[Time: 3 Hours]   **[Marks:70**

Please check whether you have got the right question paper.

N.B: 1.   **All questions are compulsory**
   2.   **Figures to the right indicate full marks**

Q. 1 (A) Answer the following questions:-   **12**

     a)   Give the suitable structures for the following compounds **(Any two)**
         i)   Pent-3yn-1-al
         ii)   l-cyclobutenyl-1,3-cyclohexadiene

     b)   Assign E/Z or R/S or D/L notation and nomenclate the following as per
        IUPAC rules **(Any two)**
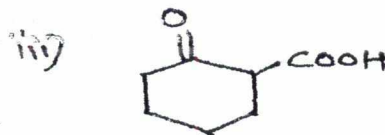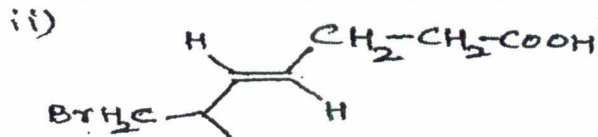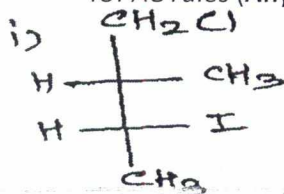
     c)   Draw possible resonating structures for the following compounds
         i)   Chlorobenzene   ii)   p-nitrophenol
     d)   Arrange the following in increasing order of acidity and justify
        Phenol, p-chlorophenol and benzoic acid
     e)   Arrange the following in increasing order of basicity and justify
        aniline, m-nitroaniline, cyclohexylamine
     f)   Establish the relationship between following pair of molecules
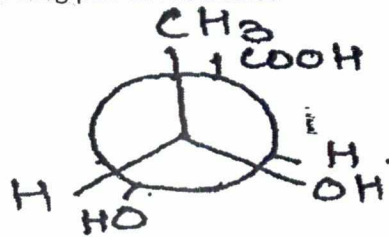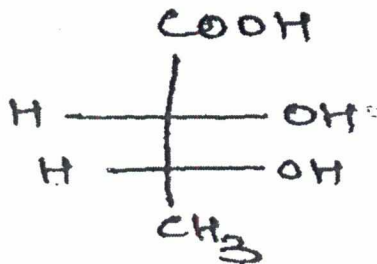
(B) Give product for the following reactions **(Any three)**   3

TURN OVER

(ii) acetone + ethyl bromide $\xrightarrow[NaH]{Ph_3P}$

(iii) $CH_3-CH_2-\underset{\underset{CH_3}{|}}{CH}-CH=\underset{\underset{CH_3}{|}}{C}-CH_2CH_2-CH_3 \xrightarrow{O_3/Zn}$

(iv) $CH_3-CH_2-CH=CH_2 \xrightarrow{Br_2/H_2O}$
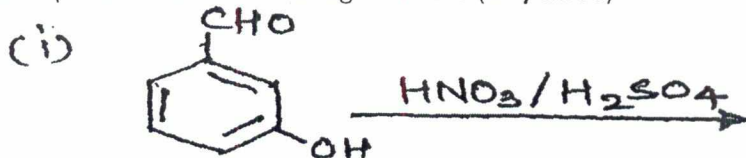
Q. 2 (A) Identify tautomeric system present in the following pair of molecules   2

(i)

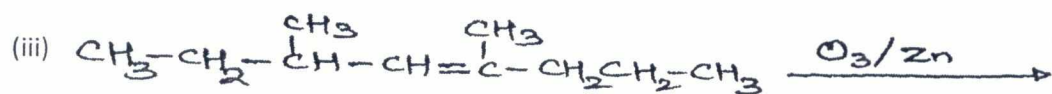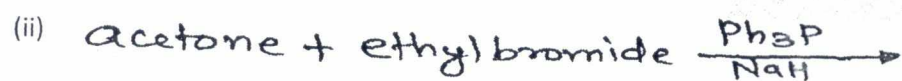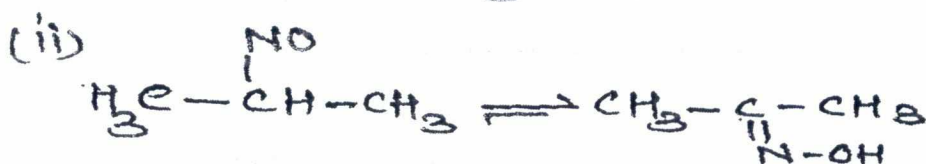$$H_2C=\underset{\underset{H}{|}}{\overset{\overset{OH}{|}}{C}} \rightleftharpoons H_3C-\overset{\overset{O}{||}}{C}-H$$

(ii)

$$H_3C-\underset{\underset{NO}{|}}{CH}-CH_3 \rightleftharpoons CH_3-\underset{\underset{N-OH}{||}}{C}-CH_3$$

(B) Arrange the following carbanions in increasing order of stability and justify   2

$$C_6H_5-\overset{\ominus}{C}H_2, \quad CH_2=CH-\overset{\ominus}{C}H_2, \quad (C_6H_5)_3-\overset{\ominus}{C}$$
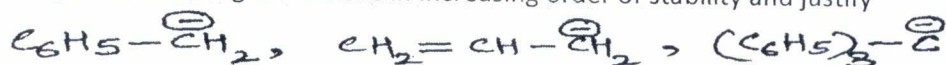
(C) Give the products when the intermediate formed from reaction of propene and BH_3 4
reacts with
   I. $H_2O_2 + \overset{\ominus}{OH}$
   II. Br_2
   III. Name each type of above reaction and what is the net regiospecificity of the reaction
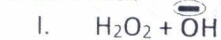
(D) Discuss stereochemistry of S_N1 reaction with appropriate example   4

Q. 3 (A) Discuss stereochemistry of E_2 elimination with projection formula   4
(Newmann/Sawhorse) for the following reaction
1, 2- dibromo-1, 2- dimethyl 1-butane $\xrightarrow{Alc\ KOH}$
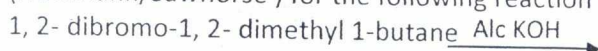
(B) Compare S_N1 and S_N2 reaction   4
(C) Explain the following terms with suitable examples   3
   i.   Meso isomer   ii. Atropisomer   iii.   Chiral molecule

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Q. 4 (A) Arrange the following compounds in increasing order of reactivity towards   2
electrophilic aromatic substitution reaction and justify your answer by giving
reason

Bromobenzene, Acetanilide, Benzene, Benzoic acid

(B) "Chloro group in chlorobenzene is deactivating but o/p directing towards   2
electrophilic aromatic substitution reaction". Justify the above statement

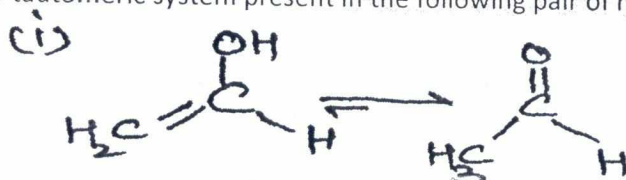(C) Give the product of the following reactions (**any three**)   3

(i) C_3H_7 — C(=O) — OAg $\xrightarrow{Br_2/CCl_4}$

(ii) $H_2C=CH - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_3 \xrightarrow{HBr}$

(iii) $HC \equiv C\ CH_2 \xrightarrow{NBS}$

(iv) cyclohexene $\xrightarrow{Zn/CH_2I_2}$
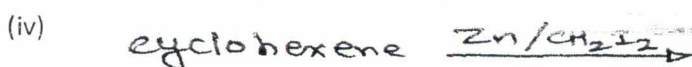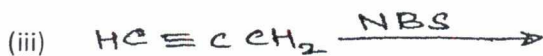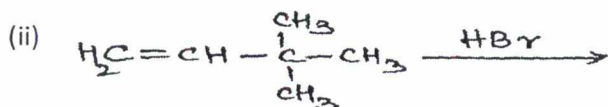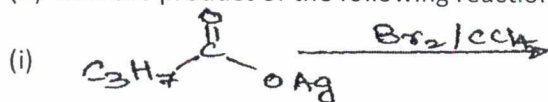
(D) Attempt the following conversions (**any four**)   4

i) n-propane ⟶ proyne

ii) Toluene ⟶ p-methyl acetophenone

iii) 2,4- dinitro chloro benzene $\xrightarrow{C_2H_5ONa}$

iv) 2-chloro butane ⟶ butane-2-ol

v) 1-propene ⟶ propyleneglycol

Q. 5 (A) Identify whether the following molecules are chiral or achiral. Justify   2

(i) ⬡—OH   (ii) $H_2C \cdots C$ —Cl
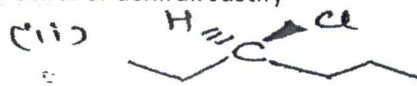
(B) Suggest a suitable method to resolve a racemic mixture of basic organic compound   2

(C) State Huckel's rule of aromaticity.   4

Identify whether the given molecules are aromatic, antiaromatic and non-aromatic

(i)   (ii)   (iii)

4
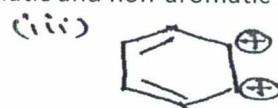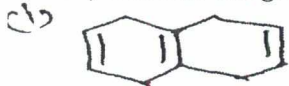
(D) Discuss with suitable example nucleophillic aromatic substitution reaction proceeding with elimination-addition mechanism   3

Q. 6 (A) Explain why alkynes are less reactive than alkene towards addition of bromine   2

(B) Compare the stabilities of 1,3,5- heptatriene and 1,3,6,- heptatriene. Justify   2

(C) Attempt the following conversions (**any three**)   3

    I.   Acetylene ⟶ 2-hexyne

    II.   1- butene ⟶ 1, 3-butadiene

    III. $(CH_3)_2$- CH Br ⟶ 2 – methyl pentane

    IV.   Isobutylene ⟶ acetone

(D) Give the product of the following reactions (**any two**)   2

    i) Z-but-2-ene peracetic acid

    ii) $\xrightarrow[NaBH_4]{Hg(OAc)_2,\ H_2O}$

    iii) 3 hexyne H_2 / Lindlar Catalyst $\longrightarrow$

(E) Write a note on chlorination of ethane   2

[Time: Three Hours]   [Marks:70]

Please check whether you have got the right question paper.

N.B: 1.   All Questions are compulsory.

1.   **Answer the following**
      a)   Draw the structure of AMP   1
      b)   Name the stop codons   1
      c)   Name the shuttle which transports reducing equivalent from cytosol to mitochondria) matrix   1
      d)   Give the net ATP yield after oxidation of stearic acid   1
      e)   Enlist the components of ETC   1
      f)   Name two drugs inhibiting cholesterol synthesis; also mention the step which is inhibited   2
      g)   Name two drugs inhibiting Topoisomerase   2
      h)   Give the significance of Pentose phosphate pathway   2
      i)   Explain why DNA polymerase III is the primary enzyme for replication instead of DNA   2
           polymerase I
      j)   Calculate total ATPs formed when two molecules of acetyl CoA are consumed in TCA cycle   2

2.   a)   Give the names and structures of the substrate and product of the following enzymatic   4
           reactions (any 2)
           i)   Glutamine- PRPP amidotransferase
           ii) β - Ketoacyl ACP reductase
           iii) α - ketoglutarate dehydrogenase complex

      b)   Write structures of given substrate and product with name of the enzyme catalysing the   4
           reaction (any 2)
           i)   Pyruvate to oxaloacetate
           ii)   Acetoacetyl CoA to HMG CoA
           iii) Inosinate to adenylosuccinate

      c)   Differentiate biosynthesis and β - oxidation of fatty acid   3

3.   a)   Give the biosynthesis of UTP. Predict the effect of methotrexate on pyrimidine nucleotide   4
           synthesis
      b)   Discuss post transcriptional modification in eukaryotes   4
      c)   Give the significance of telomeres and telomerase inhibitors   3

4.   a)   Write a note on Salvage pathway   -3
      b)   Differentiate between prokaryotic and eukaryotec translation   3
      c)   Give steps for synthesis of mevalonate   3
      d)   Describe role of proteases and peptidases   2

5.   a)   Write a note on glycogenogenesis   4
      b)   Explain the preparatory phase of glycolysis   4
      c)   Explain DNA sequencing by Sanger dideoxy method   3

6.   a)   Distinguish between oxidative and substrate level phosphorylation   4
      b)   Compare biosynthesis with chemical synthesis of peptides   4
      c)   Draw schematic representation of DNA replication in prokaryotic cell   3

Q.P. Code :05549

[Time: Three Hours]   [Marks:70]

Please check whether you have got the right question paper.

N.B: 1.   All the questions are compulsory.
         2.   Figure to right indicate full marks.

Q.1 a   Convert the following: 2
         i)   2 pint=...................ml
         ii)   200 minims=...................ml
         iii)   10 kg=.................lb
         iv)   10 grains=.....................mg
    b   What are the steps involved in general dispensing procedures   2
    c   Calculate the dose of a drug for a 5 years child when the adult dose of the same drug is 50 mg   1
    d   Give an account of manufacturing of lozenge   2
    e   Give an account of suspension made by chemical reaction   2
    f   Differentiate between o/w and w/o emulsion   2
    g   Classify different types of emulsifiers with examples   2
    h   Enlist the advantages and disadvantages of capsules as a dosage form   2

Q.2 a   How many ml of 1:10000 w/v solution of preservative benzalkonium chloride can be made from 250 ml of   3
        0.25% solution
    b   Comment on the following prescription   4
        Rx
        Sodium sulphate   30% w/w
        Effervescent base⁻   qs
        Dose: 1 tsp to be added to a tumblerful of water and consumed before breakfast
        OR
        Classify powders. Describe the salient features of compounding and dispensing of tablet triturates.
    c   Enlist the various types of ointment bases. Describe in detail any one ointment base   4

Q.3 a   Classify creams. Write a note on preservation of creams   3
    b   Enlist the advantages of solution as a dosage form. comment on the following prescription   4
        Rx
        100 ml of Zinc chloride and Zinc sulphate mouthwash BPC
        Zinc chloride   1% w/v
        Zinc sulphate   2% w/v
        Label: To be diluted with 20 times its volume of warm water before use
        OR
        Give an account of solutions taken orally
    c   Elaborate on compounding and dispensing of pastilles   4

21B78D2F7E4B051D23199DFD4103351A

Q.4 a   Explain the "Wet Gum" method used for compounding of emulsions.   3

b   What are the ideal properties of a good suspension? Differentiate between suspension containing diffusible   4
and indiffusible solids.

OR

Write a note on compounding and dispensing of suspensions containing precipitate forming liquids.

c   Draw and imaginary prescription and label its parts. Include a note on pricing of prescription   4

Q.5 a   Find the amount of NaCl to be included in 100 ml of a 0.3% w/v solution of Zinc sulphate so that, on dilution   3
with an equal quantity of water, it will be iso-osmotic with tissue fluids.

Given:

Freezing point of 1%w/v solution of Zinc sulphate is -0.076^0C

Freezing point of 1%w/v solution of sodium chloride is -0.576^0C

b   Give a detailed account of theobroma oil as a suppository base   4

OR

Discuss polyethylene glycol as suppository base

c   What in incompatibility. Discuss chemical incompatibility   4

Q.6 a   Give the labeling instruction for **any2** of the following dosage forms: 2
  1. Ear drops
  2. Moutnwashes
  3. Creams

b   Give the English translation of the following Latin terms or abbreviations: 2
  1. t.i.d.
  2. Dolore urgent
  3. Post cibos
  4. Omni hora

c   Write a note on dispensing of proprietary medicines   3

d   In what proportions would you mix Tween 80 (HLB 15) and Span 80 (HLB 4.5) to obtain 50 g of an emulgent   2
having a HLB of 8.

e   Define displacement value. Discuss its significance   2

Q.P. Code :06710

[Time: 3 Hours]   [Marks:70]

Please check whether you have got the right question paper.

N.B: 1.   All questions are compulsory.
        2.   Draw neat labelled diagrams wherever necessary.

Q.1	a)	Differentiate between Simple and U-tube manometer.	03
	b)	Outline the mass transfer in Turbulent flow.	03
	c)	What is caking and how do you combat caking.	02
	d)	Enlist various factors affecting rate of evaporation.	02
	e)	Draw neat and labelled diagram for vapour-liquid equilibrium of an ideal binary mixture.	02
	f)	Discuss Aluminum and its alloys.	03
Q.2	a)	Explain in detail positive displacement pumps.	04
	b)	Describe in detail Swenson Walker crystallizer OR Krystal crystallizer.	04
	c)	Discuss the theory and applications of Molecular Distillation.	03
Q.3	a)	With a neat diagram explain the working of Rotameter OR Venturimeter.	04
	b)	Classify condensors and elaborate on any one.	03
	c)	Elaborate on brine systems and absorption systems in refrigeration.	04
Q.4	a)	State and explain Bernoulli's theorem.	04
	b)	Describe with suitable examples basic principles involved in any one temperature measurement device.	04
		OR	04
		b)State Fourier's and Kirchhoff's law of Heat transfer.	03
		c) Explain Nucleation phenomena in crystallization.	
Q.5	a)	Elaborate on centrifugal Pumps .	03
	b)	Give an account on Theory of Fractionation OR Sieve Plate columns.	04
	c)	Discuss the Electrical Hazards encountered in manufacturing unit and steps involved in its prevention.	04
Q.6	a)	Explain in detail working of Pneumatic conveyors.	03
	b)	Elaborate on design and working of Climbing Film evaporator.	04
	c)	Write a short note on Galvanic OR Pitting corrosion.	04

1

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Q.P. Code :07264

[Time: 3 Hours]   [Marks:70]

Please check whether you have got the right question paper.

N.B: 1. All questions are compulsory
        2. Figures to the right indicates full marks
        3. Draw neat and labeled diagram wherever diagram wherever necessary

Q.1 A) Answer the following
                                                                            12

        Vii.   Define 'Iso-volumetric Ventricular Contraction'.
        viii.   Define Stroke Volume and enlist the factors affecting it.
        ix.   Define Net filtration pressure.
        x.   What are the causes of Peptic Ulceration.
        xi.   Give the general structure and composition of tooth.
        xii.   State the functions of Renal System.

    B) Fill in the Blanks   3
        iv.   The chamber of heart with the thickest myocardium is -------------.
        v.   ---------- cells secretes pepsinogen and gastric lipase.
        vi.   The Aortic and Pulmonary Valves are known as the ------------.

Q.2 A) Answer ANY TWO of the following
                                                                            8

        iv.   Draw a neat and labeled diagram of section of ovary.
        v.   Describe the role of various accessory sex glands in male reproductive system.
        vi.   Write a note on sexually transmitted diseases.

    B) Answer ANY ONE of the following
                                                                            3

        iii.   Write a note on male infertility.
        iv.   Describe role of FSH in menstrual cycle.

Q.3 A) Answer ANY TWO of the following
                                                                            8

        iv.   Draw a neat and labeled diagram showing internal structure of heart.
        v.   Discuss the pathophysiology of congestive heart failure.
        vi.   Draw a normal ECG. Explain the significance of segments and peaks and its diagnostic use.

    B) Answer ANY ONE of the following
                                                                            3

        i.   Explain the effect of the following on Heart.
                a. Calcium
                b. Adrenaline
                c. Acetylcholine

        ii.   Describe the structure features of capillaries and state its functions

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Q.4 A)   Answer ANY TWO of the following   8

        iv)   Draw neat and labeled diagram of nephrons.
        v)   Explain the process of urine formation.
        vi)   Explain the structure and function of liver.

  B)   Answer ANY ONE of the following   3

        iii.   Define: Hypervolemia, Hypernatremia and Hypokalemia.
        iv.   Explain rennin-angiotensin-aldosterone system.

Q.5 A)   Answer ANY TWO of the following   8

        iv)   Draw neat and labeled diagram of section of small intestine.
        v)   Describe the process of digestion and absorption of carbohydrates across the GIT.
        vi)   Discuss the function of gall bladder and pancreas.

  B)   Answer ANY ONE of the following   3

        iii)   Write a note on Reflux Esophagitis.
        iv)   Discuss the pathophysiology of Crohn's disease.

Q.6 A)   Answer ANY TWO of the following   8

        iv)   Describe the pathophysiology of Atherosclerosis.
        v)   Write a note on Baro-receptor reflex.
        vi)   Differentiate between pulmonary and systemic circulation.

  B)   Answer ANY ONE of the following   3

        iii)   What does the heart sounds 'lubb and 'dupp' indicate?
        iv)   Write a note on Angina pectoris.

_____

Q.P. Code :09451

[Time: 3 Hours]   [Marks:70]

Please check whether you have got the right question paper.

N.B: 1.   All questions are **compulsory**.
          2.   Use of **simple calculator** is allowed.
          3.   **Figures** to the **right** indicate **full marks**.

Q.1 (A) Attempt any 7 [2 marks each]:   14

1)   The value of $\int_2^5 (3x^2 + 2x + 1)dx$ is:
     a)   411
     b)   141
     c)   142
     d)   35

2)   If $\begin{vmatrix} 2 & x \\ 1 & 4 \end{vmatrix} = \begin{vmatrix} x & 6 \\ 2 & 4 \end{vmatrix}$ then the value of x is:
     a)   1
     b)   -2
     c)   4
     d)   2

3)   The Nth derivative of f(x)=log(2x+1) is:
     a) $y_n = \dfrac{1}{2(2x+1)}$
     b) $y_n = \dfrac{(1)^{n-1}(n-1)!2^n}{(2x+1)^n}$
     c) $y_n = \dfrac{(1)^n(n)!2^n}{(2x+1)^n}$
     d) $y_n = \dfrac{(1)^n(n-1)!2^n}{(2x+1)^n}$

4)   For f(x,y)=x^2+xy+ y^2, the value of $\dfrac{\partial^2 f}{\partial x^2}$ is:
     a)   2x+y
     b)   1
     c)   2
     d)   x+2y

5)   If y=2x, then Δy by taking h=1 is:
     a)   4
     b)   2
     c)   3
     d)   1

6)   If A=$\begin{bmatrix} k & k & 4 \\ 3 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}$ is a singular matrix, then value of k is:
     a)   5/4
     b)   5/2

1

[P.T.O]

c) 15/4

d) 40/8

7) The solution of the differential equation x dx+y dy=0 is:

    a) $x^2 + y^2 = c$

    b) $x^2 - y^2 = c$

    c) x+y=c

    d) x-y=c

8) The value of $\int logx\ dx$ is:

    a) xlogx-1+c

    b) xlogx+1-c

    c) x(logx+1)+c

    d) x(logx-1)+c

9) General solution for the differential equation $(D^3 - 6D^2 + 9D)y = 0$ is:

    a) $(c_1 x + c_2)\ e^{3x} + c_3$

    b) $c_1 e^{3x} + c_2 e^{3x} + c_3 e^{0x}$

    c) $(c_1 x + c_2 x)e^{3x} + c_3$

    d) $(c_1 x + c_2)\ e^{3x} + c_3 e^{3x}$

(B) Attempt any 1:   1

10) The value of $\int_{-2}^{2} x^5 dx$ is:

    a) 16/3

    b) 8/3

    c) 0

    d) 3/16

11) Which of the following is not a homogeneous differential equation?

    a) f(x,y)=2x-9y

    b) $f(x,y)=3x^2 - 7y^2$

    c) $f(x,y)=x^2 + 3y^2 - 1$

    d) a and b

Q.2 (A) Attempt any two (4 marks each)   8

    1) Find the Nth derivative of $y = \frac{2x+1}{x^2+3x+2}$

    2) Using Maclaurin's series, give the expansion of f(x)=cosx

    3) Examine the function f(x,y)=xy(3-x-y) for maxima and minima.

(B) Attempt any one (3 marks)   3

    1) State Roil's Mean Value Theorem. Use it to verify for $f(x)=x^2 - 5x + 6$ in [2,3]

    2) Differentiate the equation: $(1+x^2)y_2 - xy_1 + y = 0$, n times w.r.t.x.

Q.3 (A) Attempt any two (4 marks each)   8

    1) Obtain the reduction formula for $\int_{0}^{\frac{\pi}{2}} Sin^n x\ dx$, hence evaluate $\int_{0}^{\frac{\pi}{2}} Sin^{10} x\ dx$

2

2) Find the whole area of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$

3) Evaluate : $\int_0^{\frac{\pi}{2}} Sin^4 x \; dx$

(B) Attempt any one (3 marks)

1) The portion of the curve $x^2=9y$ between x=0 and x=3 is revolved about x-axis. Find the volume of solid of revolution.

2) By using the properties of Definite integral, Prove $\int_0^{\pi/2} \left(\frac{cosx}{sinx+cosx}\right) dx = \frac{\pi}{4}$

Q.4 (A) Attempt any two (4 marks each)

1) By using the Adjoint method, find the inverse of the matrix $A=\begin{bmatrix} 2 & -1 & 3 \\ 1 & 1 & 1 \\ 1 & -1 & 1 \end{bmatrix}$

2) Find the Eigen values and one of the Eigen vectors of the matrix: $\begin{bmatrix} 2 & -1 & 1 \\ 2 & 2 & -1 \\ 1 & 2 & -1 \end{bmatrix}$

3) Verify Cayley Hamilton theorem for the matrix $A=\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(B) Attempt any one (3 marks)

1) Solve the following equations by Cramer's rule:
   x+y=3, y+z=5, x+z=4

2) Find the Rank of the matrix $A=\begin{bmatrix} 2 & 3 & 4 \\ 4 & 3 & 1 \\ 1 & 2 & 4 \end{bmatrix}$

Q.5 (A) Attempt any two (4 marks each)

1) Solve $(x^3+y^3)dy=x^2y \; dx$

2) Solve (1-x) dy-(1+y) dx=0. Also find the particular solution, if y=2 when x=1

3) Find the particular solution of $(D^3-D^2-D+1)y=0$, when x=0, y=1 and $\frac{dy}{dx} = 0$

(B) Attempt any one (3 marks)

1) Form the differential equation for $y=ae^x+be^{-x}$, where a, b are arbitrary constants.

2) Solve the following homogeneous differential equations: $\frac{dy}{dx} = \frac{xy+y^2}{x^2+xy}$

Q.6 (A) Attempt any two (4 marks each)

1) Using Lagrange's interpolation formula obtain a polynomial which passes via the points (0,5),(1,-1) and (3,13).

2) Given :

x	1	3	5	7	9	11	13
f(x)	5	21	53	101	165	245	341

Find $\int_1^{13} f(x)dx$, using Simpson's 1/3rd rule.

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3) Estimate the missing term by using E and Δ from the following:

x	0	1	2	3	4
Y	1	3	9	-	81

(B) Attempt any one (3 marks)   3

    1) Estimate the value of f(x) at x=2.65 from the following data by Newton's forward difference formula.

x	-1	0	1	2	3
f(x)	-21	6	15	12	3

    2) Solve $\left(\frac{\Delta^2}{E}\right) x^3$ by taking h=1

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