BISHOP SCOTT BOYS' SCHOOL

SUMMER VACATION ASSIGNMENT

12

Date of Submission

18-06-2026

Session: 2026–2027

Teacher's Note

Dear Parents,

Teachers and parents both play an equally important role in shaping a child's learning journey. At school, teachers guide, support, and nurture students by helping them understand concepts and develop essential skills. At home, parents observe, encourage, and reinforce these learnings, creating a balanced environment for growth. This strong partnership between school and home ensures that students feel supported, confident, and motivated in all aspects of their education.

Keeping this in mind, holiday homework has been thoughtfully designed to help students remain connected with their studies during the summer break. It provides an opportunity for children to revise what they have learned, apply their knowledge in practical ways, and reflect on their understanding. Through these activities, students can explore their creativity, strengthen their skills, and become more independent learners. With your continued support and encouragement, we hope this vacation will be both enjoyable and enriching for your child.

SUBJECT : ENGLISH

(A). Answer the following in about 100 to 120 words:-

1. In today's fast life children neglect their aging parents. What do you think children can do to have an involved and inclusive relationship with their elderly parents ? Answer in context with 'My mother at Sixty Six.'
2. Educating children is the responsibility of society. Justify the statement in view of 'The Last Lesson.'
3. How do the stories–'The Last Lesson' and 'Lost Spring' illustrate the impact of socio- political factors on education?
4. Franz thinks, "will they make them sing in German, even the pigeons ?What could this mean?
5. Discuss the narrative techniques used by the authors in 'The Third Level'. How do these techniques effectively convey the themes of escapism and nostalgia? Provide specific examples from the text to support your analysis.

(B). Answer these questions in not more than 40 to 50 words:-

1. What happened when Charlie went to buy the tickets?
2. What is the poet's childhood fear?
3. What does the contrasting imagery of the church clock and the Prussians trumpets represent in 'The Last Lesson?'
4. Why was the order from Berlin called a thunderclap by Franz?
5. State how language can act as a means to unite a population through an example from the story 'The Last lesson.'

(C). Read the following extract and answer the questions based on this:

"...I looked again at her,

wan,pale; as a late winter's moon

and felt that old

familiar ache, my childhood's fear,

but all I said was, see you soon Amma

all I did was smile and smile and smile…"

1. What is the speaker's emotional state when looking at her mother?
   a) Confused b) Nostalgic c) Empathetic d) Fearful

2. What does the use of the word 'but' at the beginning of the line, but all I said, suggest?

3. State T/F:

   The poetic device used in the line- 'pale as winter's moon' is the same as the one used in the line -'the winter wind wistfully wailed at night.'

4. Complete the sentence appropriately. The repetition of the word smile suggests that…….

5. Name one poetic device used in this extract.

PORTFOLIO QUESTIONS

1. WRITE AN ARTICLE EXPLORING HOW RURAL WOMEN IN BIHAR ARE ACHIEVING FINANCIAL INDEPENDENCE THROUGH SELF HELP GROUPS KEEPING IN VIEW 'JEEVIKA'(BIHAR STATE RURAL LIVELIHOODS MISSION)A SUCCESS STORY.
2. Write a conversation with an elder in about 100 to 120 words about how a local festival has changed over 50 years. Draw an attractive picture of any Bihari festival on the cover page.
3. Do you believe that intergenerational bonding (interaction between youth and seniors) should be made a part of a school curriculums? Illustrate your analysis. What opinion would you like to give about an old age homage?
4. Compose a poem from the perspective of M Hamel on his last night in the village of Alsace.
5. Imagine you are Kamla Das. You are leaving for abroad. You see your mother at airport who has come to see you off .You have the same fear of separation as the poetess has in the poem 'The Mother at Sixty Six.' Express your feeling in about 100 to 120 words.

SUBJECT : BIOLOGY

ZOOLOGY

1. Differentiate between spermatogenesis and oogenesis in humans on the basis of the following:

   a) When the process is initiated.

   b) Number of functional gametes produced per primary spermatocytes/oocyte.

   c) Specific site at which meiosis II is completed.

2. Why does failure of testis to descend into the scrotum causes sterility?

3. What is acrosome ?

4. Name and explain the role of the inner and middle wall of the human uterus.

5. Describe the development of placenta during pregnancy in human female.

6. Explain the role of placenta.

7. Mention the site where fertilization of the oven occurs in human female.Explain the process of fertilization and mentions how polyspermy is prevented ?

8. Name the embryonic stage that gets implanted in the uterus. Explain the process of implantation in human female.

9.Explain the ovarian and uterine events taking place along with the role of pituitary and ovarian hormones during menstrual cycle in a normal human female under the following phrases:

   (a) Follicular phase / proliferative phase

(b) Luteal phase / secretory phase

(c) Menstrual phase

10. Describe the changing level of FSH, LH and progesterone during menstrual cycle induced change in the ovary and the uterus in human females.

SUBJECT : BOTANY

11. A farmer notices that his hybrid crop loses vigor in the next generation. Explain this in terms of sexual reproduction and genetic segregation. How can apomixis solve this problem?

12. If the synergids are destroyed before fertilization, predict the consequences on fertilization. Give reasons.

13. Why does pollen viability differ among species? How is it related to pollination strategy?

14. In a flower, if tapetum fails to function properly, what will be the effect on pollen development? Explain mechanistically.

15. Explain how pollen-pistil interaction ensures that only compatible pollen fertilizes the ovule.

16. Why is endosperm development initiated before embryo development in most angiosperms?

17. A plant shows parthenocarpy. Differentiate it from apomixis and explain its significance.

18. What will happen if:

(a) No pollination occurs

(b) Pollination occurs but fertilization fails

Explain outcomes in both cases.

19. Draw and label:

L.S. of anther showing microsporangia

Mature embryo sac

Explain key structures in both.

20. Draw the stages of pollen tube growth and explain how it reaches the embryo sac.

INVESTIGATORY PROJECT:

1) Make flashcards on homologous and analogous organs showing examples from both plants and animals.

Also, make flashcards on different disease causing organisms explain their life cycles as well.

SUBJECT : CHEMISTRY

1) What are Ambident nucleophiles? Explain with examples.
2) What is racemic mixture?
3) Define SN1 and SN2 reaction.
4) Why chlorobenzene does not give Nucleophilic substitution reaction?
5) What is phosgene gas? Write its method of preparation.
6) The synthesis of alkyl fluorides is best accomplished by
   (a) Finkelstein reaction (b) Swart's reaction
   (c) free radical fluorination (d) Sandmeyer's reaction.
7) The optically inactive compound from the following is
   (a) 2-chloropropanal (b) 2-chloropentane
   (c) 2-chlorobutane (d) 2-chloro-2-methylbutane.
8) Which one of the following is likely to give a precipitate with $AgNO_3$ solution?
   (a) $(CH_3)_3CCl$ (b) $CHCl_3$ (c) $CH_2=CH-Cl$ (d) CCl_4
9) Elimination of bromine from 2-bromobutane results in the formation of
   (a) equimolar mixture of 1 and 2-butene (b) predominantly 2-butene
   (c) predominantly 1-butene (d) predominantly 2-butyne
10) In S_N2 reactions, the correct order of reactivity for the following compounds: CH_3Cl, CH_3CH_2Cl, $(CH_3)_2CHCl$ and $(CH_3)_3CCl$ is-
   (a) $(CH_3)_2CHCl > CH_3CH_2Cl > CH_3Cl > (CH_3)_3CCl$
   (b) $CH_3Cl > (CH_3)_2CHCl > CH_3CH_2Cl > (CH_3)_3CCl$
   (c) $CH_3Cl > CH_3CH_2Cl > (CH_3)_2CHCl > (CH_3)_3CCl$
   (d) $CH_3CH_2Cl > CH_3Cl > (CH_3)_2CHCl > (CH_3)_3CCl$
11) An alkyl halide can be converted into alcohol by the
   (a) Addition reaction (b) Substitution reaction
   (c) Dehydrohalogenation reaction (d) None of the above
12) Write the IUPAC name of $(CH_3)_3 C CH_2Br$.
13) Why do we keep chloroform in the dark coloured bottles?
14) What happens when n-butyl chloride reacts with alcoholic KOH?
15) What is Sandmeyer's reaction?
16) Arrange the following compounds in the increasing order of reactivity towards an SN^2 reaction.
   2-Bromo-2- methyl butane, 1-Bromo pentane, 2-Bromo pentane
17) Convert aniline to chlorobenzene.
18) Why is allyl chloride hydrolysed more readily than n-propyl chloride?
19) What is β elimination of alkyl halide?
20) Explain the optical activity of 2-Chlorobutane.

SUBJECT : PHYSICS

INSTRUCTION: To be done in Physics Notebook.

Chapter -1 : Electric Charges and Fields

1. State Coulomb's law in vector form. Two point charges +q and –3q are placed at a distance 'd' apart in air. Find the position where the electric field due to these charges is zero. Also, derive the expression for the electric field due to a system of two charges using the principle of superposition.

2. Derive the expression for the electric field intensity at a point on the axial line of an electric dipole. Also, find the expression for the electric field on the equatorial line of the dipole. Show that for large distances ($r >> 2a$), the axial field is twice the equatorial field in magnitude but opposite in direction.

3. What is an electric dipole? Define electric dipole moment. Derive the expression for the torque experienced by an electric dipole placed in a uniform electric field. Mention the position of stable and unstable equilibrium.

4. State Gauss's theorem in electrostatics. Using Gauss's law, derive the expression for the electric field due to an infinitely long straight uniformly charged wire (linear charge density λ). Also, derive the electric field due to a thin infinite plane sheet of charge with surface charge density σ.

5. Using Gauss's law, find the electric field due to a uniformly charged thin spherical shell (i) at a point outside the shell ($r > R$), (ii) at a point on the surface ($r = R$), and (iii) at a point inside the shell ($r < R$). Draw the variation of electric field with distance from the centre.

6. Two identical conducting spheres A and B carry charges +Q and –3Q respectively. They are brought in contact and then separated by a distance d. Find the force between them after separation. If they are now connected by a conducting wire, what will be the final charge on each? Explain the principle of conservation of charge used here.

7. Define electric flux. State and prove Gauss's law. A point charge +q is placed at the centre of a cube of side 'a'. What is the electric flux through one face of the cube? If the charge is placed at a corner of the cube, what will be the flux through one face?

8. Derive the expression for the electric field due to a uniformly charged infinite plane sheet using Gauss's law. Two large thin metal plates are placed parallel to each other at a small separation and carry surface charge densities $+\sigma$ and $-\sigma$ respectively. Find the electric field in the three regions: (i) left of the first plate, (ii) between the plates, and (iii) right of the second plate.

9. Explain the properties of electric field lines. Why do electric field lines never intersect each other? Draw the field lines due to (i) an isolated positive point charge, (ii) an electric dipole, and (iii) two equal positive point charges.

10. Two point charges $q_1 = +4\ \mu C$ and $q_2 = -2\ \mu C$ are placed at points A and B, 10 cm apart in air. Find the electric field at the midpoint of AB and at a point 10 cm from A on the line extended beyond A. Also, calculate the force on a charge $q = +1\ \mu C$ placed at the midpoint.

Chapter -2 : Electrostatic Potential and Capacitance

1. Define electric potential and electric potential difference. Derive an expression for the electric potential at a point due to an electric dipole on (i) the axial line and (ii) the equatorial line. Show that for large distances ($r >> a$), the potential on the axial line is twice that on the equatorial line in magnitude but opposite in sign.

2. Derive the expression for the potential energy of a system of two point charges. Hence, obtain the expression for the potential energy of an electric dipole placed in a uniform electric field. Also, find the positions of stable and unstable equilibrium.

3. State the principle of a capacitor. Derive the expression for the capacitance of a parallel plate capacitor with air as the medium between the plates. How does the capacitance change when (i) a dielectric slab of thickness t (< d) is introduced between the plates, and (ii) the separation between the plates is doubled?

4. Derive an expression for the energy stored in a charged capacitor. Show that the energy stored is given by $U = (1/2)CV^2 = (1/2)Q^2/C = (1/2)QV$. A parallel plate capacitor is charged by a battery to a potential V. The battery is then disconnected and a dielectric slab is inserted between the plates. Explain what happens to the charge, potential difference, capacitance, and energy stored.

5. Explain the term equipotential surface. Draw the equipotential surfaces for (i) a point charge, (ii) an electric dipole, and (iii) two identical positive charges. Why do equipotential surfaces never intersect each other? Justify.

6. Define dielectric constant (relative permittivity) of a medium. Derive the expression for the capacitance of a parallel plate capacitor when a dielectric slab of dielectric constant K completely fills the space between the plates. A parallel plate capacitor is charged to a potential difference V and then isolated. A dielectric slab of constant K is inserted between the plates. Find the change in energy stored.

7. Two point charges +q and –q are placed at a distance 2a apart. Derive the expression for the electric potential at any point on the equatorial line of this electric dipole. Also, find the work done in moving a test charge from one point to another on the equatorial line. (3 marks)

8. Three capacitors of capacitances 2 μF, 3 μF, and 6 μF are connected (i) in series and (ii) in parallel. Calculate the equivalent capacitance in each case. If this combination is connected to a 100 V supply, find the charge on each capacitor and the total energy stored in both cases.

9. Derive the expression for the capacitance of a spherical capacitor consisting of two concentric spheres of radii R_1 and R_2 ($R_1 < R_2$). A parallel plate capacitor has plate area A and separation d. It is charged to a potential difference V by a battery and then disconnected. A conducting slab of thickness t ($t < d$) is inserted between the plates. Find the new capacitance, potential difference, and energy stored.

Instruction: (write the experiments and activities in practical notebook)

Experiments list-

1. To determine resistivity of two / three wires by plotting a graph for potential difference versus current.

2. To find resistance of a given wire / standard resistor using metre bridge.

3. To verify the laws of combination (series) of resistances using a metre bridge.

4. To determine resistance of a galvanometer by half-deflection method and to find its figure of merit.

ACTIVITIES:

1. To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source.

2. To assemble the components of a given electrical circuit.

3. To draw the diagram of a given open circuit comprising at least a battery, resistor/rheostat, key, ammeter and voltmeter. Mark the components that are not connected in proper order and correct the circuit and also the circuit diagram.

INVESTIGATORY PROJECT

I**nstruction**: Submit printed report with a cover page in a stick file.

"To study various factors on which the internal resistance/EMF of a cell depends."

SUBJECT : MATHEMATICS

Select the appropriate answer -

1) **A relation R in a set A is called _____, if $(a_1, a_2) \in R$ implies $(a_2, a_1) \in R$, for all $a_1, a_2 \in A$.**

(a) symmetric (b) transitive (c) equivalence (d) non-symmetric

2) **Let R be a relation on the set N of natural numbers defined by nRm if n divides m. Then R is -**

(a) Reflexive and symmetric (b) Transitive and symmetric

(c) Equivalence (d) Reflexive, transitive but not symmetric

3) **The maximum number of equivalence relations on the set A = {1, 2, 3} are -**

(a) 1 (b) 2 (c) 3 (d) 5

4) **If set A contains 5 elements and set B contains 6 elements, then the number of one-one and onto mappings from A to B is -**

(a) 720 (b) 120 (c) 0 (d) None of these

5) **Let $f : [2, \infty) \to R$ be the function defined by $f(x) = x^2 - 4x + 5$, then the range of f is -**

(a) R (b) $[1, \infty)$ (c) $[4, \infty)$ (d) $[5, \infty)$

6) **Let $f : R \to R$ be defined by $f(x) = 1/x \ \forall \ x \in R$. Then f is -**

(a) one-one (b) onto (c) bijective (d) f is not defined

7) **Let A = {1, 2, 3} and consider the relation R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1,3)}. Then R is -**

(a) reflexive but not symmetric (b) reflexive but not transitive

(c) symmetric and transitive (d) neither symmetric, nor transitive

8) **If $f : R \to R$ be defined by $f(x) = 3x^2 - 5$ and $g : R \to R$ by $g(x) = x/(x^2 + 1)$, then g o f is -**

(a) $(3x^2 - 5)/(9x^4 - 30x^2 + 26)$ (b) $(3x^2 - 5)/(9x^4 - 6x^2 + 26)$

(c) $3x^2/(x^4 + 2x^2 - 4)$ (d) $3x^2/(9x^4 + 30x^2 - 2)$

9) **Let $f : R \to R$ be given by $f(x) = \tan x$. Then $f^{-1}(1)$ is -**

(a) $\pi/4$ (b) $\{n\pi + \pi/4 : n \in Z\}$

(c) Does not exist (d) None of these

10) **If $f: R \to R$ be given by $f(x) = (3 - x^3)^{1/3}$, then fof(x) is -**

(a) $x^{1/3}$ (b) x^3 (c) x (d) $(3 - x^3)$

11) Let R be the relation in the set {1, 2, 3, 4} given by R = {(1, 2), (2, 2), (1, 1), (4,4), (1, 3), (3, 3), (3, 2)}. In this case, which statement is correct ?

(a) R is reflexive and symmetric but not transitive.

(b) R is reflexive and transitive but not symmetric.

(c) R is symmetric and transitive but not reflexive.

(d) R is an equivalence relation.

12) Let R be the relation in the set N given by $R = \{(a, b) : a = b - 2, b > 6\}$. Hence –

(A) $(2, 4) \in R$ (B) $(3, 8) \in R$ (C) $(6, 8) \in R$ (D) $(8, 7) \in R$

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.

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

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

(c) (A) is true but (R)is false.

(d) (A) is false but (R) is true.

13) Assertion (A) : The relation P on set X is a transitive relation.

Reason (R) : The relation P has a subset of the form {(a, b), (b, c), (a, c)}, where a, b, c ∈ X.

14) Assertion (A) : The function f is not onto.

Reason (R) : 3 ∈ R (co-domain of f) has no preimage in the domain of f.

15) Sherlin and Danju were playing Ludo at home. While rolling the dice , Sherlin's sister Raji observed and noted that the possible outcomes of the throw every time belong to set { 1,2,3,4,5,6}. Let A be the set of players while B be the set of the possible outcomes.

A = {S,D}, B = { 1,2,3,4,5,6}

(A) Let R:B -> B be defined by R = {(x,y): y is divisible by x } . Check whether R is reflexive, symmetric or transitive.

(B) Raji wants to know the number of functions from A to B. How many number of functions are possible ?

16) Let A be the set of all students of a boys school. Show that the relation R in A given by

R = {(a, b) : a is sister of b} is the empty relation and R′ = {(a, b) : the difference between heights of a and b is less than 3 meters} is the universal relation.

17) Let T be the set of all triangles in a plane with R a relation in T given by R = {(T1 , T2) : T1 is congruent to T2 }. Show that R is an equivalence relation.

18) Show that the relation R in the set {1, 2, 3} given by R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 3)} is reflexive but neither symmetric nor transitive.

19) Show that the relation R in the set Z of integers given by R = {(a, b) : 2 divides a – b} is an equivalence relation.

20) Determine whether each of the following relations are reflexive, symmetric and transitive:

(i) Relation R in the set A = {1, 2, 3, ..., 13, 14} defined as R = {(x, y) : 3x – y = 0}

(ii) Relation R in the set N of natural numbers defined as R = {(x, y) : y = x + 5 and x < 4}

21) Let L be the set of all lines in a plane and R be the relation in L defined as R = {(L1 , L2) : L1 is perpendicular to L2 }. Show that R is symmetric but neither reflexive nor transitive.

22) Show that the relation R in the set A = {1, 2, 3, 4, 5} given by R = {(a, b) : |a – b| is even}, is an equivalence relation. Show that all the elements of {1, 3, 5} are related to each other and all the elements of {2, 4} are related to each other. But no element of {1, 3, 5} is related to any element of {2, 4}.

23) Let R be the relation defined in the set A = {1, 2, 3, 4, 5, 6, 7} by R = {(a, b) : both a and b are either odd or even}. Show that R is an equivalence relation. Further, show that all the elements of the subset {1, 3, 5, 7} are related to each other and all the elements of the subset {2, 4, 6} are related to each other, but no element of the subset {1, 3, 5, 7} is related to any element of the subset {2, 4, 6}.

24) Show that the relation R in the set A of points in a plane given by R = {(P, Q) : distance of the point P from the origin is same as the distance of the point Q from the origin}, is an equivalence relation. Further, show that the set of all points related to a point P ≠ (0, 0) is the circle passing through P with origin as centre.

25) Let L be the set of all lines in XY plane and R be the relation in L defined as R = {(L1 , L2) : L1 is parallel to L2 }. Show that R is an equivalence relation. Find the set of all lines related to the line y = 2x + 4.

26) Let T be the set of all triangles in the Euclidean plane, and let a relation R on T be defined as aRb if a is congruent to b ∀ a, b ∈ T. Then R is -

(a) Reflexive but not transitive (b) Transitive but not symmetric

(c) Equivalence (d) None of these

27) Consider the non-empty set consisting of children in a family and a relation R defined as aRb if a is brother of b. Then R is -

(a) Symmetric but not transitive (b) Transitive but not symmetric

(c) Neither symmetric nor transitive (d) Both symmetric and transitive

28) The maximum number of equivalence relations on the set A = {1, 2, 3} are -

(a) 1 (b) 2 (c) 3 (d) 5

29) If a relation R on the set {1, 2, 3} be defined by R = {(1, 2)}, then R is -

(a) Reflexive(b) Transitive (c) Symmetric (d) None of these

30) Let us define a relation R in R as aRb if $a \geq b$. Then R is -

(a) An equivalence relation

(b) Reflexive, transitive but not symmetric

(c) Symmetric, transitive but not reflexive but symmetric

(d) Neither transitive nor reflexive

31) Let A = {1, 2, 3} and consider the relation

R = {1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1,3)}.

Then R is -

(a) Reflexive but not symmetric

(b) Reflexive but not transitive

(c) Symmetric and transitive

(d) Neither symmetric, nor transitive

32) If set A contains 5 elements and set B contains 6 elements, then the number of one-one and onto mappings from A to B is -

(a) 720 (b) 120 (c) 0 (d) None of these

33) Let A = {1, 2, 3, ...n} and B = {a, b}. Then the number of surjections from A into B is -

(a) nP2 (b) $2^n - 2$ (c) 2n– 1 (d) n^2

34) Let R be a relation on the set L of lines defined by l R l if l is perpendicular to l , then relation R is

(a) Reflexive and symmetric (b) Symmetric and transitive

(c) Equivalence relation (d) Symmetric

35) Given set A ={1, 2, 3} and a relation R = {(1, 2), (2, 1)}, the relation R will be -

(a) Reflexive if (1, 1) is added

(b) Symmetric if (2, 3) is added

(c) Transitive if (1, 1) is added

(d) Symmetric if (3, 2) is added

36) If $R = \{(x, y): x + 2y = 8\}$ is a relation on N,then write the range of R.

37) Show that the relation 'is congruent to'on the set of all triangles in a plane is an equivalence relation.

38) Let n be a positive integer. Prove that the relation R on the set of Z of all integers numbers defined by $(x, y) \in R \Leftrightarrow x - y$ is divisible by n, is an equivalence relation.

39) Let f: R → R be defined by $f(x) = x^4$,write$f^{-1}(1)$

40) If a function $g = \{(1,1), (2,3), (3,5), (4,7)\}$ is described by $g(x) = \alpha x + \beta$, find the values of α and β

41) Show that the function f: R → R given by $f(x) = \cos x$ for all $x \in R$, is neither one –one nor onto.

42) Let R be a relation on the set of all lines in a plane defined by $((l_1, l_2) \in R \Leftrightarrow$ line l_1 is parallel to line l_2. Show that R is an equivalence relation.

43) Prove that the function f: Q → Q given by $f(x) = 2x - 3$ for all $x \in Q$ is a bijection.

44) Let R be the equivalence relation on the set Z of integers given by $R = \{(a, b): 2 \text{divides } a - b\}$. Write the equivalence class [0].

45) Write the smallest equivalence relation on the set $A = \{1,2,3\}$.

46) Find the number of relations that can be defined from the set $A = \{1,2,3\}$ to the set $B = \{a, b, c\}$

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:

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false and R is true.

47) **Assertion:** If set A contains 7 elements and set B contains 6 elements, then the number of one-one onto mapping from A to B is 420.

Reason: If A and B are two non-empty sets containing m and m elements respectively, then number of one – one onto functions from A to B = $\begin{cases} n!, \text{if } m = n \\ 0, \text{if } m \neq n \end{cases}$

48) **Assertion:** Relation R defined in the set A as $R\{(x, y): y - x$ is an integer,$x, y \in R\}$ is an equivalence relation.

Reason: Relation R defined in the set B as $R\{(x, y): x = \alpha y$ for some rational number $\alpha, x, y \in R\}$ is an equivalence relation.

49) If f: $Q - \{3\} \rightarrow Q$ be a function defined by $f(x) = \frac{2x+3}{x-3,}$ show that f is one-one but not onto.

50) In a classroom, a teacher teaches a topic Relation on a set, which is defined below.

A relation R on a set A is said to be an equivalence relation on A iff it is -

I. Reflexive: aRb or $(a, a) \in R, \forall a \in A$
II. Symmetric: aRb $\Rightarrow$ bRa or $(a, b) \in R \Rightarrow (b, a) \in R$, where$a, b \in A$
III. Transitive : if aRb and bRc, then aRc or $(a, b) \in R$ and $(b, c) \in R \Rightarrow (a, c) \in R$where $a, b, c \in A$

Based on the above information, answer the following questions:

(I) If the relation $R = \{(1,1), (1,2), (1,3), (2,2), (2,3), (3,1), (3,2), (3,3)\}$ defined on the set $A = \{1,2,3\}$, then show that R is reflexive but neither symmetric nor transitive.

(II) If the relation $R = \{(1,2), (2,1), (1,3), (3,1)\}$ defined on the set $A = \{1,2,3\}$, then show that R is symmetric but neither reflexive nor transitive.

(III) If the relation R on the set N of all natural numbers defined as $R = \{(x, y): y = x + 5 \text{ and } x < 4\}$, then show that R is neither reflexive, nor symmetric nor transitive

The relation R in the set Z of integers given by $R = \{(a, b): 2 \text{ divides } (a - b)\}$. Show that R is an equivalence relation.

CHAPTER : 3 : MATRIX

1. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$,then $A^T + A = I_2$ if -
   (a) $\theta = n\pi, n\epsilon Z$
   (b) $\theta = \frac{(2n+1)\pi}{2}, n\epsilon Z$
   (c) $\theta = 2n\pi + \frac{\pi}{3}, n\epsilon Z$
   (d) $\theta = \pi$

2. If A and B are symmetric matrices, then ABA is -
   (a) Symmetric matrix
   (b) Skew-symmetric matrix
   (c) Diagonal matrix
   (d) Scalar matrix

3. If A and B are square matrices of the same order, then $(A + B)(A - B)$ is equal to -
   (a) $A^2 - B^2$
   (b) $A^2 - BA - AB - B^2$
   (c) $A^2 - B^2 + BA - AB$
   (d) $A^2 - AB + B^2 + AB$

4. The number of all possible matrices of order 3×3 with each entry 0 or 1 is -
   (a) 27
   (b) 18
   (c) 81
   (d) 512

5. If $A = \begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$ and $kA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then the values of k, a and b are respectively -
   (a) -6,-12,-18
   (b) -6,4,9
   (c) -6,-4,-9
   (d) -6,12,18

6. If $A = \begin{bmatrix} 2 & 0 & -3 \\ 4 & 3 & 1 \\ -5 & 7 & 2 \end{bmatrix}$ is expressed as the sum of a symmetric and skew-symmetric matrix, then the symmetric matrix is -
   (a) $\begin{bmatrix} 2 & 2 & -4 \\ 2 & 3 & 4 \\ -4 & 4 & 2 \end{bmatrix}$
   (b) $\begin{bmatrix} 2 & 4 & -5 \\ 0 & 3 & 7 \\ -3 & 1 & 2 \end{bmatrix}$
   (c) $\begin{bmatrix} 4 & 4 & -8 \\ 4 & 6 & 8 \\ -8 & 8 & 4 \end{bmatrix}$
   (d) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

7. If A is 3×4 matrix and B is a matrix such that $A^T B$ and $B^T A$ are both defined. Then, B is of the type -
   (a) 3×4
   (b) 3×3
   (c) 4×4
   (d) 4×3

8. If the matrix AB is zero, then -
   (a) It is not necessary that either A=O or B=O
   (b) $A = O \; or B = O$
   (c) $A = O \; and \; B = O$
   (d) All the above statements are wrong.

9. If $A = \begin{bmatrix} n & 0 & 0 \\ 0 & n & 0 \\ 0 & 0 & n \end{bmatrix}$ 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) nB
   (c) B^n
   (d) A+B

10. Matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$, then A^2 is equal to -
   (a) A null matrix
   (b) A unit matrix
   (c) –A
   (d) A

11. If $A = [1 \quad 2 \quad 3]$, then write AA^T
12. A matrix has 12 elements .What are the possible orders can it have?
13. If A and B are two matrices of the order $3 \times m$ and $3 \times n$, respectively and $m = n$, then find the order of matrix $5A - 2B$.
14. If matrix $\begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}$ is a skew-symmetric matrix then find the values of $a, b,$ and c
15. Construct a 2×2 $matrix\ A = [a_{ij}]$ whose elements are given by
    (i) $[a_{ij}] = \frac{(i+2j)^2}{2}$ (ii) $[a_{ij}] = \frac{|2i-3j|}{2}$
16. If $\begin{bmatrix} a+b & 2 \\ 5 & ab \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$, find the values of a and b .
17. Given $A = \begin{bmatrix} 2 & 4 & 0 \\ 3 & 6 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 8 \\ 1 & 3 \end{bmatrix}$ Is $(AB)' = B'A'$?
18. Find the value of x such that $\begin{bmatrix} 1 & x & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = 0$
19. Let $A = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix}, C = \begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix}$ Find a matrix D such that $CD - AB = 0$
20. Let $A = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$ $and\ f(x) = x^2 - 4x + 7$. Show that f(x) =O . Use this result to find A^5.
21. A trust invested some money in two type of bonds .The first bond pays 10% interest and second bond pays 12% interest. The trust received ₹ 2800 as interest. However, if trust had interchanged money in bonds, they would have got ₹ 100 less as interest. Using matrix method , find the amount invested by the trust.
22. If $A = \begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$ and $B = [-2 \quad -1 \quad -4]$, verify that $(AB)' = B'A'$
23. Express $\begin{bmatrix} 3 & -2 & -4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{bmatrix}$ uniquely as the sum of a symmetric and skew-symmetric matrix.
24. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then find α satisfying $0 < \alpha < \frac{\pi}{2}$ when $A + A' = \sqrt{2}I_2$,where A' is transpose of A
25. To promote the making of toilets for women, an organization tried to generate awareness through (1) house calls (2) emails and (3) announcements. The cost for each mode per attempt is given below:

    (1) ₹ 50 (2) ₹ 20 (3) ₹ 40

    The number of attempts made in the villages X,Y and Z are given below:

	(1)	(2)	(3)
X	400	300	100
Y	300	250	75

Z	500	400	150

Also, the chance of making of toilets corresponding to one attempt of given modes is

(1) 2% (2)4% (3)20%

(i) Find the cost incurred by the organization on village X

(ii) What can be the total number of toilets that can be expected after the promotion in village X?

(iii) What can be the total number of toilets that can be expected after the promotion in village Z?

Find the sum of the cost incurred by the organization on villages Y and Z

CHPATER : DETERMINANTS

1. If $\begin{vmatrix} \alpha & 3 & 4 \\ 1 & 2 & 1 \\ 1 & 4 & 1 \end{vmatrix} = 0$,then the value of α is -
   (a) 1
   (b) 2
   (c) 3
   (d) 4

2. Let $\begin{vmatrix} x & 2 & x \\ x^2 & x & 6 \\ x & x & 6 \end{vmatrix} = ax^4 + bx^3 + cx^2 + dx + e$. Then, the value of $5a + 4b + 3c + 2d + e$ is equal to -
   (a) 0
   (b) -16
   (c) 16
   (d) None of these

3. The value of determinant $\begin{vmatrix} a^2 & a & 1 \\ \cos nx & \cos(n+1)x & \cos(n+2)x \\ \sin nx & \sin(n+1)x & \sin(n+2)x \end{vmatrix}$ is independent of -
   (a) n
   (b) a
   (c) x
   (d) None of these

4. The value of $\begin{vmatrix} 5^2 & 5^3 & 5^4 \\ 5^3 & 5^4 & 5^5 \\ 5^4 & 5^5 & 5^6 \end{vmatrix}$ is -
   (a) 5^2
   (b) 0
   (c) 5^{13}
   (d) 5^9

5. The matrix $\begin{vmatrix} 5 & 10 & 3 \\ -2 & -4 & 6 \\ -1 & -2 & b \end{vmatrix}$ is a singular matrix, if the value of b is -
   (a) -3
   (b) 3
   (c) 0
   (d) Non-existent

6. If x, y, z are non-zero real numbers, then the inverse of the matrix $A = \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$, is -

(a) $\begin{bmatrix} x^{-1} & 0 & 0 \\ 0 & y^{-1} & 0 \\ 0 & 0 & z^{-1} \end{bmatrix}$

(b) $xyz \begin{bmatrix} x^{-1} & 0 & 0 \\ 0 & y^{-1} & 0 \\ 0 & 0 & z^{-1} \end{bmatrix}$

(c) $\frac{1}{xyz} \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$

(d) $\frac{1}{xyz} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

7. The value of $\begin{vmatrix} \sin 10° & -\cos 10° \\ \sin 80° & \cos 80° \end{vmatrix}$ is -

(a) 0
(b) 1
(c) -1
(d) 2

8. If $\begin{vmatrix} 5 & 3 & -1 \\ -7 & x & -3 \\ 9 & 6 & -2 \end{vmatrix} = 0$, then the value of x is –

(a) 3
(b) 7
(c) 5
(d) 9

9. If $f(x) = \begin{vmatrix} 0 & x-a & x-b \\ x+a & 0 & x-c \\ x+b & x+c & 0 \end{vmatrix}$, then -

(a) $f(a) = 0$
(b) $f(b) = 0$
(c) $f(0) = 0$
(d) $f(1) = 0$

10. Let $X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$, $A = \begin{bmatrix} 1 & -1 & 2 \\ 2 & 0 & 1 \\ 3 & 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 \\ 1 \\ 4 \end{bmatrix}$. If $AX = B$, then X is equal to -

(a) $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$

(b) $\begin{bmatrix} -1 \\ -2 \\ -3 \end{bmatrix}$

(c) $\begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$

(d) $\begin{bmatrix} 0 \\ 2 \\ 1 \end{bmatrix}$

11. The number of solutions of the system of equations is -

$$2x + y - z = 7$$
$$x - 3y + 2z = 1$$
$$x + 4y - 3z = 5$$

(a) 3
(b) 2
(c) 1
(d) 0

12. The existence of the unique solution of the system of equations:

$$x + y + z = \lambda$$
$$5x - y + \mu z = 10$$
$$2x + 3y - z = 6$$ depends on -

(a) μ only
(b) λ only
(c) $\lambda \; and \; \mu$ both
(d) Neither μ nor λ

13. The system of equations :

$$x + y + z = 5$$
$$x + 2t + 3z = 9$$
$$x + 3y + \lambda z = \mu$$

has unique solution, if -

(a) $\mu = 13\lambda = 5$
(b) $\lambda \neq 5$
(c) $\lambda = 5, \mu \neq 13$
(d) $\mu \neq 13$

14. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that $A^{-1} = kA$,then k equals -

(a) 19
(b) $\frac{1}{19}$
(c) -19
(d) $-\frac{1}{19}$

15. If for the matrix$A$, $A^3 = I$,then $A^{-1} =$ _____
    (a) A^2
    (b) A^3
    (c) A
    (d) 2A

16. Evaluate :$\begin{vmatrix} a+ib & c+id \\ -c+id & a-ib \end{vmatrix}$

17. For what value of x the matrix A is singular?

$$A = \begin{bmatrix} 1+x & 7 \\ 3-x & 8 \end{bmatrix}$$

18. Evaluate : $\Delta = \begin{bmatrix} \cos A \cos B & \cos A \sin B & -\sin A \\ -\sin B & \cos B & 0 \\ \sin A \cos B & \sin A \sin B & \cos A \end{bmatrix}$

19. Find the integral value of x , if $\begin{vmatrix} x^2 & x & 1 \\ 0 & 2 & 1 \\ 3 & 1 & 4 \end{vmatrix} = 28$

20. If $A = \begin{vmatrix} 2 & 0 & 0 \\ -1 & 2 & 3 \\ 3 & 3 & 5 \end{vmatrix}$, then find $A\ (adjA)$

21. Find the area of a triangle whose vertices are $(5,4), (-2,4) and\ (2,-6)$

22. Find the value of x if the area of triangle is 35 sq.units with vertices $(x, 4\ ), (2,-6) and\ (5,4)$

23. Find the value of k so that the system of linear equations $x + y + z = 2, 2x + y - z = 3\ \ and$ $3x + 2y + kz = 4$ has a unique solution.

24. The sum of three numbers is 2. If twice the second number is added to the sum of first and third, the sum is 1. By adding second and third number to five times the first number, we get 6. Find the three numbers by using matrices.

25. Prove that the determinant $\begin{vmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{vmatrix}$ is independent of θ

26. If $A = \begin{vmatrix} 1 & \tan x \\ -\tan x & 1 \end{vmatrix}$, show that $A^T A^{-1} = \begin{vmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{vmatrix}$

27. Using cofactors of elements of second row, evaluate $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$

28. Find the inverse of matrix $A = \begin{vmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{vmatrix}$

29. Show that the matrix $A = \begin{vmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{vmatrix}$ satisfies the equation $A^2 - 4A - 5I_3 = O$ and hence find A^{-1}

30. Using matrix method, solve the system of equations

$3x + 2y - 2z = 3, x + 2y + 3z = 6\ and\ 2x - y + z = 2$

31. Gautam buys 5 pens, 3 bags and 1 instrument box and pays a sum of ₹160. From the same shop.Vikram buys 2 pens, 1 bag and 3 instrument boxes and pays a sum of ₹ 190. AlsoAnkur buys 1 pen, 2 bags and 4 instrument boxes and pays a sum of ₹ 250.

Based on the above information, answer the following questions:

a) Convert the given above situation into a matrix equation of the form $AX = B$

b) Find $|A|$

c) Find A^{-1}

d) Determine $P = A^2 - 5A$

SUBJECT : ACCOUNTANCY

1. A and B are partners sharing profits and losses in the ratio of 3 : 2. A has given a loan of ₹50,000 to the firm. Show the treatment of interest on loan if the partnership deed is silent.
2. X and Y are partners sharing profits in the ratio of 3 : 2. They admit Z for 1/5 share. Calculate the new profit-sharing ratio and sacrificing ratio.
3. Mention any four rights of a partner as specified under the Indian Partnership Act, 1932.
4. Define “Partnership Deed”. State any four contents of a partnership deed.
5. A and B are partners without any written agreement. A contributed ₹60,000 and B ₹40,000 as capital. A claims interest on capital. How will this be dealt with in the books of the firm?
6. A and B are partners sharing profits in the ratio of 2 : 1. B is entitled to a salary of ₹20,000 p.a. and interest on capital of ₹2,000. If profit for the year is ₹60,000, prepare Profit & Loss Appropriation Account.
7. Differentiate between *interest on capital* and *interest on drawings* (any four points).
8. A, B, and C were partners in a firm. Their capitals on April 1, 2025, were ₹5,00,000, ₹3,00,000, and ₹2,00,000 respectively. As per the partnership deed:
   Interest on Capital is allowed @ 10% p.a.

   A is entitled to a salary of ₹5,000 per month.

   B is entitled to a commission of 10% of net profit after charging such commission.

   Net profit for the year ended March 31, 2026, was ₹3,30,000. Prepare Profit & Loss Appropriation Account and Partners’ Capital Accounts.

9. X and Y are partners sharing profits in the ratio of 3:2. Their fixed capitals were ₹10,00,000 and ₹5,00,000. The deed provided for interest on capital @ 8% p.a. even if it involves the firm in loss. The net profit for the year was ₹90,000. Show the distribution of profits/losses and prepare the relevant accounts.
10. P, Q, and R entered into partnership on July 1, 2025. P contributed ₹6,00,000, Q ₹4,00,000, and R ₹3,00,000. Profits are shared in 3:2:1. P guaranteed that R’s share of profit after charging interest on capital @ 10% p.a. would not be less than ₹75,000 in any year. The profit for the year ended March 31, 2026, was ₹3,15,000. Prepare Profit & Loss Appropriation Account.
11. Ankur and Bobby were partners providing software solutions. They shared profits in 3:2. They admitted Kartik as a new partner for 1/4th share with a guarantee of minimum profit of ₹2,00,000. Any deficiency was to be borne by Ankur and Bobby in 4:1. Loss for the year was ₹4,00,000. Pass necessary journal entries regarding the distribution of loss and guarantee.
12. Define "Charge against Profit" and "Appropriation of Profit." Give two examples of each. Also, explain the treatment of "Interest on Partner’s Loan" in the absence of a partnership deed. (Theory/Numerical mix).
13. On March 31, 2026, the balances in the capital accounts of Saroj, Mahender, and Umar after making adjustments for profits and drawings were ₹80,000, ₹60,000, and ₹40,000 respectively. Subsequently, it was discovered that interest on capital and drawings had been omitted. The profit for the year was ₹80,000. Drawings were: Saroj ₹20,000; Mahender ₹15,000; Umar ₹10,000. Interest on capital is to be allowed @ 10% p.a. Pass the necessary adjustment entry.
14. A, B and C are Partners sharing Profit and Loss in a ratio of 5:3:2 and a Capital of Rs 400000, Rs 300000 and Rs 500000 respectively. They agreed to change their profit-sharing ratio from new financial year. A sacrificed 1/3rd of her share in favour of C and B sacrificed 2/15 from his share in Favour of C. They also

adjusted their Capital as per New Profit-Sharing Ratio. Find New Profit-Sharing Ratio and required change in their Capitals.

15. Reema and Seema are partners sharing profits equally. The partnership deed provides that both partners will get monthly salaries of ₹5,000 each; interest on capital will be allowed @ 5% p.a. and interest on drawings will be charged @ 10% p.a. Their capitals were ₹5,00,000 each and drawings during the year were ₹60,000 each. The firm incurred a loss of ₹2,00,000 during the year. Prepare Profit & Loss Appropriation Account.

SUBJECT : BUSINESS STUDIES

1. Management is a complex activity that has three main dimensions explain these dimensions.

2. Explain any four characteristics of management

3. What do you mean by coordination why coordination is considered as essence of management?

4. What are the various features of management correlate these features with real examples.

5. "Management is purely arts" do you agree with the statement explain with reasoning.

6. Co-relate the various level of management with decision making.

7. "Management is considered as full fledged profession." Do you agree with this statement give reason to support of your answer.

8. Differentiate between efficiency and effectiveness.

9. Explain any four significance of management principles.

10. Throw some light on the background of Taylor and his contributions.

11. Through some light on the background of Henry fayol and his contributions.

12. Give a comparative study between contributions of Taylor and Fayol.

13. List all the principles of management developed by Henry Fayol.

14. What are the principles of scientific management?

15. Rohan is desirous of setting of a small factory to manufacture packing materials. He plan to use logical approach and take every decision with fact and figure with proper reasoning rather than relying on hit or miss method. State the principle of scientific management used by Rohan.

SUBJECT : ECONOMICS

1. "A country's total National Income (NI) at the end of the year is *80,000 crore. During the same year, the Gross Domestic Product (GDP) increased by ₹10,000 crore. The depreciation on capital goods was ₹ 2,000 crore and National savings at the end of year is ₹ 15,000 crore. Additionally, country invested ₹ 8,000 crore in new capital goods industries."

   In the light of above text, categorise the items as 'stock' or 'flow' variables with valid arguments.

2. Discuss the concept of factor income and transfer income with the help of an examples.

3. Distinguish between intermediate product and final product, giving suitable examples in support of your answer.

4. Distinguish between consumer goods and capital goods.

5. State and discuss briefly the three main components of Net Factor Income from Abroad.

6. Explain the concept of normal residents.

7. "The Restrictive policies under the colonial government adversely affected the structure, composition and volume of India's foreign trade." Justify the above statement with valid explanation.

8. Explain the main objectives and impacts of land settlement policies implemented under the British government rule.

9 Why was there low level of productivity in agriculture during the British rule?

10. State the two-fold motive for systematic destabilisation of indigeneous Indian industries in the British era.

11. Briefly discuss “Growth “as an important goal of five year plans.

12. Discuss any three achievements of Green Revolution.

13. “Land reforms were more successful only in two states”. Why?

14. “Subsidies put a huge burden on the government’s finances but are necessary

    for poor and marginal farmers.” Comment.

15. Briefly discuss the policy of industrial licensing.

SUBJECT : HISTORY

1. Discuss the drainage system of Harappa?
2. Why is Mahabharata called a dynamic text?
3. Elucidate on the language and content of Mahabharata?
4. Discuss the duties of chandalas as laid down in Manusmriti.
5. Discuss the types of marriages.
6. Discuss the limitations of inscriptional evidence.
7. What was agrahara?
8. Who was gahapati?
9. What was the significance of Gandatindu Jataka?
10. Elucidate on the characteristics of Mahajanapadas.
11. Give a detailed account of Mauryan administration.
12. How do historians reconstruct the history of Mauryan empire?
13. Discuss the reasons responsible for the disintegration of the Harappan Civilization.
14. Account for the rise of Magadha.
15. Write a short note on citadel.

SUBJECT : GEOGRAPHY

1. Define "Environmental Determinism" and "Possibilism."

2. Explain the three stages of the Demographic Transition Theory with the help of a diagram.Analyze the economic and social consequences of a declining population in developed nations.

3. Differentiate between the "Growth" and "Development" concepts. Explain the four pillars of human development as defined by Mahbub ul Haq.

4. Compare and contrast "Subsistence Agriculture" and "Commercial Livestock Rearing."

5. Discuss the factors influencing the location of high-tech industries in the world.

6. What is "Outsourcing"? How has it created new job opportunities in developing countries like India?

7. Evaluate the importance of the Trans-Siberian Railway as a major rail link in the world.

8. Explain the significance of the Suez Canal and the Panama Canal in international trade.

9. The distribution of population in India is highly uneven." Support this statement with three socio-economic and two physical factors.

10. Why is there an urgent need for Water Conservation and Rainwater Harvesting in India? Suggest three traditional methods used in different states.

11. Explain the concept of Digital Divide and its impact on global development.

12. Differentiate between 'Push' and 'Pull' factors of migration in India.

13. Analyze the socio-demographic consequences of migration on the place of origin.

14. What is Target Area Planning? How does it differ from regional planning?

15. Locate and label the following major ports on an outline map of India-

Kandla (Gujarat), Marmagao (Goa), Tuticorin (Tamil Nadu), Paradip (Odisha), Haldia (West Bengal).

SUBJECT : POLITICAL SCIENCE

TOPIC OF THE PROJECT WORK - SAARC

1. **“**The disintegration of the Soviet Union changed the nature of global politics.”Explain.
2. Critically evaluate the features of the Soviet System. How did it differ from the Capitalist System of the USA?
3. Analyze the factors that led to the rise of nationalism and the desire for sovereignty within various republics of the USSR.
4. Describe the role and functions of the Planning Commission. Why was it eventually replaced?
5. Discuss the "Kerala Model" of development. How did it differ from the models adopted by other Indian states?
6. "China is expected to overtake the US as the world's largest economy by 2040." Analyze the strengths and weaknesses of the Chinese economy in light of this statement.
7. Analyze the "Vision 2020" of ASEAN. How does it define an outward-looking role for the association?
8. What is the 'ASEAN Way'?
9. What is SAFTA? State its primary objective regarding trade in South Asia.
10. Explain the circumstances that led to the creation of Bangladesh in 1971. How did India contribute to this process?
11. Evaluate the role of SAARC (South Asian Association for Regional Cooperation). Why has it not been as successful as the European Union or ASEAN?
12. Mention any two factors that have contributed to the failure of a stable democracy in Pakistan.
13. What was the 'Standstill Agreement' in the context of the princely state of Hyderabad?
14. What were the "three challenges" India faced immediately after independence?
15. Examine the role of the States Reorganisation Commission (SRC).

SUBJECT : INFORMATICS PRACTICES

SHORT ANSWER TYPE QUESTIONS

1. Which command can be used to install pandas?
2. Write command to create an empty series.
3. Write command to create an empty dataframe.
4. Differentiate between series and dataframe.
5. How can empty dataframe be created?
6. Can we add two series with different indices? If yes, what type of output will be produced?
7. Write code to install the module needed to draw graphs.
8. Write any four components of graph and respective functions for using the components.

LONG ANSWER TYPE QUESTIONS

Create the following dataframe 'Sales' containing year wise sales figures for five sales persons in INR. Use the years as column labels, and sales person names as row labels.

	2018	2019	2020
Manish	800000	900000	500000
Mala	950000	1100000	550000
David	900000	1000000	700000
Sam	600000	700000	400000

1. Use the dataframe created above to do the following:
   a) Display the row labels.
   b) Display the column labels.
   c) Display the data types of each column.
   d) Display the dimensions, shape, size and values of the dataframe.
   e) Display the last two rows.
   f) Display the first two columns.

2. Use the DataFrame created above to do the following:

a) Display the sales made by all sales persons in the year 2020.

b) Display the sales made by Manish and David in the year 2018.

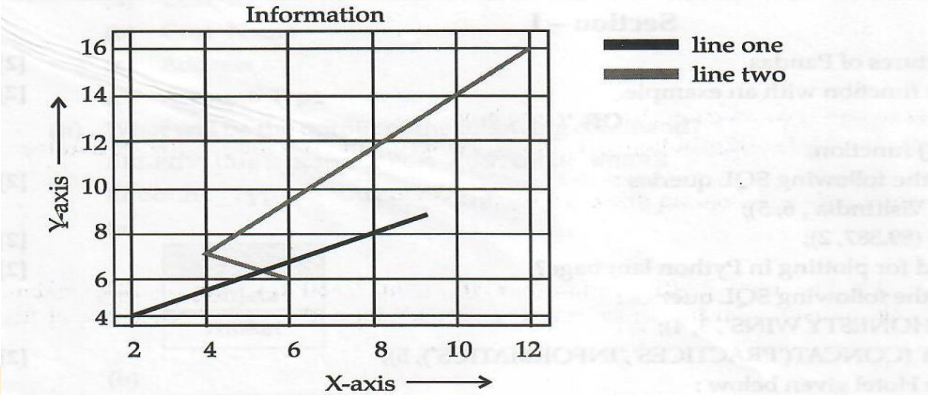
c) Display the sales made by Sam 2019.

d) Add data to Sales for salesman Sumeet where the sales made are [100000, 117800, 152000] in the years [2018,2019,2020] respectively.

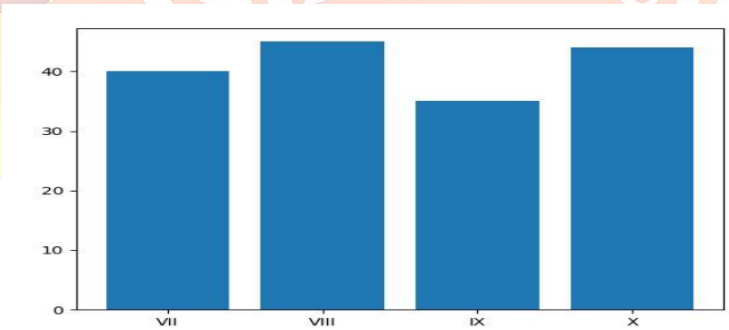
e) Delete the data for the year 2019 from the DataFrame Sales.

f) Delete the data for sales man Mala from the DataFrame Sales.

3. Consider the following graph. Write the code to plot it.



4. Draw the following bar graph representing the number of students in each class.



5. Create the following Series and do the specified operations:

a) EngAlph, having 26 elements with the alphabets as values and default index values.

b) Vowels, having 5 elements with index labels ‘a’, ‘e’, ‘i’, ‘o’ and ‘u’ and all the five values set to zero. Check if it is an empty series.

c) Friends, from a dictionary having roll numbers of five of your friends as data and their first name as keys.

d) MTseries, an empty Series. Check if it is an empty series.

e) MDays, from a numpy array having the number of days in the months of a year. The labels should be the month numbers from 1 to 12.

6. Using the Vowel Series created in Question 7, write codes for the following:

a) Set all the values of Vowels to 10 and display the Series.

b) Divide all values of Vowels by 2 and display the Series.

c) Create another series Vowels1 having 5 elements with index labels 'a', 'e', 'i', 'o' and 'u' having values [2,5,6,3,8] respectively.

d) Add Vowels and Vowels1 and assign the result to Vowels3. e) Subtract, Multiply and Divide Vowels by Vowels1.

e) Alter the labels of Vowels1 to ['A', 'E', 'I', 'O', 'U'].

Activity Based Assignment

INSTRUCTION:

For question number 1 to 3, type and run the code, print the code, the output you get and attach with report file.

1. Create a dataframe for examination result and display row labels, column labels and data types of each column.

2. Given the school result data of a class in excel sheet, create dataframe by importing data from the excel sheet, analyses the performance of the students on different parameters, for example subject wise or marks scored. For the Data frames created above, plot appropriate charts with title and legend.

3. Take data of your interest from an open source (for example data.gov.in), aggregate and summarize it.

Then plot it using different plotting functions of the Matplotlib library.