



# THE TIMES OF INDIA

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**TODAY'S EDITION**

➤ This week, solve biology and mathematics sample paper, prepared by your teachers  
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➤ Ahead of the World Sparrow Day, an activist talks of the need to create awareness among kids on saving the near-extinct bird  
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➤ 3 reasons why MS Dhoni's CSK can win the title this season  
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**STUDENT EDITION**

FRIDAY, MARCH 19, 2021



**WEB EDITION**

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## NEWS IN CLUES

Which award has often been described as 'The Mathematicians' Nobel'?

**CLUE 1:** The annual prize is different from the Fields Medal, which is awarded every four years, and with age limits.

**CLUE 2:** First awarded in 2003, it comes with a monetary award of 7.5 million Norwegian kroner.

**CLUE 3:** Chennai-born Indian-American and Padma Bhushan recipient SR Srinivasa Varadhan won it in 2007 for his work on large deviations.

**ANSWER: THE ABEL PRIZE.** Israeli computer scientist AVI WIGDERSON AND HUNGARIAN MATHEMATICIAN LÁSZLÓ LOVÁSZ have been declared the joint winners for 2021 "for their foundational contributions to theoretical computer science and discrete mathematics, and their leading role in shaping them into central fields of modern mathematics"

## One half of Earth is rapidly getting colder than the other



**DID YOU KNOW?**

In an interesting discovery, scientists have revealed that one half of the Earth is cooling faster than the other. According to them, the side of the planet, which contains the Pacific Ocean is losing heat at a more rapid rate than the other half, which contains Africa, Europe and Asia.

The Earth is continuously cooling and will eventually become a frigid, lifeless rock, much like Mars, claim scientists

### WHY IS IT SO

**1** Scientists say there is a discrepancy because of the Pacific hemisphere, which has been covered with more ocean than the other half for the last 400 million years. Besides, land is a better insulator than water, they said

may have been trapped in the Pacific zone by the earlier long-lived supercontinent Rodinia (1.1-0.7 billion years ago), and the Pacific mantle may still be hotter than the African mantle today

**2** Moreover, researchers are of the view that the extra heat released from the Pacific mantle

**3** But now, with Europe, Asia and Africa all located on one half of the world, and water making up much of the Pacific hemisphere, the global cooling is lopsided, they added

### HOW DID THEY FIND OUT

■ To study how the Earth's internal heat behaves, scientists created a model by dividing the Earth into African and Pacific hemispheres, and then divided the entire surface of the Earth into a grid by half latitude and longitude

■ Two datasets were combined for the research— one looked at the amount of heat from the Earth's interior, which was flowing through the crust, and the other tracked the movement of continents over millions of years. The first one revealed that the oceanic crust is a worse insulator than the continental crust, and as a result of this, most of the heat, which the Earth loses, dissipates through the oceans

## Spotlight

### PUNAM RAUT CLIMBS TO TOP 20 IN ODI RANKINGS

India's Punam Raut moved into the top 20 of the International Cricket Council's (ICC) women's ODI rankings for batswomen on Tuesday after her stellar performances in the five-match series between India and South Africa.

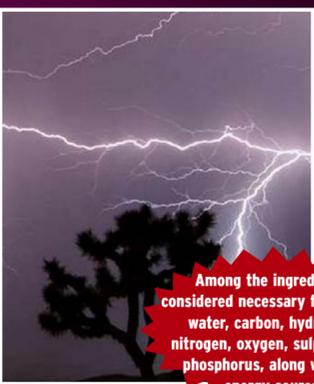


■ Punam, 31, recorded scores of 62 not out, 77, and 104 not out in the second, third and fourth ODIs, respectively.

■ She has also held a career high ranking of 13th, and is fourth on the list among Indian batswomen, after Smriti Mandhana (7th) Mithali Raj (9th) and Harmanpreet Kaur (15th)

■ Meanwhile, South Africa's Lizelle Lee replaced England's Tammy Beaumont at the top of the rankings for batswomen.

## Primordial lightning strikes may have helped life emerge on Earth



The emergence of Earth's first-living organisms billions of years ago may have been facilitated by a bolt out of the blue, or perhaps a quintillion of them, claims a new study. According to researchers, lightning strikes during the first billion years after the planet's formation, roughly 4.5 billion years ago, may have freed up phosphorus required for the formation of biomolecules essential to life.

Among the ingredients considered necessary for life are water, carbon, hydrogen, nitrogen, oxygen, sulphur and phosphorus, along with an energy source

➤ According to researchers, the study may offer insight into the origins of Earth's earliest microbial life, and potential extra-terrestrial life on similar rocky planets

## Idris Elba inks multi-book deal to pen children's books with HarperCollins

Hollywood star Idris Elba has signed a deal with publisher HarperCollins to come out with a range of children's books inspired by his daughter Isan Elba. As part of the multi-book deal, the actor will be publishing picture books and fiction, which he developed in collaboration with his writing partner Robyn Charteris.



■ Charteris has previously penned drama, pre-school and animation TV shows, including the soap 'Crossroads'

■ Ann-Janine Murtagh, the executive publisher at HarperCollins Children's Books, hailed Elba as one of the most-iconic and multi-talented creatives of his generation

## 8-YEAR-OLD SOLVES 3 RUBIK'S CUBES SIMULTANEOUSLY, USING HIS HANDS AND FEET

Atharva R Bhat, an 8-year-old boy from Bengaluru has made it to the record books by solving three Rubik's Cubes simultaneously. Using both his hands and feet, Bhat solved the cubes in less than two minutes, creating a Guinness World record. "The fastest time to solve three rotating puzzle cubes simultaneously, using hands and feet is one min 29.97 sec, achieved by Atharva R Bhat from Bengaluru," Guinness organisers wrote on YouTube.



■ Last month, 13-year-old Taniska Sujit, another Indian girl solved a Rubik's cube blindfolded, with blistering speed

## WORLD Sparrow DAY / March 20



■ The World Sparrow Day is celebrated to raise awareness about the bird, which is on the verge of extinction

■ According to environmentalists, the increased use of pesticides, change in the pattern of buildings, the decline of home gardens are some of the primary reasons for the sharp decline of sparrows in the last few years

■ Besides, they blame the radiation from the mobile and the TV towers for their untimely death

■ The initiative to conserve sparrows was started by the Nature Forever Society (NFS) of India, founded by Mohammed Dilwar, an Indian conservationist

■ He started his work helping the house sparrow in Nasik, Maharashtra

■ The first World Sparrow Day was celebrated in 2010 in different parts of the world

## DEMI LOVATO'S NEW ALBUM TO RELEASE ON APRIL 2



Singer-songwriter Demi Lovato's new album, 'Dancing With The Devil: The Art Of Starting Over', will release on April 2. The 28-year-old revealed during a social media chat that her upcoming album's original title was just going to be 'The Art Of Starting Over', but she decided to tie it with her new documentary 'Dancing With The Devil'. Lovato also revealed that there will be 19 tracks on the album and three bonus songs. Three of the songs will be collaborations. Many rumours suggest that one of them might be with Ariana Grande.

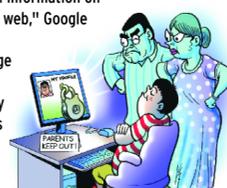
## Google launches website to help parents with kids' tech use

In a bid to give parents more control over their kids' watch time, Google has introduced families.google, a website with resources for family, as kids begin using technology...

■ The new website offers detailed guides that spell out how to approach your kids' technology use from various organisations

■ "Alongside overviews of our kids and families products, you can also catch up on the latest apps and services and find helpful information on parental controls across the web," Google said in a statement

■ Parents can now encourage children to spend more time with apps they approve of by designating them as "always allowed," even when their screen time limit is up



### UNRAVELLED

According to Google, two in five parents are not confident in talking about different tech-related topics with the kids; this includes discussions about things like screen time, digital well-being and discovering quality apps, games and activities

# TEST YOUR CORE STRENGTH IN BIOLOGY



CLASS: XII - 2020-21

SUBJECT:  
BIOLOGY (CBSE)

Time Allowed: 3 Hours

Maximum Marks: 70

## GENERAL INSTRUCTIONS

- All questions are compulsory.
- The question paper has four sections: Section A, Section B, Section C and Section D. There are a total of 33 questions in the paper.
- Section-A has 14 questions of 1 mark each and 02 case-based questions. Section-B has 9 questions of 2 marks each. Section-C has 5 questions of 3 marks each and Section-D has 3 questions of 5 marks each.
- There is no overall choice.
- Wherever necessary, neat and properly labeled diagrams should be drawn.

## SECTION-A

- Q1.** Pineapples, grapes are developed from an unfertilised ovary and resulting in seedless fruit. Can you name the developmental process? [1]
- Q2.** A bilobed, dithecous anther has 100 microspore mother cell per microsporangium. How many male gametophytes this anther can produce? [1]
- Q3.** Unisexual flowers have pollen grains which are small, dry, non-sticky. Stigma and style of such flowers are well exposed and hairy. Name the pollinating agent. [1]
- Q4.** The genes for haemophilia are located on chromosome of humans. Why is it normally impossible for a haemophilic father to pass the gene to his son? [1]
- Q5.** Ovaries are made of soft tissue and are not fixed in any bony socket but are placed in abdominal cavity. There is a possibility that they may get displaced. But this generally does not happen. How is this attained? [1]
- Q6.** What will happen if a cell fails to divide after DNA replication? Name the main enzyme for the process of replication. [1]
- Q7.** Why did Meselson and Stahl grow *E. coli* in a medium containing  $^{15}\text{NH}_4\text{Cl}$  for many generations? [1]
- Q8.** Proteins encoded by genes 'cry IAc' and 'cry IIAb' and that of 'cry IAb' are different in their control. What is the logic behind this statement? [1]
- Q9.** In making bacteria as a competent host for transformation with r-DNA, it is treated with a specific concentration of divalent cation like calcium. What is the role of calcium? [1]
- Q10.** India has only 2.4% of the land area of the world but it has 8.1% of the species diversity. What are the favourable environmental condition that has favoured speciation in India? [1]
- Q11. Assertion:** Primary transcripts in eukaryotes are non-functional.  
**Reason:** Methyl guanosine triphosphate is attached to the 3' end of hnRNA.  
a. Both assertion and reason are true.  
b. Both assertion and reason are true, but reason is not the correct explanation of assertion.  
c. Assertion is true but reason is false.  
d. Both assertion and reason are false. [1]

## PRACTICE PAPER SET BY SIMI MATHEW, PGT BIOLOGY, UDGAM SCHOOL FOR CHILDREN, AHMEDABAD

- Q12. Assertion:** Exonucleases remove nucleotides from the ends of DNA.  
**Reason:** Endonucleases make cuts at specific positions within the DNA.  
a. Both assertion and reason are true.  
b. Both assertion and reason are true, but reason is not the correct explanation of assertion.  
c. Assertion is true but reason is false.  
d. Both assertion and reason are false. [1]

- Q13. Assertion:** Hot spots are areas which have been degraded beyond repair.  
**Reason:** There has been adverse changes in environment.  
a. Both assertion and reason are true.  
b. Both assertion and reason are true, but reason is not the correct explanation of assertion.  
c. Assertion is true but reason is false.  
d. Both assertion and reason are false. [1]

- Q14. Assertion:** Kangaroo rat can live without drinking water.  
**Reason:** This is an adaptation to water scarcity in arid condition.  
a. Both assertion and reason are true.  
b. Both assertion and reason are true, but reason is not the correct explanation of assertion.  
c. Assertion is true but reason is false.  
d. Both assertion and reason are false. [1]

- Q15. Read the following and answer the questions given below.** (1 x 4=4)  
AIDS is caused by a virus. The Americans named it HCLV III. Later the name was changed to HIV. HIV is a retrovirus that attacks helper T cells. The virus is a spherical, enveloped virus of about 90 - 120 nm in diameter. Its genome consists of a single stranded RNA filament segmented into two identical filaments and associated with the reverse transcriptase enzyme. Due to the presence of two identical filaments of RNA, HIV is diploid. It contains 2 protein coats. The envelope consists of a lipid bilayer derived from host cell membrane and projecting knob like glycoproteins spikes with pedicels formed of virus coded glycoproteins. Besides helper T cells, HIV also infects macrophages and some B lymphocytes.

- i.** Which one is the most infectious disease?  
a. Aids b. malaria  
c. Hepatitis B d. cough and cold  
**ii.** HIV that causes AIDS first start destroying  
a. B lymphocytes b. Thrombocytes  
c. leukocytes d. helper T lymphocytes  
**iii.** Which of the following is a pair of viral disease?  
a. Ringworm, AIDS  
b. common cold, AIDS  
c. dysentery, common cold  
d. typhoid, tuberculosis  
**iv.** At which stage of HIV infection does one usually show symptoms of AIDS?  
a. Within 15 days off sexual contact with an infected person.  
b. When the infecting retrovirus enters host cells.  
c. When viral DNA is produced by reverse transcriptase.  
d. When HIV replicates rapidly in helper T lymphocytes and damages large number of these.

- Q16. Read the following and answer the questions given below.** (1 x 4=4)  
Testing for Covid-19 using RT-PCR. The objective of Covid 19 testing is to identify part of the Corona viral genome in the patient sample. As, there is insufficient viral RNA to detect directly in the patient sample, a process called reverse transcription polymerase chain reaction is used for amplification. Short single

- Q17.** A disease reported to be high among individual of age group of 15-24 years. Name the disease and mention three preventative measures of these diseases  
**Q18.** Read the sequence of the nucleotides in the given segment of mRNA and the respective amino acid sequence in the polypeptide chain.  
Met Phe Met Phe Val Ser X  
A U G U U A U G C U C U U U A A

## SECTION-B (9X2=18)

- Q17.** A disease reported to be high among individual of age group of 15-24 years. Name the disease and mention three preventative measures of these diseases  
**Q18.** Read the sequence of the nucleotides in the given segment of mRNA and the respective amino acid sequence in the polypeptide chain.

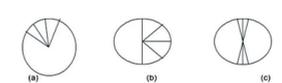
**Polypeptide:** met-phe-met-proline-valine-serine

- (i)** Write the nucleotide sequence of the DNA strand from which this mRNA was transcribed.  
**(ii)** What does the last codon of this RNA stand for?

- Q19.** Most of the living organisms try to maintain the constancy of their internal environment in terms of optimal temperature and osmotic concentration. What is the terminology used for this type of constancy? How do the following organisms maintain it and also specify the terms for that.  
**i.** Mammals **ii.** All plants  
**iii.** Birds in Siberia

- Q20.** If a true breeding homozygous pea plant with green pod and axial flower as dominant characters is crossed to a recessive homozygous pea plant with yellow seeds and terminal flowers, then what would be the:  
a. genotypes of the two parents [1]  
b. phenotype and genotype of the F<sub>1</sub> offspring. [1]

- Q21. i)** The DNA strand with Polarity 3'-5' acts as a template during transcription. Why? [1]  
**ii)** The other strand with polarity 5'-3' is called coding strand. Why? [1]  
**Q22.** Write the sex chromosomes complement of the following.  
a. *Drosophila* female & male [1]  
b. Male and Female grasshopper [1]  
**Q23.** What is depicted by a, b and c in the following representation of species diversity? Why these estimates do not give any figure for prokaryotes?



- Q24.** Many mammals from colder climates generally have shorter ear and limbs in comparison to the mammals of other biome. Why? Which general principle is followed?

- Q25.** If a species of fish becomes extinct, all those parasites, specific to that fish also face extinction. Which of the major cause described as "the evil Quartet's" is being accounted?

## SECTION-C (5X3=15)

- Q26.** Placenta is not just a connection and umbilical cord is not just a tube. They remain active throughout the gestation period. Is the above statement true? Justify.

- Q27.** The genetic disorders can be grouped under two broad categories-Mendelian disorders and chromosomal disorders which one of two can be traced in a family by pedigree chart? Name two such disorders.

- Q28 a.** A bio active molecule produced by microorganism acts by competitively inhibiting the enzyme responsible for cholesterol synthesis. Name the enzyme and the microbe out of which it is extracted? [1]

- b.** Two villagers were arguing for the nutritive value of milk and curd? Being a normal science student and having studied the biochemistry of both the products, tell which one is more nutritive and justify it? [1]

- c.** The name virus generally brings in our mind havoc that they are our enemies. There is a category of virus which has species specific narrow spectrum, has insecticidal application, having no impact on plants and other animals. Name the category and give one example? [1]

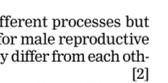
- Q29.** A farmer noticed that nematode infection in tobacco plants has resulted in the reduction in the yield. suggest a strategy which provides cellular defense for providing resistance in this pest. Explain the technique.

- Q30.** Write a note on the age pyramids.

## SECTION-D (3X5=15)

- Q31. Study the following diagram and answer the following questions:**

- a. Label the parts A, B, C and D [1]  
b. How does D differ from F? [1]  
c. What is the function of E? [1]  
d. Spermatogenesis and spermeogenesis are two different processes but both are essential for male reproductive system. How do they differ from each other? [2]



- Q32.** Evaluate the suitability of DNA and RNA as genetic material and justify the suitability of the one that is preferred as an idea genetic material.

- Q33.** Identify and name the disease in which the patient cells lose the property of contact inhibition. State its possible causes and explain any three methods to accurately depict the pathological and physiological changes that take place due to the disease in living tissues.

## Determine the matrix to get perfect score

Paper set by Venkateshwara Rao, Principal, Vikas Vidyaniketan School, Visakhapatnam

- Q1** If  $AB = O$  for the matrices  
 $A = \begin{bmatrix} \cos^2\theta & \cos\theta \sin\theta \\ \cos\theta \sin\theta & \sin^2\theta \end{bmatrix}$  and  
 $B = \begin{bmatrix} \cos^2\phi & \cos\phi \sin\phi \\ \cos\phi \sin\phi & \sin^2\phi \end{bmatrix}$   
then  $\theta - \phi$  is

- (A) an odd multiple of  $\frac{\pi}{2}$   
(B) an odd multiple of  $\pi$   
(C) an even multiple of  $\frac{\pi}{2}$  (D) 0

- Q2** If  $X = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ , then value of  $X^n$  is  
(A)  $\begin{bmatrix} 3n & -4n \\ n & -n \end{bmatrix}$  (B)  $\begin{bmatrix} 2+n & 5-n \\ n & -n \end{bmatrix}$   
(C)  $\begin{bmatrix} 3^n & (-4)^n \\ 1^n & (-1)^n \end{bmatrix}$  (D) none of these

- Q3** If the matrix  $\begin{bmatrix} 0 & 2\beta & \gamma \\ \alpha & \beta & -\gamma \\ \alpha & -\beta & \gamma \end{bmatrix}$

- is orthogonal, then  
(A)  $\alpha = \pm \frac{1}{\sqrt{2}}$  (B)  $\beta = \pm \frac{1}{\sqrt{6}}$   
(C)  $\gamma = \pm \frac{1}{\sqrt{3}}$  (D) all of these

- Q4** If A, B are two  $n \times n$  non-singular matrices, then  
(A) AB is non-singular  
(B) AB is singular  
(C)  $(AB)^{-1} = A^{-1}B^{-1}$   
(D)  $(AB)^{-1}$  does not exist

- Q5** If B is a non-singular

**EXAMS Rfun**  
MOCK PAPER  
SUBJECT:  
MATHEMATICS  
CLASS X  
MARKS: 100

- lar matrix and A is a square matrix, then  $\det(B^{-1}AB)$  is equal to  
(A)  $\det(A^{-1})$  (B)  $\det(B^{-1})$   
(C)  $\det(A)$  (D)  $\det(B)$

- Q6** If A is a square matrix of order  $n \times n$  and k is a scalar, then  $\text{adj}(kA)$  is equal to  
(A)  $k \text{adj} A$  (B)  $k^n \text{adj} A$   
(C)  $k^{n-1} \text{adj} A$  (D)  $k^{n+1} \text{adj} A$

- Q7** If  $A = \text{diag}(2, -1, 3)$ ,  $B = \text{diag}(-1, 3, 2)$ , then  $A^2B =$   
(A)  $\text{diag}(5, 4, 11)$  (B)  $\text{diag}(-4, 3, 18)$   
(C)  $\text{diag}(3, 1, 8)$  (D) B

- Q8** If A is a square matrix of order 3, then the true statement is (where I is unit matrix).  
(A)  $\det(-A) = -\det A$  (B)  $\det A = 0$   
(C)  $\det(A+I) = 1 + \det A$   
(D)  $\det 2A = 2 \det A$

- Q9** If  $A = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{bmatrix}$

- then AB is equal to  
(A) B (B) 3B (C) B<sup>3</sup> (D) A + B

- Q10** If  $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$  satisfies the equation  $x^2 - (a+d)x + k = 0$ , then  
(A)  $k = bc$   
(B)  $k = ad$   
(C)  $k = a^2 + b^2 + c^2 + d^2$   
(D)  $k = ad - bc$

- Q11** Matrix  $A = \begin{bmatrix} x & 3 & 2 \\ 1 & y & 4 \\ 2 & 2 & z \end{bmatrix}$ ,  
if  $x, y, z = 60$  and  $8x + 4y + 3z = 20$ , then  $A(\text{adj} A)$  is equal to  
(A)  $\begin{bmatrix} 64 & 0 & 0 \\ 0 & 64 & 0 \\ 0 & 0 & 64 \end{bmatrix}$  (B)  $\begin{bmatrix} 88 & 0 & 0 \\ 0 & 88 & 0 \\ 0 & 0 & 88 \end{bmatrix}$

- (C)  $\begin{bmatrix} 68 & 0 & 0 \\ 0 & 68 & 0 \\ 0 & 0 & 68 \end{bmatrix}$  (D)  $\begin{bmatrix} 34 & 0 & 0 \\ 0 & 34 & 0 \\ 0 & 0 & 34 \end{bmatrix}$

- Q12** If a, b, c > 0 & x, y, z ∈ R,

- then the determinant  
 $\begin{vmatrix} (a^2 + a^{-2}) & (a^2 - a^{-2}) & 1 \\ (b^2 + b^{-2}) & (b^2 - b^{-2}) & 1 \\ (c^2 + c^{-2}) & (c^2 - c^{-2}) & 1 \end{vmatrix} =$   
(A)  $a^2b^2c^2$  (B)  $a^{-2}b^{-2}c^{-2}$   
(C)  $a^2b^2c^2$  (D) zero

- Q13** If a, b & c are non-zero real numbers, then  $D = \begin{vmatrix} b^2c^2 & bc & b+c \\ c^2a^2 & ca & c+a \\ a^2b^2 & ab & a+b \end{vmatrix} =$   
(A) abc (B)  $a^2b^2c^2$   
(C)  $bc+ca+ab$  (D) zero

- Q14** Let  $f(\theta) = \begin{vmatrix} \cos^2\theta & \cos\theta \sin\theta & -\sin\theta \\ \cos\theta \sin\theta & \sin^2\theta & \cos\theta \\ \sin\theta & -\cos\theta & 0 \end{vmatrix}$   
then  $f\left(\frac{\pi}{6}\right) =$   
(A) 0 (B) 1 (C) 2 (D) none

- Q15** If  $\begin{bmatrix} (b+c)^2 & a^2 & a^2 \\ b^2 & (c+a)^2 & b^2 \\ c^2 & c^2 & (a+b)^2 \end{bmatrix} =$   
 $kabc(a+b+c)^2$  then the value of k is  
(A) 1 (B) 2 (C) 0 (D)  $ab+bc+ac$

- Q16** Let m be a positive integer &  $D_n = \begin{vmatrix} 2r-1 & mC_r & 1 \\ m^2-1 & 2^m & m+1 \\ \sin^2(m^r) & \sin^2(m) & \sin^2(m+1) \end{vmatrix}$   
( $0 \leq r \leq m$ ), then the value of  $\sum_{r=0}^m D_r$  is given by:

- (A) 0 (B)  $m^2 - 1$  (C)  $2^m$  (D)  $2^m \sin^2(2^m)$

- Q17** If  $f(x) = \begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & (x+1)x \\ 3x(x-1) & x(x-1)(x-2) & (x+1)x(x-2) \end{vmatrix}$   
then  $f(100)$  is equal to:  
(A) 0 (B) 1 (C) 100 (D) -100

- Q18** If  $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$  and  $|A^{-1}| = 125$  then the value of  $\alpha$  is  
(a)  $\pm 1$  (b)  $\pm 2$  (c)  $\pm 3$  (d)  $\pm 5$

- Q19** If  $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 0 \\ 3 & 1 \end{bmatrix}$  then value of  $\alpha$  for which  $A^2 = B$  is  
(a) 1 (b) -1 (c) 4 (d) no real values

- Q20** No of  $2 \times 2$  Skew symmetric Matrices can be formed with elements 1 and -1  
(a) 0 (b) 1 (c) 4 (d) 6

- Q21** The determinant  $\Delta = \begin{vmatrix} b & c & ba+c \\ c & d & ca+d \\ ba+c & ca+d & aa+ca \end{vmatrix}$  is equal to zero if  
(A) b, c, d are in A.P.  
(B) b, c, d are in G.P.  
(C) b, c, d are in H.P.  
(D) None of these

- Q22** Matrix  $\begin{bmatrix} a & b & (a-b) \\ b & c & (b-c) \\ 2 & 1 & 0 \end{bmatrix}$

- is non invertible if  
(A)  $\alpha = 1/2$   
(B) a, b, c are in A.P.  
(C) a, b, c are in G.P.  
(D) a, b, c are in H.P.

- Q23** If  $A =$  (where  $bc \neq 0$ ) satisfies the equations  $x^2 + k = 0$ , then  
(A)  $a + d = 0$  (B)  $k = -|A|$   
(C)  $k = 2|A|$   
(D) none of these

- Q24** If  $A^{-1} = \begin{bmatrix} 1 & -1 & 0 \\ 0 & -2 & 1 \\ 0 & 0 & -1 \end{bmatrix}$ , then  
(A)  $|A| = 2$  (B) A is singular  
(C)  $\text{Adj. } A = \begin{bmatrix} 1/2 & -1/2 & 0 \\ 0 & -1 & 1/2 \\ 0 & 0 & -1/2 \end{bmatrix}$   
(D) A is skew symmetric matrix

- Q25** Find x so that  $[1 \ x \ 1] \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 3 & 2 & 5 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = 0$   
(A) -2 (B) 5 (C)  $\frac{9}{8}$  (D)  $-\frac{9}{8}$

- These questions are meant for practice purpose only. Students are advised to check format, syllabus and marks for Board test papers with their teachers. Questions have been given by teachers and NIE is not responsible for them.