## भारतीय विमानपत्तन प्राधिकरण

(अनुसूची - ए' मिनी रत्न - श्रेणी 1-सार्वजनिक क्षेत्र का उद्यम)
AIRPORTS AUTHORITY OF INDIA
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राजीव गांधी भवन, सफदरजंग हवाईअड्डा, नई दिल्ली- 110003
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## RECRUITMENT FOR VARIOUS POSTS IN OFFICIAL LANGUAGE AND AIR TRAFFIC CONTROL

ADVERTISEMENT No. 08/2022

| Participant ID |  |
| :--- | :--- |
| Participant Name |  |
| Test Center Name | Shankara Institute of Technology |
| Test Date | $21 / 02 / 2023$ |
| Test Time | $12: 30$ PM - $2: 30$ PM |
| Subject | Junior Executive (Air Traffic Control) |

## Section : General Knowledge

Q. 1 Which of the following is NOT one of the three major types of indigenous wild silks produced in Assam?
Ans 1. Kausheya Pat
X 2. Golden Muga Silk
X 3. White Pat
X 4. Warm Eri Silk
Q. 2 In which of the following states did Micro-Finance Institutions Network (MFIN) launch a series of free Medical Health Camps in 18 flood affected districts in September 2022?
Ans
X 1. Meghalaya
2. Assam

X 3. Bihar
X 4. Jharkhand
Q. 3 Match the columns.

| Rivers |  | Their origin |
| ---: | :--- | :---: |
| I. | Indus | a) Amarkantak (Madhya Pradesh) |
| II. | Godavari | b) Mansarovar (Tibet) |
| III. | Cauvery | c) Nasik (Maharashtra) |
| IV. | Narmada | d) Coorg (Karnataka) |

Ans

1. I-b, II-c, III-d, IV-a

X 2. I-a, II-c, III-b, IV-d
X 3. I-d, II-c, III-b, IV-a
X 4. I-b, II-c, III-a, IV-d
Q. 4 Who is the awardee of Major Dhyan Chand Khel Ratna Award 2022?

Ans
$X$ 1. Eldhose Paul
X 2. R Praggnanandhaa
X 3. Avinash Mukund Sable

- 4. Sharath Kamal Achanta
Q. 5 In which year did the University Grants Commission Act come into force?

Ans
X 1.1954
$\times 2.1950$
$\times 3.1952$

- 4.1956
Q. 6 Article 148 of the Constitution of India guides towards the appointment of $\qquad$ _.

Ans
$X$ 1. Finance Commissioner
2. Comptroller and Auditor-General of India

X 3. Election Commissioner
X 4. Attorney-General for India
Q. 7 The reformer Henry Vivian Derozio was associated with $\qquad$ -

Ans $\quad \times 1$. Ahmadiya Movement
$X$ 2. Suddhi Movement
3. Young Bengal Movement

X 4. Akali Movement

## Q. 8 Which of the following leucoplasts store oils and fats?

Ans $\times 1$. Aleuroplasts
$X$ 2. Nucloeplasts
3. Elaioplasts

X 4. Amyloplasts

Chosen Option : $\mathbf{4}$
Q. 9 Which of the following Harappan sites was excavated in the 1960s under the guidance of BK Thapar?
Ans
$X$ 1. Lothal
X 2. Harappa
X 3. Mohenjodaro
4. Kalibangan
Q. 10 Identify the cnidarian that is correctly matched with its common name.

Ans
X 1. Adamsia - Sea-pen
2. Physalia - Portuguese man-of-war

X 3. Pennatula - Sea-fan
X 4. Gorgonia - Sea anemone
Q. 1 Each of the five persons among $\mathrm{M}, \mathrm{N}, \mathrm{O}, \mathrm{P}$ and Q like different drinks among coffee, tea, hot chocolate, iced tea and energy drink, not necessarily in the same order. They all have different professions - Teacher, Librarian, Technician, Accountant and Acrobat. N does not like tea. M likes coffee and is a librarian. N and P like neither energy drink nor iced tea. O likes energy drink but he is neither a teacher nor an accountant. Q is a technician. The one who likes tea is a teacher. Which of the following is correct?
Ans
$X 1$. O likes energy drink and is a technician.
$X$ 2. Q is an acrobat and likes energy drink.
$X$ 3. P is an accountant and likes iced tea.
4. P is a teacher and likes tea.
Q. 2 If in a certain coding language, 'flowers go black' is written as 'la vo mu', 'black panther died' is written as 'zi mu be' and 'panther go red' is written as 'be la ho', how will 'panther' be written in that language?
Ans
$X$ 1. ho
X 2. zi

- 3. be

X4.la
Q. 3 Seven teachers P, Q, R, S, T, U and V are sitting in a straight row, facing north. Only Q sits between $V$ and $U$. Only R sits to the right of T. P is to the immediate left of T. Only P sits between T and S. V does not sit at any of the extreme ends of the row. Who sits to the immediate left of Q ?
Ans
$\times 1$. T
X2. V

- $3 . U$
$\times 4$. P
Q. 4 A certain number of people are sitting in a row, facing south. Naresh sits fourth to the right of Sita. Only four people sit between Naresh and Kumar. Raju sits to the immediate right of Kumar. Only two people sit between Kumar and Anuj. Amit sits third to the right of Anuj. If no other person is sitting in the row, what is the total number of people seated?
Ans
X 1.14
- 2.16
$\times 3.15$
$\times 4.17$
Q. 5 Given below are pairs of events (i) and (ii). You have to read them and decide their nature of relationship. You have to assume that the information given in both (i) and (ii) is true and not assume anything beyond the given information in deciding the answer.
Event (i) Many people visited the Taj Mahal during the weekend.
Event (ii) Few foreigners visited the Taj Mahal during the weekdays.
Ans

1. Event (ii) is the effect and event (i) is its immediate and principal cause.
2. Both the events are effects of some independent causes.
$X$ 3. Both the events are effects of some common cause.
X 4. Event (i) is the effect and event (ii) is its immediate and principal cause.
Q. 6 Each of M, N, O, P, Q, R and S has birthdays on a different day of a week starting from Monday and ending on Sunday of the same week.
Only $\mathbf{N}$ has birthday before $\mathbf{Q}$ who has birthday on Tuesday. $\mathbf{R}$ has birthday on Thursday. P has birthday immediately after $S$, but not on Sunday. $M$ has birthday on one of the days before 0 . Who has birthday on Sunday?
Ans
X1.s
$\times 2 . \mathrm{Q}$

- 3.0
$\times 4 . \mathrm{M}$
Q. 7 Given below are pairs of events (i) and (ii). You have to read them and decide their nature of relationship. You have to assume that the information given in both (i) and (ii) is true and not assume anything beyond the given information in deciding the answer.
Event (i) The prices of imported goods dropped significantly this year. Event (ii) The government reduced the tax on importing goods.
Ans
X 1. Event (ii) is the effect and event (i) is its immediate and principal cause.

2. Event (i) is the effect and event (ii) is its immediate and principal cause.
$X$ 3. Both the events are effects of some independent causes.
X 4. Both the events are effects of some common cause.
Q. 8 Mr. Pandey and Mr. Gupta stepped out of the same office and walked towards West. Mr. Pandey walked 300 m and took a right turn. He walked 200 m and took a left turn. He walked 90 m and reached the bank. Meanwhile, Mr. Gupta walked 650 m to reach the bus stop. In which direction is the bus stop from the bank?
Ans
X 1. North-West
X 2. South-East
3. South-West
$\times 4$. North
Q. 9 Two men stepped out of an apartment but walked in different directions to reach different destinations. The first man walked 92 m towards west and took a left turn. He then walked 100 m and took a left turn. He then walked 240 m and took a right turn. Finally, he walked for 100 m to reach a point D . The second man walked 80 m towards east and took a right turn. He then walked 110 m to reach a point B . In which direction is point B from point D ?

Ans
X 1. South-East
2. North-West

X 3. North-East
X 4. South-West
Q. 10 Study the given information carefully and answer the question that follows.

A group of 8 classmates, 4 boys $H, I, J$ and $K$ and 4 girls $D, E, F$ and $G$ decided to sit at a round table to have coffee, during the lunch break. They are sitting in such a way that:

1. all of them are facing each other
2. no two girls or two boys are sitting side by side
3. $J$ is between $D$ and $G$ and is facing $I$
4. $E$, who is sitting between $K$ and $I$, is facing $D$
5. H is to the immediate right of F .

Who is sitting in front of $K$ ?
Ans

1. H

X2.D
X 3 .F
$\times 4.1$
Q. 11 F, $K, W, C, U, B$ and $D$ are seven family members attending an economics fair. $D$ is the brother of $B$. C is wife of W. $F$ is K's husband. B is U's wife. $K$ is the mother of $U$ and daughter of $W$. How is $D$ related to $U$ ?
Ans
$X$ 1. Brother
$X$ 2. Father
X 3. Husband
4. Wife's brother
Q. 12 Read the given statements and conclusions carefully Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.
Statements:
Few sheep are chimpanzees.
No chimpanzee is a gorilla.
All gorillas are bears.
Conclusions:
(I) Some bears are not chimpanzees.
(II) All chimpanzees are sheep.
(III) All bears are gorillas.

Ans $\quad$ 1. Only conclusion II follows
$X$ 2. Either conclusion I or conclusion III follow
$X$ 3. None of the conclusions follow
4. Only conclusion I follows
Q. 13 Select an option that is true regarding the following two statements labelled Assertion (A) and Reason (R).
A. Sun is a star.
R. Stars are space objects that produces their own energy through fusion reaction of gases.

Ans

1. Both 'A' and ' $R$ ' are true and ' $R$ ' is the correct explanation of ' $A$ '
$X$ 2. ' $A$ ' is true but ' $R$ ' is false.
$X$ 3. Both ' $A$ ' and ' $R$ ' are false.
$X$ 4. Both ' $A$ ' and ' $R$ ' are true but ' $R$ ' is not the correct explanation of ' $A$ '.
Q. 14 A question is given, two statements labelled I and II. Identify which of the statements is/are sufficient/necessary to answer the question.
Question:
On what day of the week does Punit's birthday fall?
Statements:
I. Arjun correctly remembers that Punit's birthday comes before Thursday but after Monday.
II. Bhushan correctly remembers that Punit's birthday comes after Tuesday but before Saturday.
Ans
$X 1$. The data in statement I alone is sufficient to answer the question, while the data in statement II alone is not sufficient to answer the question.
X 2. The data in statement II alone is sufficient to answer the question, while the data in statement I alone is not sufficient to answer the question.
2. The data given in both statements I and II together are necessary to answer the
question.
X 4. The data either in statement I alone or statement II alone are sufficient to answer the question.
Q. 15 If
' $P$ \& $Q$ ' means ' $P$ is the brother of $Q$ 's mother',
' $P$ Ø $Q$ ' means ' $P$ is the father of $Q$ ',
' $P$ * $Q$ ' means ' $P$ is the mother of $Q$ ',
' $P=Q$ ' means ' $P$ is the wife of $Q$ ',
' $P \% Q^{\prime}$ means ' $P$ is the husband of $Q$ ', then how is $M$ related to $S$ in the following
expression?
$\mathbf{S}=\mathbf{Q} \varnothing \mathbf{0} \% \mathrm{~N}$ * M
Ans
$X$ 1. Brother's child
$X$ 2. Daughter's husband
3. Son's child
$X$ 4. Brother

Section : General Aptitude
Q. 1

The value of $\frac{5 \frac{1}{4} \div 2 \frac{1}{3} \text { of } \frac{3}{4}-\frac{3}{4} \times 1 \frac{1}{2} \div 1 \frac{1}{8}+\frac{2}{3}}{0 . \overline{29} \div 0.3 \overline{2} \text { of }(30 \div 11)}$ is:
Ans
$\times 1 . \frac{8}{9}$
2. 8
$\times 3 . \frac{9}{8}$
$\times 4.9$
Q. 2 Pipes $A$ and $B$ can fill a tank in 12 hours and 15 hours, respectively. Pipe $C$ is an emptying pipe. Pipes $A$ and $B$ are opened together for 5 hours and then $B$ is closed and $C$ is opened. A and $C$ together filled the remaining part of the tank
in 10 hours. Pipe C alone can empty $\frac{7}{15}$ th part of the tank in:
Ans

1. 8 hours
$\times$ 2. 7 hours
$\times$ 3. $7 \frac{1}{2}$ hours
X4. $8 \frac{1}{2}$ hours
Q. 3 In finding HCF of two positive integers by division method, the last divisor is 28 and the respective quotients from the beginning are 30,1 and 3 . What is the sum of the two integers?
Ans
$\times 1.3566$
$\times 2.3554$
X 3.3564
2. 3556
Q. 4 A sum of $₹ 7,560$ is divided between $A, B$ and $C$ such that the ratio of the share of $A$ to the combined share of $B$ and $C$ is $5: 9$ and the ratio of the share of $C$ to the combined share of $A$ and $B$ is $3: 7$. What is the share of $B$ ?
Ans
3. ₹2,592

X 2. ₹ 2,482
X 3. ₹2,590
X4. ₹2,480
Q. 5 A and B enter into a partnership with capitals in the ratio $\frac{4}{3}: \frac{5}{6}$. After 6-months, A reduces his capital by $25 \%$ and $B$ increases his capital by $50 \%$. What is the share of B in the profit of ₹ 63.6 lakhs, at the end of a year?

Ans

1. 30
2. 33.6
$\times 3.32$
X 4.32 .5
Q. 6 A car travelling at a speed of $70 \mathrm{~km} / \mathrm{h}$ overtakes a bus travelling in the same direction and leaves it 170 m behind in 18 seconds. What is the speed (in $\mathrm{km} / \mathrm{h}$ ) of the bus?
Ans
$\times 1.40$
X 2.45

* 3.36
$\times 4.42$
Q. 7 The cost price of item $A$ is ₹ 500 more than that of item $B$. When $A$ is sold at a loss of $10 \%$ and $B$ is sold at a profit of $25 \%$, then there is a profit of $4 \%$ in the entire transaction. What is the selling price of item $A$ ?
Ans
X 1. ₹1,260

2. ₹ 1,350

X 3. ₹1,440
X4. ₹1,620
Q. 8 The marked price of an article is ₹ 450 . It is sold for ₹ 348.48 , after giving two successive discounts each of $x \%$ on the marked price. If a single discount of $2 x \%$ is given on the same marked price, then what will be its selling price?
Ans
X 1. ₹306
X 2. ₹315
3. ₹342

X 4. ₹360
Q. 9 The ratio of alcohol and water in solution $A$ is $3: 5$ and it is $7: 3$ in solution $B$. Six litres of $A$ and 5 litres of $B$ are mixed in a vessel and one litre water is also added to this mixture. What is the ratio of alcohol and water in the resulting mixture?
Ans

- $1.23: 25$

X $2.23: 29$
X 3.21:22
$\times 4.22: 23$
Q. 10 The simple interest on a certain sum for $12 \frac{1}{2}$ years at $15 \%$ p.a. exceeds the amount of the same sum at simple interest
for $6 \frac{1}{2}$ years at $12 \%$ p.a. by ₹ 1197 . The sum (in ₹) is:
Ans
X 1.12,500
$\times 2.13,000$
X 3.12,800

- $4.12,600$
Q. 11 By selling an article for ₹ 219.60 , a shopkeeper loses $\mathbf{8 . 5 \%}$. If he sells it for ₹ 265.20 , then his profit per cent is:
Ans
× $1.10 \%$

2. $9 \%$
3. $10.5 \%$
4. $12.5 \%$
Q. 12 If a 8-digit number $43 \times 259 \mathrm{y} 2$ is divisible by 88 , then the largest possible value of $(5 x+2 y)$ is:

Ans
$\times 1.64$

- 2.63
$\times 3.52$
$\times 4.56$
Q. 13 The time taken by a boat to cover a certain distance upstream is equal to $\frac{4}{7}$ of the time taken by it to cover three times the same distance downstream. The speed of the stream is $7.5 \mathrm{~km} / \mathrm{h}$. How many (total) hours will the boat take to go 42 km upstream and 54 km downstream?

Ans
$\times 1.3$
2. 3.5
$\times 3.4 .2$
$\times 4.4$
Q. 14 Rashid borrowed a sum of ₹ 30,240 at $10 \%$ p.a., interest compounded annually. If the amount is to be paid back in two equal annual instalments, then the interest paid by him is:
Ans

1. ₹ 4,608

X 2. ₹ 4,590
X 3 . ₹ 4,518
X4. ₹4,600
Q. 15 The diameter of a solid metallic spherical bullet is 3.5 cm . 96 such bullets are melted and recast into a solid right circular cylinder of height 56 cm . What is the curved surface area (in $\mathrm{cm}^{2}$ ) of the cylinder?
Ans
X $1.448 \pi$
X $2.280 \pi$

- $3.392 \pi$
$\times 4.336 \pi$

Section: General English

## Q. 1 Select the most appropriate option to fill in the blank.

He $\qquad$ the loan he had taken from his friend within a month.
Ans
$X 1$. revealed
$X$ 2. reserved

- 3. repaid
$X 4$. requested
Q. 2 Select the most appropriate option to fill in the blank. I wanted to buy some peanuts, but I didn't see anyone $\qquad$ them.
Ans
$X$ 1. sold

2. selling
$X$ 3. sells
$X$ 4. to sell
Q. 3 Select the most appropriate option to fill in the blanks.

When she was hungry, she ate $\qquad$ orange and drank $\qquad$
Ans
$X$ 1. the, the
2. an, a

X 3.a, a
$\times 4$. a, the
Q. 4 Select the most appropriate option to fill in the blank. We found her playing with $\qquad$ little dog in the park.
Ans
X 1. No word required
2. a

X 3. the
X4.an
Q. 5 Select the most appropriate option to fill in the blanks.

I happily $\qquad$ to the demand of our workmen for extra bonus. After all, this year our sales
had all expectations.

Ans
Х 1. exceeded, exceeded
2. exceeded, acceded
3. acceded, exceeded

X 4. acceded, acceded
Q. 6 Select the most appropriate option to collocate with the word 'look' to fill in the blank.

Let's take a $\qquad$ look through this file.
Ans
X 1.swift
X 2. fast
X 3. rapid
4. quick
Q. 7 Select the most appropriate option to fill in the blanks.

He ordered his soldiers to search $\qquad$ whole forest for $\qquad$ lost puppy of the boy.
Ans

1. the, the
2. the, a

X3.a, a
X 4. a, the
Q. 8 Select the most appropriate option to fill in the blank.

Tom: "What are you going to do with this laptop?"
Peter: "I $\qquad$ it."

Ans

1. will sell
$X$ 2. was selling
$X$ 3. sell
X 4. sold
Q. 9 Select the most appropriate option to fill in the blank. At the association's meeting, people voted by raising $\qquad$ hands.

Ans

1. their
2. them
3. theirs
4. our
Q. 10 Select the most appropriate option to fill in the blank. Last night, a thick fog caused a massive accident $\qquad$ the Expressway.
Ans

- 1. on
$X$ 2. at
$X$ 3. above
X 4. over
Q. 11 Select the most appropriate option to fill in the blank. Last year, I $\qquad$ a house in Shimla.
Ans
- 1. bought
$X$ 2. buy
$X 3$. was buying
$X 4$. have bought
Q. 12 Parts of a sentence are given below in jumbled order. Arrange the parts in the correct order to form a meaningful sentence.
A. Shivaji's son Sambhaji grew up
B. under the shelter and watch
C. of his father and,
D. more importantly, his grandmother, Jijabai

Ans
$X 1$. ABDC
X 2. ADCB
X 3.ACBD
4. $A B C D$
Q. 13 Select the most appropriate ANTONYM of the given word.

Scrumptious
Ans 1.Tasteless
$X$ 2. Delicious
$\times$ 3. Appetising
$\times$ 4. Satisfying
Q. 14 Select the most appropriate synonym of the given word.

Expedite
Ans
X 1. Halt
2. Hasten
3. Hold
4. Hinder
Q. 15 Identify the proverb that best suits the following scenario.

As long as the outcome is good, problems on the way don't matter.
Ans
$X 1$. An hour in the morning is worth two in the evening.
2. All is well that ends well.
$X$ 3. All is fair in love and war.
X 4. Every cloud has a silver lining.
Q. 16 Select the most appropriate meaning of the given idiom.

Bag of bones
Ans
X 1. An unreliable person
X 2. An unsolved issue
3. A very thin person

X 4. A bag full of trash
Q. 17 Select the most appropriate option to collocate with the word 'tired' to fill in the blank. Sometimes she $\qquad$ tired of looking after small children.
Ans
X 1 .goes
$X$ 2. begins
X 3. makes
4. gets

Status: Answered
Chosen Option: $\mathbf{4}$
Q. 18 Select the most appropriate option to fill in the blank.

Much of $\qquad$ credit for making this school great goes to its Principal.

Ans
Х 1. No word required
X 2 . an
X3.a
4. the
Q. 19 Select the most appropriate option to fill in the blank and complete the given proverb correctly.
A journey of thousand miles begins $\qquad$ -.
Ans $\quad$ 1. after finishing school
X 2. gradually
X 3. from home
4. with a single step
Q. 20 Select the most appropriate option to fill in the blank. Look, the children $\qquad$ such fun on this swing!
Ans
X 1. have
2. are having

X 3. had
X 4. have had

Section : Domain Knowledge
Q. 1 Let $A=\left(\begin{array}{cc}\alpha & 1 \\ 0 & -1\end{array}\right)$ and $B=\left(\begin{array}{ll}4 & 1 \\ 0 & 1\end{array}\right)$, such that $A^{2}=B$, then the value of $\alpha$ is:

Ans
X1. -2
$\times 2.1$
-3. 2
X4. -1
Q. 2 For a 100 ohm resistor connected to a $220 \mathrm{~V}, \mathbf{5 0 ~ H z ~ A C ~ s u p p l y , ~ t h e ~ n e t ~ p o w e r ~ c o n s u m e d ~}$ over a full cycle is:
Ans
X 1.220 W
X2. 4.84 W
X 3.2.20 W
4. 484 W

## Q. 3 Capacitors connected in series behave like:

Ans
X 1. galavanometer
$X$ 2. resistors connected in series
X 3. potentiometer

- 4. resistors connected in parallel
Q. 4 Consider a circuit with Resistance, Inductor and Capacitor connected in series. The phase difference between the current and the alternating voltage (at resonance) is:
Ans
X $1 . \pi / 2$

2. $\pi$
3. 0
4. $\pi / 4$
Q. 5 If A and B are mutually exclusive events with $P(A)=\frac{1}{2} P(B)$, then $P(A)=$ ?

Ans
ค. $\frac{1}{3}$
$\times 2 . \frac{1}{6}$
$\times 3 . \frac{1}{4}$
$\times 4 . \frac{1}{2}$
Q. 6 The electric field of a plane electromagnetic wave oscillates sinusoidally with a frequency of $2.0 \times 10^{10} \mathrm{~Hz}$ and an amplitude of $60 \mathrm{Vm}^{-1}$. The wavelength (in cm ) of the wave is ( $\mathrm{c}=3$ $\times 10^{8} \mathrm{~ms}^{-1}$ ):
Ans
$\times 1.0 .15$
X 2. 0.015
$\times 3.0 .66$

- 4.1 .5
Q. 7 A parallel plate capacitor has a capacitance of ' $C$ '. If the distance between the plates is reduced by half and the space between the plates is filled with a medium having dielectric constant 6 , the new capacitance is:
Ans
- 1.12 C
$\times 2.2 \mathrm{C}$
X 3.6C
$\times 4 . \mathrm{c} / 3$
Q. 8 Let * be binary operation defined on R by $p * q=\frac{p+q}{2}, \forall p, q \in R$. The operation is:

Ans
$X$ 1. neither associative nor commutative
2. commutative but not associative
$X$ 3. commutative and associative
$X$ 4. associative but not commutative
Q. 9 Electric conduction in a semiconductor takes place due to:

Ans $\times 1$. neither holes nor electrons
2. both holes and electrons
3. only electrons
4. only holes
Q. 10 Consider a conductor of metal with non-uniform cross-section. The parameter that is constant is:

Ans
$X 1$. drift velocity
$X$ 2. drift speed
X 3. current density
4. current
Q. 11 The radius of the innermost orbit of hydrogen atom is $5.3 \times 10^{-11} \mathrm{~m}$. The radii of $\mathrm{n}=2$ orbit is:
Ans
$X 1.21 .2 \times 10^{-10} \mathrm{~m}$
$X 2.10 .6 \times 10^{-10} \mathrm{~m}$
$\times 3.1 .06 \times 10^{-10} \mathrm{~m}$
4. $2.12 \times 10^{-10} \mathrm{~m}$
Q. 12

The derivative of $\tan ^{-1}\left(\frac{\sqrt{1+x^{2}}-1}{x}\right)$ with respect to $\tan ^{-1} x$ is:
Ans
x 1. $\frac{1}{1+x^{2}}$
2. $\frac{1}{2}$

⒊ $\frac{\sqrt{1+x^{2}}-1}{x^{2}}$
$\times 4.1$
Q. 13

The value of $\int \frac{1}{2 x^{2}+x-3} d x$ is:
Ans
X 1. $\log \left(\frac{2 x+3}{x-1}\right)+c$
2. $\frac{1}{5} \log \left(\frac{2 x+3}{x-1}\right)+c$
× 3. $\log \left(\frac{x-1}{2 x+3}\right)+c$
4. $\frac{1}{5} \log \left(\frac{x-1}{2 x+3}\right)+c$
Q. 14 The resistivity of a current-carrying conducting wire is $p$. If the wire is doubled in length and its area of cross-section is reduced by half, the new resistivity is:
Ans
$X$ 1. double that of the old value
$X$ 2. four times that of the old value
$\times 3$. half that of the old value
4. same as the old value
Q. 15

If $\left|\begin{array}{ccc}2 x-4 & 4 & 0 \\ 2 & x-1 & 1 \\ 2 & 2 & 0\end{array}\right|=0$, then $x=$ ?
Ans
X 1. -4
-2. 4
$\times$ 3. -5
X4. 5
Q. 16 If $f(x)=6-5 x, f: \mathbf{R} \rightarrow \mathbf{R}$, where $\mathbf{R}$ is a set of all real numbers, then $f$ is:

Ans $\quad \times 1$. only onto function
$\checkmark$ 2. one to one and onto function
$X$ 3. only one to one function
$X$ 4. only function
Q. 17

If $\int \frac{\sqrt{4+x^{2}}}{x^{6}} d x=\frac{A\left(4+x^{2}\right)^{3 / 2}\left(B x^{2}-6\right)}{x^{5}}+C$, then A is:
Ans

$$
\text { 1. } \frac{1}{120}
$$

X2. $-\frac{1}{120}$
$\times 3.120$
X 4. -120
Q. 18

The value of $\lim _{x \rightarrow \infty}\left(\frac{2 x-1}{2 x+3}\right)^{\frac{x+1}{2}}$ is:
Ans
$\times 1.0$
2. $\frac{1}{e^{2}}$
3. $\frac{1}{e}$
$\times 4$. e
Q. 19

If $x=a\left(t+\frac{1}{t}\right)$ and $y=a\left(t-\frac{1}{t}\right)$, then $\frac{d x}{d y}$ is:
Ans
$\times 1 . \frac{1}{x}$
2. $\frac{y}{x}$
$\times 3.1$
$\times 4 . \frac{x}{y}$
Q. 20 A straight wire carries a current from north to south. The direction of the magnetic field at a point east of the wire will be:
Ans
$X 1$. south to north
$X$ 2. vertically downward
X 3. north to south
4. vertically upward
Q. 21 The frequency of the electromagnetic wave produced by an oscillating charge particle (oscillating with frequency v ) is:
Ans
X 1.2 v
$\times 2.0$
X 3.v/2

- 4.v
Q. 22 The average value of alternating current during a full cycle is ( $\mathrm{i}_{0}$ is the peak value):

Ans $\quad \times 1 . i_{0} / 2 \pi$
$\times 2.2 i_{0} / \pi$
$\times 3 . \mathrm{i}_{0}$

- 4.0


## Q. 23 The charge carriers in a p-type semiconductor are:

Ans
$X 1$. only holes
2. large number of holes and a small number of electrons
$X$ 3. large number of electrons and a small number of holes
$X$ 4. equal number of holes and electrons
Q. 24 The electric flux passing through a surface of area $A=8 j \mathrm{~m}^{2}$ in an electric field vector $E=2 i$ $+3 \mathrm{j}-4 \mathrm{k} / \mathrm{m}$ (bold is for vectors) is:
Ans
X 1.16 V-m
X $2.32 \mathrm{~V}-\mathrm{m}$
X 3. $-32 \mathrm{~V}-\mathrm{m}$
4. $24 \mathrm{~V}-\mathrm{m}$
Q. 255 apples and 6 oranges are kept in a box. If three fruits are chosen at random, then the probability that 2 apples and one orange are picked is:

Ans
-1. $\frac{4}{11}$
×2. $\frac{5}{11}$
$\times 3 . \frac{6}{11}$
×4. $\frac{4}{13}$
Q. 26 Consider three vectors $p=2 i+3 j+4 k, q=i+4 j-k$ and $r=2 i+3 j+k$. If $p, q$ and $r$ denote the position vector of three non-collinear points, then the equation of the plane containing these points is:

Ans
X1. $x+y+5=0$
X2. $\mathrm{x}-\mathrm{y}-5=0$
X3. $x-y+5=0$
2. $x+y-5=0$
Q. 27 A closely wound solenoid 80 cm long has 5 layers of windings of 400 turns each. The diameter of the solenoid is 1.8 cm . If the current carried is 8.0 A , the magnitude of the magnetic field inside the solenoid (near the centre) is:
Ans
X $1.2 \times 10^{-2} \mathrm{~T}$
$\times 2.2 .5 \mathrm{~T}$

- $3.2 .5 \times 10^{-2} \mathrm{~T}$
$\times 4.2 \mathrm{~T}$
Q. 28 Consider the solar system as a large atom. The quantum number $(\mathrm{n})$ that characterises Earth's orbit (radius $=1.5 \times 10^{11} \mathrm{~m}$ ) with Earth moving at an orbital speed of $3 \times 10^{4} \mathrm{~m} / \mathrm{s}$ is (mass of Earth is $6 \times 10^{24} \mathrm{~kg}$ ):
Ans
X 1.2 .56

2. $2.56 \times 10^{74}$
$\times 3.2 .56 \times 10^{73}$
$\times 4.2 .56 \times 10^{39}$
Q. 29 The magnitude of magnetic force per unit length ( $\mathrm{N} / \mathrm{m}$ ) on a wire carrying a current of 8 A and making an angle of $30^{\circ}$ with the direction of a uniform magnetic field of 0.15 T is:
Ans
X 1.0 .8
$\times 2.1 .2$
$\times 3.0 .15$

- 4.0 .6
Q. 30

The number of solutions of the matrix equation $A^{2}=\left[\begin{array}{ll}1 & 1 \\ 2 & 3\end{array}\right]$ is:
Ans

1. more than 2
$X$ 2. no solution
$X$ 3. less than 2
$\times 4$. exactly 2
Q. 31 A coin is tossed $n$ times. If the probability of getting at least two heads is greater than that of getting at least three tails
by $\frac{21}{128}$, then n is:
Ans
$\times 1.5$
$\times 2.6$
$\times 3.8$
-4.7
Q. 32 If $\mathrm{A}=\{1,2,3,4,5\}$, then the relation $\mathrm{R}=\{(2,3),(3,4),(2,4)\}$ on A is:

Ans $\quad \times 1$. symmetric only
$\checkmark$ 2. transitive only
$X$ 3. symmetric and transitive only
$X$ 4. reflexive and transitive only
Q. 33

If $f(16)=16$ and $f^{\prime}(16)=5$, then $\lim _{x \rightarrow 16} \frac{\sqrt{f(x)}-4}{\sqrt{x}-4}=$ ?
Ans $\times 1.4$
-2. 5
$\times 3.8$
$\times 4.6$
Q. 34 If $a \sin ^{2} \theta+b \cos ^{2} \theta=c$, then $\tan ^{2} \theta=$ ?

Ans
$\times$ 1. $\frac{a-c}{c-b}$
2. $\frac{c-b}{a-c}$
×3. $\frac{a-c}{b-c}$
×4. $\frac{b-c}{a-c}$
Q. 35 A 100 W light bulb is able to convert $10 \%$ of its power to visible radiation. The average intensity of the visible radiation at a distance of 1 m from the bulb is:
Ans
1.0.8 W/m²
2. 10 W
3. $0.08 \mathrm{~W} / \mathrm{m}^{2}$
4. $8 \mathrm{~W} / \mathrm{m}^{2}$
Q. 36 The instrument that is based on the principle that when an electric current flows in a coil placed in a magnetic field, a deflecting torque acts upon the coil is:
Ans

1. moving coil galvanometer

X 2. moving coil flywheel
$X$ 3. rheostat
X 4. current carrying conductor
Q. 37 Isotopes have the same number of:

Ans
$X 1$. nucleons
2. protons
$X$ 3. deuterons
$X$ 4. neutrons
Q. 38 If $\mathbf{a}=\vec{i}-2 \vec{j}+\overrightarrow{\mathrm{k}}, \mathbf{b}=\vec{i}+\overrightarrow{\mathrm{k}}, \mathbf{c}=2 \vec{j}-\overrightarrow{\mathrm{k}}$, then the area (in sq. units) of a parallelogram with diagonals $\mathrm{a}+\mathrm{b}$ and $\mathrm{b}+\mathrm{c}$ will be:
Ans
X 1. $2 \sqrt{14}$
$\times 2 . \frac{\sqrt{14}}{2}$
3. $\sqrt{14}$

X4. 14
Q. 39

The value of the determinant $\left|\begin{array}{lll}b^{2}-a b & b-c & b c-a c \\ a b-a^{2} & a-b & b^{2}-a b \\ b c-a c & c-a & a b-a^{2}\end{array}\right|=$ ?
Ans
X 1. abc

- 2. 0

X 3. $a b+b c+c a$
X4. $a+b+c$
Q. 40 If $f(x)=\frac{1}{1+x}, g(x)=f\{f(x)\}$ and $h(x)=f[f\{f(x)\}]$, then the value of $f(x) \cdot g(x) \cdot h(x)$ is:

Ans
X 1. $\frac{1}{2 x-3}$
X2. -1
X 3. $\frac{1}{2 x}$
4. $\frac{1}{2 x+3}$
Q. 41 If $3 \sin x+3 \sin 4 x=\sin y$ and $3 \cos x+3 \cos 4 x=\cos y$, then $\cos 3 \mathrm{x}=$ ?

Ans
X 1. 1/18
2. $-17 / 18$

X 3. $-1 / 18$
X4. $17 / 18$
Q.42 An electron beam with cross-section area $1.0 \mathrm{~mm}^{2}$ has $6 \times 10^{16}$ electrons ( $q=1.6 \times 10^{-19}$ C) passing per second perpendicular to any section. The current density (ampere per metre ${ }^{2}$ ) in the beam is:
Ans
$\times 1.9 .6 \times 10^{2}$
$\times 2.9 .6 \times 10^{-3}$

- $3.9 .6 \times 10^{3}$
$\times 4.9 .6$
Q.43 A radioactive nucleus emits 3 alpha particles and 2 positrons. For the resultant nucleus, the ratio of neutrons to protons is (consider the initial nucleus to have atomic number Z and atomic mass A):
Ans
X 1. $(\mathrm{A}-\mathrm{Z}-8) /(\mathrm{Z}-4)$
X 2. $(A-Z-4) /(Z-2)$

3. $(A-Z-4) /(Z-8)$

X 4. $(A-Z-12) /(Z-4)$
Q. 44 The ratio of the volume of an atom to the volume of the nucleus is (in terms of order of magnitude):
Ans
$\times 1.10^{25}$
$\times 2.10^{5}$
$\times 3.10^{10}$

- $4.10^{15}$
Q. 45 The source of energy in stars is:

Ans
$X$ 1. electron degeneracy
$X$ 2. dissociation of atoms
3. nuclear fusion reaction
4. nuclear fission reaction
Q. 46 Consider gamma rays, X-rays and UV rays travelling in a vacuum. All of these are traveling with $\qquad$ _.

Ans
X 1. same speed and same frequency
2. same speed but different wavelengths

X 3. same frequency but different speeds
X 4. same wavelength but different speeds
Q. 47 If $a=m \vec{i}+16 \vec{j}$ and $|\mathrm{a}|=20$, then find the value of m .

Ans

1. 12
$\times 2.10$
X 3.11
X4.14
Q. 48 In the hydrogen atom, transition takes place from $n=3$ to $n=2$ orbit. The wavelength of the emitted radiation lies in the $\qquad$ region.
Ans

- 1. visible

X 2. UV
X 3. X-ray
X 4. infrared
Q. 49 The half life of a radioactive substance is 10 years and its initial mass is $\mathbf{1 g}$. The remaining amount after 20 years is $\qquad$
Ans
X 1.0 .75 g
X2. 1.00 g
X 3.0 .50 g

- 4.0 .25 g
Q. 50 The angle between the lines $3 x=3 y=-2 z$ and $2 x=-y=-3 z$ is:

Ans
$\times 1.30^{\circ}$
$\times 2.60^{\circ}$

- 3. $90^{\circ}$
$\times 4.45^{\circ}$
Q. 51 The value of $\sin 10^{\circ}-\cos 10^{\circ}$ is:

Ans
$\times 1 .-\sqrt{2} \cos 35^{\circ}$
2. $-\sqrt{2} \sin 35^{\circ}$
3. $\sqrt{2} \cos 35^{\circ}$

X4. $\sqrt{2} \sin 35^{\circ}$
Q. 52 The coordinates of the point that divides the join of $(5,6)$ and $(-3,6)$ in the ratio $3: 5$ are:

Ans
X 1. $(2,-6)$

- 2. $(2,6)$

X 3. $(-2,-2)$
X 4. $(-2,6)$
Q. 53 What is the length of the perpendicular drawn from point $(3,4,5)$ to line $\frac{x}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ ?

Ans
X 1. $3 \sqrt{21}$
2. $\frac{3 \sqrt{21}}{7}$
$\times 3 . \frac{\sqrt{21}}{7}$
$\times 4 . \frac{3}{7}$
Q. 54 An unbiased $p-n$ junction has holes diffusing from $p$-region to the $n$-region because:

Ans $\quad \times 1$. holes move across the junction following the potential difference
$X$ 2. free electrons in the $n$-region attracts them
$X$ 3. holes in the p-region repel them
4. hole concentration in p-region is more compared to the $n$-region
Q. 55 The value of $k$ for which straight line $x+y+3 z-2=0=2 x+y-z-3$ is parallel to the plane $3 x+2 y+k z-4=0$ is:

Ans $\times 1.3$
$\times 2.1$
-3. 2
X 4. -1
Q. 56

The value of $\int \frac{x^{3 / 2}}{\sqrt{1+x^{5}}} d x$ is:
Ans

1. $\frac{2}{5} \log \left(x^{5 / 2}+\sqrt{1+x^{5}}\right)+c$

X 2. $\frac{1}{2} \log \left(\sqrt{1+x^{5}}\right)+c$
⒊ $\frac{1}{2} \log \left(\frac{1+x^{5}}{1-x^{5}}\right)+c$
x. $\frac{2}{5} \log \left(x^{5 / 2}-\sqrt{1+x^{5}}\right)+c$
Q. 57 The area bound by the parabolas $y=3 x^{2}$ and $x^{2}-y+4=0$ is:

Ans
$\times$ 1. $\frac{16}{3}$
2. $\frac{16}{3} \sqrt{2}$
× 3. $\frac{16}{3} \sqrt{3}$
$\times 4.16 \sqrt{2}$
Q. 58 If $\mathrm{P}(2,3,4), \mathrm{Q}(5,8,7)$ and $\mathrm{R}(-1,-2,1)$ are collinear, then R divides PQ in the ratio:

Ans
$X$ 1.2:1 externally
X 2. 1:2 internally
X 3. 2: 1 internally

- 4. 1:2 externally
Q. 59 When the length of a microscope tube is increased, its magnifying power:

Ans
X 1. remains the same
X 2. increases
X 3. becomes zero
4. decreases
Q. 60 Silicon (at $\mathbf{3 0 0} \mathrm{K}$ ) has hole concentration (and equal electron concentration) of $1.5 \times 10^{16}$ $\mathrm{m}^{-3}$. After indium is doped, the new hole concentration is $4.5 \times 10^{22} \mathrm{~m}^{-3}$. The value of electron concentration in the doped silicon is:

Ans
$\times 1.4 .5 \times 10^{22} \mathrm{~m}^{-3}$
$\times 2.3 .0 \times 10^{6} \mathrm{~m}^{-3}$
$X 3.1 .5 \times 10^{16} \mathrm{~m}^{-3}$

- $4.5 .0 \times 10^{9} \mathrm{~m}^{-3}$

