $K_2Cr_2O_7$, aqueous solution containing $Na_2Cr_2O_7$ and Na_2SO_4 is concentrated. Na_2SO_4 having lower solubility crystallizes out and further the crystals of Na_2SO_4 are removed by filteration.

100. Aromatic diazonium salts are somewhat stable at low temperature and hence, during their preparation cold conditions are required. During preparation of diazonium salts, temperature is maintained at/between 273 K – 278 K.

104. P generation: RR (Red) × WW (White)

Gametes: (R) (W)

F_1 generation: RW(Roan)

F_2 generation: RW × RW

♀ ♂	R	W
R	RR (red)	RW (roan)
W	RW (roan)	WW (white)

Phenotypic ratio: 1 Red : 2 Roan : 1 White
Genotypic ratio : RR : RW : WW
1 : 2 : 1

105. Central dogma of molecular biology proposes unidirectional or one way flow of information from DNA to RNA and from RNA to protein.

107. Summary of photosynthesis is

$$6CO_2 + 12H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} C_6H_{12}O_6 + 6O_2\uparrow + 6H_2O$$

12 molecules of water are required to form one molecule of glucose during photosynthesis.

108. *Rhizobia* are the nitrogen fixing bacteria that form symbiotic association with roots of leguminous plants.

109. The end products of ETS are water and ATP. The oxygen which is the last acceptor in ETS combines with $2H^+$ present in the matrix and water molecule is formed. Three ATP molecules are also formed at the end of ETS.

112. Parents : Tt × Tt
F_1:

♀ ♂	T	t
T	TT	Tt
t	Tt	tt

Tall : Dwarf
3 : 1

113. Fungal hyphae penetrate into the host cells and forms vesicles or finely branched arbuscles, hence the name Vesicular Arbuscular Mycorrhizae.

118. ‘Siphonogamy’ is the transport of non-motile male gametes through pollen tube. Plasmogamy is the fusion of protoplasts of two cells. Karyogamy is the fusion of two nuclei. Zooidogamy is the transport of motile gametes through water.

121. Parents : XXYy × xxYy

Gametes: (XY) (Xy) (xY) (xy)

F_1 generation :

♀ ♂	XY	Xy
xY	XxYY	XxYy
xy	XxYy	Xxyy

Thus, XxYY : 1
XxYy : 2
Xxyy : 1
xxyy : 0

125. Geitonogamy: It is the transfer of pollen grains from anther to stigma of another flower produced on the same plant.
Autogamy: It is the transfer of pollengrains from anther to stigma of the same flower.

127. The pyramid of energy cannot be inverted in a stable ecosystem because at each trophic level only 10% energy is left. Thus, the amount of energy decreases and pyramid will always be upright and cannot be inverted.

129. Methanogenic stage is the last stage of biogas production. During this stage, methanogenic bacteria produce biogas which is mainly made up of methane.

134. Parthenocarpic fruits are developed without fertilization, thus they are without seeds.

137. In dichogamy, stamens and carpels do not mature simultaneously to prevent self pollination. In sunflower, protandry is seen in which pollen grains are released much before stigma becomes receptive, thus self pollination is avoided.

139. Synthesis of new strand of DNA is possible only in $5' \rightarrow 3'$direction.

140. In incomplete dominance, when heterozygous F_1 progeny is selfed in monohybrid cross, the F_2 progeny is in the ratio 1 : 2 : 1.

141. Megaspore mother cell undergoes meiosis to form four haploid megaspores. Out of four megaspores in a linear tetrad, usually the upper three degenerate and the lowermost becomes functional megaspore which forms female gametophyte or embryo sac.

143. Light reaction provides assimilatory power (ATP + $NADPH_2$) for dark reaction. It is utilized and ADP and NADP are formed to be used back in the light reaction.

145. Parents : Male × Female
Genotype of Parents : $I^A\ I^B \times I^A\ I^B$
Gametes : (I^A) (I^B) (I^A) (I^B)
F_1 generation :

♀ ♂	I^A	I^B
I^A	$I^A I^A$	$I^A I^B$
I^B	$I^A I^B$	$I^B I^B$

Therefore, the blood group of the children would be A, B and AB.

147. Formation of megaspore and development of female gametophyte is called as Megasporogenesis.

155. Calcitonin is a non-iodinized hormone secreted by the parafollicular cells of thyroid stroma.

159. The main nitrogenous waste of *Hydra* is ammonia. *Hydra* has no organ of excretion, therefore, excretion of nitrogenous waste matter occurs directly by diffusion through the membrane.

160. Gemmules are endogenous buds formed on inner side of parental body.

161. Camel – Desert adaptation
Labeo – Aquatic adaptation
Pigeon – Aerial adaptation

162. The cerebrospinal fluid is secreted by anterior choroid plexus and posterior choroid plexus and is found inside the ventricles of the brain and central canal of the spinal cord.

163. Coacervates are the colloidal aggregates of large complex organic molecules capable of growth and division.

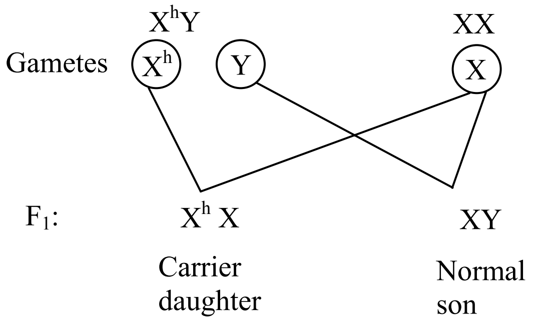
168. Macrophages engulf microorganisms and remove debris.

170. Vas deferens is a larger duct arising from cauda epididymis and reaches up to the seminal vesicles.

173. Homologous organs are structurally similar but functionally dissimilar.

174. Hisardale is a new breed of sheep developed in Punjab by cross-breeding Bikaneri ewes and Marino rams.

175. Haemophilic man × Normal woman



Daughters and sons both will be phenotypically normal.

181. Methyl isocyanate reacts quickly with water and caused swelling of lungs and development of cataract in the eyes.

183. Hardy-Weinberg equilibrium principle states that gene (allele or genotype) frequencies remain same from generation to generation thus maintaining the genetic equilibrium unless disturbed by factors like mutation, non-random mating etc.

186. Endocrine gland is a ductless gland. These secretions flow directly into the blood stream.

187. In humans, the blood passes twice through the heart. Once it goes from the right ventricle to the lungs and returns to the left atrium (pulmonary circulation); it then goes through the left ventricle, circulates through the body and again returns to the right atrium of the heart (systemic circulation). This is called double circulation of the blood.

190. Acid rain is a secondary pollutant, whereas SO_2, CO and CO_2 are primary pollutants.

191. Arbor vitae is a branched tree-like structure composed of white matter in cerebellum. It is also presumed to be the seat of soul.

192. *Australopithecus* shows characters of both apes and man.

194. Anginal pain develops in neck, lower jaw, left arm and left shoulder.

196. When SO_2 pollution in air is much higher, SO_2 mixes in the air with small particles of metals near the factories and gets oxidised into sulphur trioxide (SO_3). These gases are harmful and they react with water to form sulphuric acid (H_2SO_4) or sulphurus acid (H_2SO_3) and come down to earth with rain water. This is called acid rain or acid precipitation.