DAV POLICE PUBLIC SCHOOL, JHAJJAR

HOLIDAY HOMEWORK (2025-26)

CLASS XII (SCIENCE)

Physics

1. Three charges 4q, Q and q are in a straight line in the position of 0, l/2 and l respectively. The resultant force on q will be zero, if Q =

(a) -q (b) -2q (c) -q/2 (d) 4q

2. Dielectric constant of pure water is 81. Its permittivity will be

(a) 7.12 * 10^{-10} MKS units (b) 8.86 * 10^{-12} MKS units

(c) 1.02 * 10^{13} MKS units (d) Cannot be calculated

3. When 10^{14} electrons are removed from a neutral metal sphere, the charge on the sphere becomes

(a) 16 μC (b) -16 μC (c) 32 μC (d) -32 μC

4. The force between two charges 0.06 m apart is 5 N. If each charge is moved towards the other by 0.01m, then the force between them will become

(a) 7.20 N (b) 11.25 N (c) 22.50 N (d) 45.00 N

5. Two point charges +3 μC and +8 μC repel each other with a force of 40 N. If a charge of -5 μC is added to each of them, then the force between them will become

(a) -10 N (b) +10 N (c) +20 N (d) -20 N

6. Two point charges of 20 μC and 80 μC are 10 cm apart. Where will the electric field strength be zero on the line joining the charges from 20 μC charge

(a) 0.1 m (b) 0.04 m (c) 0.033 m (d) 0.33 m

7. What is the potential energy of the equal positive point charges of 1 μC each held 1 m apart in air

(a) 9 × 10-3 J (b) 9 × 10-3 eV (c) 2 eV/m (d) Zero

8. An electron enters between two horizontal plates separated by 2mm and has a potential difference of 1000V. The force on electron is

(a) 8 × 10-12 N (b) 8 × 10-14 N (c) 8 × 109 N (d) 8 × 1014 N

9. Electric charges of +10 μC, +5 μC, -3 μC and +8 μC are placed at the corners of a square of side √2 m. the potential at the centre of the square is

(a) 1.8 V (b) 1.8 × 106 V (c) 1.8 × 105 V (d) 1.8 × 104 V

10. Two charges of 4 μC each are placed at the corners A and B of an equilateral triangle of side Length 0.2 m in air. The electric potential at C is

(a) 9 × 104 V (b) 18 × 104 V (c) 36 × 104 V (d) 36 × 10-4 V

11. If the temperature of a good conductor decreases, how does the relaxation time of electrons in the conductor change?

12. If potential difference V applied across a conductor is increased to 2V, how will the drift velocity of the electron change?

13. State one condition for maximum current to be drawn from the cell?

14. Two wires A and B are of the same metal and of same length have their areas of cross section in the ratio 2:1 if the same potential difference is applied across each wire in turn, what will be the ratio of current flowing in A & B ?

15. A Carbon resistor has three strips of red colour and a gold strip. What is the value of the resistor? What is its tolerance?

16. Why is constantan or manganin used for making standard resistors?

17. The storage battery of a car has an emf of 12V. If the internal resistance of the battery is 0.4Ω, what is the maximum current that can be drawn from the battery?

18. What is drift velocity? Derive expression for drift velocity of electrons in a good conductor in terms of relaxation time of electrons?

19. A battery of emf E and internal resistance r sends a current, I1,I2 when connected to an external resistance of R1,R2 respectively. Find the emf. and internal resistance of the battery.

20. A cylindrical wire is stretched to increase its length by 10 calculate the percentage increase in resistance?

21. Three identical cells, each of emf. 2V and unknown internal resistance are connected in parallel. This combination is connected to a 5 ohm resistor. If the terminal voltage across the cell is 1.5 volt. What is the internal resistance of each cell? Hence define the internal resistance of a cell?

22. Show that when a current is divided between two resistances in accordance with Kirchhoff's laws, the heat provided is minimum.
23. What is the work done in moving a 2μC point change from corner A to corner B of a square ABCD when a 10μC charge exists at the centre of the square?
25. The Plates of a charged capacitor are connected by a voltmeter. If the plates of the capacitor are moved further apart, what will be the effect on the reading of the voltmeter?
26. Show mathematically that the potential at a point on the equatorial line of an electric dipole is Zero?
27. The distance between the plates of a parallel plate capacitor is d. A metal plate of thickness (d/2) is placed between the plates. What will be the effect on the capacitance?
28. Prove that the energy stored in a parallel plate capacitor is given by 1/2CV2.
29. A regular hexagon of side 10cm has a charge 5μC at each of its vertices. Calculate the potential at the centre of the hexagon.
30. In a parallel plate capacitor with air between the plates, each plate has an area and the distance between the plates is 3mm. Calculate the capacitance of the capacitor. If this capacitor is connected to a 100V supply, what is the charge on each plate of the capacitor?

Chemistry

1. Why does copper not replace hydrogen from acids?
2. Why are E- values for Mn, Ni and Zn more negative than expected?
3. Why is the first ionisation enthalpy of Cr is lower than that of Zn?
4. Transition elements show high melting points. Why?
5. When Cu^{2+} ion is treated with KI, a white precipitate is formed. Explain the reaction with the help of a chemical equation.
6. When a brown compound of manganese (A) is treated with HCl it gives a gas (B). The gas taken in excess, reacts with NH to give an explosive compound (C). Identify compounds A, B and C.
7. Although fluorine is more electronegative than oxygen, but the ability of oxygen to stabilise higher oxidation states exceeds that of fluorine. Why?
8. Although Cr^{3+} and Co^{2+} ions have same number of unpaired electrons, but the magnetic moment of Cr^{3+} is 3.87 B.M. and that of Co^{2+} is 4.87 B.M. Why?
9. Ionisation enthalpies of Ce, Pr and Nd are higher than Th, Pa and U. Why?
10. On the basis of Lanthanoid contraction, explain the following

    I. Nature of bonding in Lu_2O_3 and La_2O_3
    II. Trends in the stability of oxo salts of lanthanides from La to Lu.
    III. Stability of the complexes of lanthanides.
    IV. Radii of 4d and 5d block elements
    V. Trends in acidic character of lanthanide oxides.

11.(a) Answer the following questions:

(i) Which element of the first transition series has the highest second ionisation enthalpy?

(ii) Which element of the first transition series has highest the third ionisation enthalpy?

(iii) Which element of the first transition series has the lowest enthalpy of atomisation?

(b) Identify the metal and justify your answer.

(i) Carbonyl $M(CO)_5$

(ii) MO_3F

12.(a) Transition metals can act as catalysts because these can change their oxidation state. How

does Fe(III) catalyse the reaction between iodide and persulphate ions?

(b) Mention any three processes where transition metals act as catalysts.

13. A violet compound of manganese (A) decomposes on heating to liberate oxygen and compounds (B) and (C) of manganese are formed. Compound (C) reacts with KOH in the presence of potassium nitrate to give compound (B). On heating compound (C) with conc. H_2SO_4 and NaCl, chlorine gas is liberated and a compound (D) of manganese along with other products is formed. Identify compounds A to D and also explain the reactions involved.
14. Give the electronic configuration of the following complexes on the basis of Crystal Field Splitting theory.

$[CoF_6]^{3-}$, $[Fe(CN)_6]^{4-}$ and $[Cu(NH_3)_6]^{2+}$.

15. Arrange the following complex ions in increasing order of crystal field splitting energy (Δ_o) : $[Cr(Cl)_6]^{3-}$, $[Cr(CN)_6]^{3-}$, $[Cr(NH_3)_6]^{3+}$.

16. $CuSO_4.5H_2O$ is blue in colour while $CuSO_4$ is colourless. Why?
17. Using crystal field theory, draw an energy level diagram, write electronic configuration of the central metal atom/ion and determine the magnetic moment value in the following:

(i) $[CoF_6]^{3-}$, $[Co(H_2O)_6]^{2+}$, $[Co(CN)_6]^{3-}$

(ii) $[FeF_6]^{3-}$, $[Fe(H_2O)_6]^{2+}$, $[Fe(CN)_6]^{4-}$

18. Using valence bond theory, explain the following in relation to the complexes given below:

$[Mn(CN)_6]^{3-}$, $[Co(NH_3)_6]^{3+}$, $[Cr(H_2O)_6]^{3+}$, $[FeCl_6]^{4-}$

(i) Type of hybridisation.

(ii) Inner or outer orbital complex.

(iii) Magnetic behaviour.

(iv) Spin only magnetic moment value.

19. $CoSO_4CI.5NH_3$ exists in two isomeric forms 'A' and 'B'. Isomer 'A' reacts with $AgNO_3$ to give white precipitate, but does not react with $BaCl_2$. Isomer 'B' gives white precipitate with $BaCl_2$ but does not react with $AgNO_3$. Answer the following questions.

(i) Identify 'A' and 'B' and write their structural formulas.

(ii) Name the type of isomerism involved.

(iii) Give the IUPAC name of 'A' and 'B'.

20. What is the relationship between the observed colour of the complex and the wavelength of light absorbed by the complex?

21. Why are different colours observed in octahedral and tetrahedral complexes for the same metal and same ligands?

22. Components of a binary mixture of two liquids A and B were separated by distillation. After some time separation of components stopped and the composition of the vapour phase became the same as that of the liquid phase. Both the components started coming in the distillate. Explain why this happened.

23. Explain the solubility rule "like dissolves like" in terms of intermolecular forces that exist in solutions.

24. Discuss the biological and industrial importance of osmosis.

25. How can you remove the hard calcium carbonate layer of the egg without damaging its semipermeable membrane? Can this egg be inserted into a bottle with a narrow neck without distorting its shape? Explain the process involved.

26. Why is the mass determined by measuring a colligative property in case of some solutes are abnormal? Discuss it with the help of the Van't Hoff factor.
27. Explain why on the addition of 1 mol of NaCl to 1 litre of water, the boiling point of water increases, while the addition of 1 mol of methyl alcohol to one litre of water decreases its boiling point.

28.(a) Explain the following phenomena with the help of Henry's law.
(i) Painful condition known as bends.
(ii) Feeling of weakness and discomfort in breathing at high altitude.
(b) Why does soda water bottle kept at room temperature fizzes on opening?
29. Why is the vapour pressure of an aqueous solution of glucose lower than that of water?
30. How does sprinkling of salt help in clearing the snow-covered roads in hilly areas? Explain the phenomenon involved in the process.

Biology

A. Practice these questions related to Ch-1, 2,11,12,13

1. (a) Discuss the development of endosperm in coconut.
(b) What are tassels of corn cob?
(c) Mention one similarity between autogamy and geitonogamy.
2. What is apomixis? Explain any two ways by which apomictic seeds develop.
3. What is agamopermy? How is it different from parthenocarpy and parthenogenesis?
4. Draw a neat, labelled diagram of an anatropous ovule.
5. Describe how the changing levels of FSH, LH and progesterone during menstrual cycle induce changes in the ovary and the uterus in human females?
6. Write the specific location and function of the following cells in human males
   a. Leydig cells
   b. Sertoli cells
   c. Primary spermatocytes
7. Schematically represent the process of gametogenesis in females. What is the significance of epididymis in male fertility?
8. Compare the microsporogenesis in flower to the spermatogenesis in Human.
9. Compare the megasporogenesis in flower to the oogenesis in Human female.
10. Explain the phases of menstrual cycle.
11. Differentiate between logistic and exponential growth curve.
12. How is commensalism different from ammensalism?
13. Define brood parasitism.
14. Write the major differences between In-situ and Ex-situ conservation.
15. Briefly explain
   A. Microsporogensis
   B. Megasporogenesis

B. Project Report

Make investigatory project with following heading on it:

First page topic submitted to/submitted by certificate.

Any topic related to class 12th syllabus example HIV virus, cancer, reproductive health, ecology etc.

C. Revise Ch-1, 2,11,12,13

COMPUTER SCIENCE

CHAPTER 1, 2 & 3

PYTHON REVISION TOUR I & II, WORKING WITH FUNCTIONS

ERROR FINDING QUESTIONS

Q1.Find error in the following code(if any) and correct code by rewriting code and underline the correction;-

```
x= int("Enter value of x:")
for in range [0,10]:
if x=y print( x + y) else:
print( x-y)
```

Q2.Rewrite the following program after finding and correcting syntactical errors and underlining it.

```
a, b = 0  if (a = b) a
+b = c print( z)
```

Q3.Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

```
250 = Number
WHILE Number<=1000:
if Number=>750 print
(Number)
Number=Number+100 else
print( Number*2)
Number=Number+50
```

Q4.Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

```
Val = int(rawinput("Value:"))
Adder = 0
for C in range(1,Val,3)
Adder+=C if C%2=0:
Print (C*10)
Else: print (Adder)print  (C*)
```

Q5.Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

```
25=Val
for I in the range(0,Val) if I%2==0:
print(
I+1)
Else:
print (I-1
```

Q6.Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

```
STRING=""WELCOME NOTE""
for S in range[0,8]:print (STRING(S))
```

Q7.Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

```
a=int{input("ENTER FIRST NUMBER")}
b=int(input("ENTER SECOND NUMBER"))
```

```
c=int(input("ENTER THIRD NUMBER"))
if a>b and a>c
        print("A IS GREATER")
if b>a and b>c:
        Print(" B IS GREATER")
if c>a  and c>b:
print(C IS GREATER)
```

Q8.Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

```
i==1
a=int(input("ENTER FIRST NUMBER"))
FOR i in range[1, 11]; print(a,"*=", i
,"=",a * i)
```

Q9.Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

```
a=”1”
while a>=10:
print("Value of a=",a) a=+1
```

Q10.Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.

```
Num=int(rawinput("Number:")) sum=0
for i in range(10,Num,3)
Sum+=1 if i%2=0:
print(i*2) Else: print(i*3
print Sum)
```

OUTPUT FINDING QUESTIONS

Q1.Find output generated by the following code:

```
p=10 q=20
p*=q//3 q+=p=q**2
print(p, q)
```

Q2.Find output generated by the following code:

```
String Str=”Computer” Str[-
4:] Str*2
```

Q3.Find out the output of the Following –

```
x=20
x=x+5 x=x-10 print
(x) x, y=x-1,50 print
(x, y)
```

Q4.Find out the output of the Following –

```
for a in range(3,10,3):
for b in range(1,a,2):
print(b, end=’ ‘) print( )
```

Q5.FIND OUTPUT OF FOLLOWING

```
x=10
y=5
for i in range(x-y*2):
print("%",i)
```

Q6.Find output generated by the following code:

```
x="one"
            y="two
" c=0
while c<len(x):
print(x[c],y[c]) c=c+1
```

Q7.Find output generated by the following code:

```
for i in range(-1,7,2):
for j in range(3): print(i,j)
```

Q8.Find output generated by the following code:

```
string=”aabbcc”
count=3 while True:
if string[0]=='a': string=string[2:] elif
string[-1]=='b': string=string[:2] else:
count+=1 break
print(string)
print(count)
```

Q9. Find output generated by the following code:

```
x="hello world" print(x[:2],x[:-2],x[-
2:]) print(x[6],x[2:4])
print(x[2:-3],x[-4:-2])
```

OUTPUT AND ERROR BASED QUESTIONS ON FUNCTIONS IN PYTHON

Q1.Find the output of the following numbers:

```
Num = 20
Sum = 0
for I in range (10, Num, 3)
Sum+=i
if i%2==0:
print i*2
else:
print i*3
```

Q2.Find the output of the following

```
Text=”gmail@com”
L=len(Text) ntext=” “
for i in range (0,L):
if  text[i].isupper():
ntext=ntext+text[i].lower() elif text[i].isalpha():
ntext=ntext+text[i].upper()
else:
ntext=ntext+’bb’
```

Q3.Find the output of the following-

```
def  power (b , p):
r = b ** P return r

def calcSquare(a):
a = power (a, 2) return a

n = 5
result = calcSquare(n) print (result)
```

Q4.Find the output of the following-

```
import math
print (math. Floor(5.5))
```

Q5.Find the output

```
def gfg(x,l=[]) :
for I in range(x):
l.append(i*i)  print(l)
gfg(2)  gfg(3,[3,2,1])
gfg(3)
```

Q6.Find the output of the following-

```
count =1
def  dothis():
global count for I in (1,2,3)
count+=1 dothis( ) print count
```

Q7.Find the output of the following-

```
def addem(x,y,z):
Print(x+y+z) def prod(x,y,z):
return
x*y*z A=addem(6,16,26)
B=prod(2,3,6)  Print(a,b)
```

Q8. def Func(message,num=1):

```
print(message*num)
Func('python')
Func('easy',3)
```

GENERAL THEORY QUESTIONS

1. Differentiate between the round( ) and floor( ) functions with the help of suitable example.

2. Which string method is used to implement the following:
   a. To count the number of characters in the string
   b. To change the first character of the string in capital letter
   c. To change lowercase to uppercase letter
   d. To check whether the given character is letter or a number

3. What are default arguments?
4. What is the difference between actual and formal parameters?
5. What is a recursive function?
6. What is the difference between built-in functions and modules?
7. What is the difference between local variable and global variable?
8. What are the advantages of writing functions with keyword arguments?
9. What do you mean by scope of variables?
10. **Which of the following is valid arithmetic operator in Python?**
    (i)// (ii)**?** (iii)< (iv)and
11. **Write the type of tokens from the following:**
    (i) if (ii) roll_no

12. Which of the following are valid operators in Python:

(i) ** (ii) */ (iii) like (iv) ||
(v) is (vi) ^ (vii) between (viii) in

13. Which of the following can be used as valid variable identifier(s) in Python?

(i) 4thSum (ii) Total
(iii) Number# (iv) _Dat

ENGLISH

Revise all the topics covered upto now.

Write your responses to the questions listed below in your notebook, ensuring that your work is tidy.

1 In what ways does the imposition of German serve as a metaphor for cultural domination?
2 Explore the symbolism behind the classroom atmosphere on the day of the "last lesson".
3 How is the character of M. Hamel a reflection of a lost generation's guilt and remorse?
4 How does the author highlight the importance of language in shaping national identity?
5 What was the significance of the villagers sitting in the classroom on the last day?
6 Compare the attitudes of Franz at the beginning and end of the story. How does his character evolve?
7 How does Alphonse Daudet use irony in the story to emphasize the theme of linguistic identity?
8 How does Anees Jung subtly criticize systemic poverty and indifference through storytelling?
9 Analyze the use of contrast between the worlds of Seemapuri and Firozabad. What point is the author making?
10 Saheb loses both his freedom and dreams when he gets a job. Explain this paradox.
11 How does the author's narrative tone enhance the impact of social commentary in Lost Spring?
12 How is the theme of hope both present and absent in the stories of the ragpickers and bangle makers?
13 How does Kamala Das use imagery to convey the contrast between life and death?
14 Explain the significance of the simile "her face ashen like that of a corpse".
15 What is the effect of the natural images like "trees sprinting" and "children spilling out of Their homes"?
16 "But all I said was, see you soon, Amma" – What does this line reveal about the poet's emotional state?
17 What is the deeper meaning behind the repetition of "smile and smile and smile…"?
18 Discuss how silence and restraint in expression act as a form of emotional coping in the poem.
19 Do you think the poem ends on a note of hope or despair? Justify your response with examples from the text.
20 Write a letter to the Editor of The Hindustan Times expressing concern about the lack of sports facilities in government schools and suggesting improvements.
21 Write a letter to the Editor of The Times of India highlighting the rising trend of cyberbullying among teenagers and recommending awareness measures.
22 Draft a letter to the editor of a national daily expressing your views on increasing road rage incidents in metropolitan cities.
23 You are concerned about the high cost of education in private schools. Write a letter to the editor suggesting ways to make education inclusive.
24 You are the Head Boy/Head Girl. Draft a notice informing students about a blood donation camp organized by your school in association with the Red Cross Society.
25 Your school is organizing a Cleanliness Drive in a nearby locality. Draft a notice inviting volunteers.
26 Draft a notice for an inter-house quiz competition, including date, time, venue, and last date to register.
27 You are the Cultural Secretary. Write a notice informing about auditions for an Annual Day play.
28 As the Head Boy/Head Girl of your school, draft a notice informing students about a workshop on 'Cyber Safety and Security' being organized in the school auditorium. Include details like date, time, and registration procedure.
29 You are Ankit/Ankita, a student of Class XII. Write an article in 150–200 words on "The Role of Online Education in the Modern World" for your school magazine.
30 Write an article titled "Fitness: A Lifestyle Necessity in the Modern World" for your school magazine.

PSYCHOLOGY

1. Practical work.
   Write Practical - 1 AISS
   Practical - 2 Self concept questionnaire
   Practical -3 Sinha comprehensive Anxiety test
   Practical -4 David's battery of differential abilities.
   Practical - 5 Multiple Intelligence test.
2. Choose any one topic and prepare case study:-
   1. Depression
   2. ADHD
   3. Anxiety
   4. OCD
   5. Stress management.
3. Make a model on any one intellectual approach.
4. Watch any documentry movie on your topic of case study.

PHYSICAL EDUCATION

Chapter 1: Planning in Sports

1. Define "planning in sports." What are its objectives?
2. Explain the different types of tournaments (e.g., league, knockout). What are the advantages and disadvantages of each?
3. Discuss the importance of fixtures in a sports competition. How are fixtures prepared?
4. What are the objectives of intramural and extramural sports?
5. What is a tournament? What are the different types of tournaments?
6. Briefly explain the functions of Directing and Controlling to organize sports event.
7. Explain the meaning of specific sports programme? Write its contribution for society.

Chapter 2: Sports and Nutrition

8. Explain the importance of a balanced diet for athletes. What are the different types of nutrients and their roles?
9. What is the role of protein in sports performance?
10. Discuss the importance of carbohydrates and fats for athletes.
11. What are the different types of eating disorders? How can they affect athletes' health?
12. What are the potential risks of extreme dieting?

- **Make an assignment on " Yoga as preventive measures for lifestyle disease.**

Subject- Mathematics

Note: 1. Solve in fair notebook
2. Chapters -Relations and Functions
Inverse Trigonometric Functions
Matrices & Determents
Continuity & Differentibility

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1 Find $\frac{dy}{dx}$ at (4, 9), when $\sqrt{x}+\sqrt{y}=5$.

2 Differentiate following with respect to x : $\sin(m \sin^{-1}x)$

3 Differentiate following with respect to x : $\cos^{-1}\sqrt{\frac{1+\cos 2x}{2}}$

4 **Find $\frac{dy}{dx}$, if $y=\tan^{-1}\left[\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right]$.**

5 Show that the point (1, 0), (6, 0) and (0, 0) are collinear.

6 If points (2, 0), (0, 5) and (x, y) are collinear, then show that $\frac{x}{2}+\frac{y}{5}=1$.

7 If A is a square matrix of order 3 and $|3A| = k|A|$, then write the value of k.

8 For the set A = {1, 2, 3}, define a relation R in the set A as follows:
R = {(1, 1), (2, 2), (3, 3), (1, 3)}. Write the ordered pairs to be added to R to make it the smallest equivalence relation.

9 Find the principal value of $\sin^{-1}\left(-\frac{1}{2}\right)+\cos^{-1}\left(-\frac{1}{2}\right)$.

10 Differentiate $5^{\sin x}$, with respect to x.

11 Write the following function in the simplest form $\tan^{-1}\sqrt{\frac{1-\cos 3x}{1+\cos 3x}}$, $x<\pi$.

12 Write the value of $\cos^{-1}\left(\cos\frac{2\pi}{3}\right)+\sin^{-1}\left(\cos\frac{2\pi}{3}\right)$

13 Evaluate $\sec^{-1}\left(\frac{x-3}{x+3}\right)+\sin^{-1}\left(\frac{x+3}{x-3}\right)$

14 Prove the following: $\cos\left(\sin^{-1}\frac{3}{5}+\cot^{-1}\frac{3}{2}\right)=\frac{6}{5\sqrt{13}}$

15 Prove that $\cos\left[\sin^{-1}\left(\frac{3}{5}\right)+\sin^{-1}\left(\frac{5}{13}\right)\right]=\frac{33}{65}$.

16 Let $f(x)=\begin{cases}\frac{1-\sin^3 x}{3\cos^2 x}, & \text{if } x<\frac{\pi}{2}\\ a, & \text{if } x=\frac{\pi}{2}\\ \frac{b(1-\sin x)}{(\pi-2x)^2}, & \text{if } x>\frac{\pi}{2}\end{cases}$.

If $f(x)$ be a continuous function at $x=\frac{\pi}{2}$, find a and b.

17 Determine the values of a, b and c for which the function

$f(x) = \begin{cases} \frac{\sin(a+1)x + \sin x}{x}, & \text{if } x < 0 \\ c, & \text{if } x = 0 \\ \frac{\sqrt{x+bx^2} - \sqrt{x}}{b\sqrt{x^3}}, & \text{if } x > 0 \end{cases}$ may be continuous at $x = 0$.

18 If $y = (\sin^{-1}x)^2$, prove that $(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - 2 = 0$.

19 Differentiate x^{x^x} with respect to x.

20 Differentiate $y = \left(x + \frac{1}{x}\right)^x + x^{\left(x + \frac{1}{x}\right)}$ with respect to x.

21 If $y = \sqrt{\sin x + \sqrt{\sin x + \ldots\ldots}}$ prove that $\frac{dy}{dx} = \frac{\cos x}{2y - 1}$.

22 Let N be the set of all natural numbers and let R be a relation on N × N defined by(a, b) R (c, d) ⇔ ad = bc for all (a, b), (c, d) ∈ N × N.Show that R is an equivalence relation on N × N.

23 Let A = {1, 2, 3,....., 9} and R be the relation in A × A defined by (a, b) R (c, d) if a + d = b + c, for (a, b), (c, d) ∈ A × A. Prove that R is an equivalence relation, also obtain the equivalent class [(2, 5)].

24 Let A = {x ∈ Z : 0 ≤ x ≤ 12}. Show that R = {(a, b) : a, b ∈ A, |a – b| is divisible by 4} isan equivalence relation. Find the set of all elementsrelated to 1. Also, write the equivalence class [2].

25 If $x = a(\theta - \sin\theta)$, $y = a(1 + \cos\theta)$, find $\frac{d^2y}{dx^2}$.

26 If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, verify that $A^2 - 4A - 5I = O$.

27 Find $\frac{dy}{dx}$, if $\tan(x + y) + \tan(x - y) = 1$.

28 Three schools *A*, *B* and *C* want to award their selected students for the values of Honesty, Regularity and Hard work. Each school decided to award a sum of ₹ 2,500, ₹ 3,100, ₹ 5,100 per student for the respective values. The number of students to be awarded by the three schools is given below in the table:

School / Values	*A*	*B*	*C*
Honesty	3	4	6
Regularity	4	5	2
Hard work	6	3	4

Find the total money given in awards by the three schools separately, using matrices.

29 Which is greater tan 1 or $\tan^{-1} 1$?

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

$\frac{4}{x}-\frac{6}{y}+\frac{5}{z}=5; \frac{6}{x}+\frac{9}{y}-\frac{20}{z}=-4$

31 Show that f : N → N given by

$f(x)=\begin{cases} x+1, \text{ if } x \text{ is odd} \\ x-1, \text{ if } x \text{ is even} \end{cases}$, is bijective (both one-one and onto).

32 If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then $A^2 - 5A - 7I$ is

(*a*) a zero matrix (*b*) an identity matrix

(*c*) diagonal matrix (*d*) none of these

33 If $A = [a_{ij}] = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = [b_{ij}] = [-3\ 2]$, then find $\frac{a_{11} \cdot b_{12}}{a_{21} \cdot a_{12}} + b_{11}$.

34 A function $f(x) = \begin{cases} \frac{\sin x}{x} + \cos x, & x \neq 0 \\ 2k, & x = 0 \end{cases}$ is continuous at $x = 0$ for

(*a*) $k = 1$ (*b*) $k = 2$ (*c*) $k = \frac{1}{2}$ (*d*) $k = \frac{3}{2}$

35 Determine the value of 'k' for which the following function is continuous at x = 3:

$f(x)=\begin{cases} \frac{(x+3)^2-36}{x-3}, & x \neq 3 \\ k, & x = 3 \end{cases}$

36 For what value of 'k' is the function

$f(x)=\begin{cases} \frac{\sin 5x}{3x} + \cos x, & \text{if } x \neq 0 \\ k, & \text{if } x = 0 \end{cases}$ continuous at $x = 0$?

37 $\sec\left\{\tan^{-1}\left(\frac{y}{3}\right)\right\}$ is equal to

(*a*) $\frac{\sqrt{9+y^2}}{9}$ (*b*) $\frac{\sqrt{9+y^2}}{3}$

(*c*) $\frac{3}{\sqrt{9+y^2}}$ (*d*) $\frac{9}{\sqrt{9+y^2}}$

38 The domain of the function $y = \sin^{-1}(-x^2)$ is

(a) [0, 1]

(b) (0, 1)

(c) [–1, 1]

(d) ϕ

39 Find the principal value of $\sin^{-1}\left(\sin\frac{6\pi}{7}\right)$.

40 What is the domain of the function cos (2x – 3)?

(d) [1, 2] (a) [–1, 1] (b) (1, 2) (c) (–1, 1)

(ii) Both *A* and *R* are true but *R* is not the correct explanation of *A*.

(iii) *A* is true but *R* is false.

(iv) *A* is false but *R* is true.

41 In the following questions, a statement of assertion (*A*) is followed by a statement of reason (*R*). Choose the correct answer out of the following choices. **1**

Assertion (*A*): Given set $A = \{1, 2, 3, ... 9\}$ and relation *R* in set $A \times A$ defined by $(a, b)\ R\ (c, d)$ if $a + d = b + c$, be an equivalence relation. The ordered pair (1, 3) belongs to equivalence class related to [(5, 3)]

Reason (*R*): Any ordered pair of $A \times A$ belongs to equivalence class [(5, 3)] if $(x, y)R$ $(5, 3)\ \forall\ (x, y) \in A \times A$.

(i) Both *A* and *R* are true and *R* is the correct explanation of *A*.

(ii) Both *A* and *R* are true but *R* is not the correct explanation of *A*.

(iii) *A* is true but *R* is false.

(iv) *A* is false but *R* is true.

42 If *A* and *B* are invertible matrices then which of the following is not correct **1**

(a) $AdjA = |A|.A^{-1}$ (b) $\det(A^{-1}) = (\det A)^{-1}$

(*c*) $(AB)^{-1} = B^{-1}A^{-1}$ (*d*) $(A + B)^{-1} = A^{-1} + B^{-1}$

43 If area of a triangle with vertices (3, 2), (–1, 4) and (6, k) is 7 sq units, then possible values of k is/are **1**

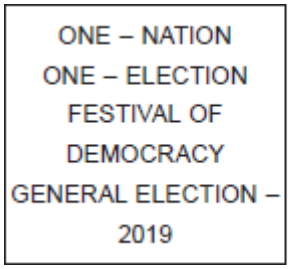
(a) 3

(b) – 4

(c) –3, 4

(d) 3, – 4

44 A general election of Lok Sabha is a gigantic exercise. About 911 million people were eligible to vote and voter turnout was about 67%, the highest ever **4**



Let I be the set of all citizens of India who were eligible to exercise their voting right in general election held in 2019. A relation 'R' is defined on I as follows:

$R = \{(V_1, V_2) : V_1, V_2 \in I$ and both use their voting right in general election – 2019$\}$

[CBSE Question Bank]

(i) Two neighbours *X* and $Y \in I$. *X* exercised his voting right while *Y* did not cast her vote in general election-2019. Check whether *X* is related to *Y* or not.

(ii) Mr. '*X*' and his wife '*W*' both exercised their voting right in general election-2019. Show that $(X, W) \in R$ and $(W, X) \in R$.

(iii) Three friends F_1, F_2 and F_3 exercised their voting right in general election-2019. Show that

$(F_1, F_2) \in R$, $(F_2, F_3) \in R$ and $(F_1, F_3) \in R$.

OR

Show that the relation R defined on set I is an equivalence relation.

45 The principal value of $\cos^{-1}\left(\frac{1}{2}\right)+\sin^{-1}\left(-\frac{1}{\sqrt{2}}\right)$ is **1**

(a) $\frac{\pi}{12}$ (b) π (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

46 What is the domain of the function $\cos(2x-3)$? **1**

(a) $[-1, 1]$

(b) $(1, 2)$

(c) $(-1, 1)$

(d) $[1, 2]$