No. of Printed Pages : **2**

21BSC5C6BTL

Sl. No.

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

BIOTECHNOLOGY

DSC 6 : Bt : 5.2 - Animal Biotechnology

(NEP)

Time : 2 Hours | Maximum Marks : 60

Note : *(i) Answer **all** sections.*

(ii) Draw labelled diagrams wherever necessary.

SECTION - A

1. Answer the following sub-questions. **10x1=10**

(a) Define Multipotency.

(b) What is Animal Biotechnology ?

(c) What is Organ Culture ?

(d) Define Biotransformation.

(e) Name a common species where artificial insemination is widely practiced.

(f) What is Reproduction ?

(g) Define Gene Constructs.

(h) List two advantages of using viral vectors in gene transfer.

(i) Expand CRISPR.

(j) What is microinjection in transgenesis ?

SECTION - B

Answer **any four** of the following questions. **4x5=20**

2. Define pluripotency and explain its significance in stem cell biology.

3. Explain the technique of organ culture and its applications.

4. Explain the process of artificial insemination.

5. Describe the process of lipofection and its application in gene transfer to animal cells.

6. Investigate the latest advancements in transgenesis and their applications in various fields.

7. Explain the process of somatic cell hybridization and its uses.

P.T.O.

SECTION - C

Answer **any three** of the following. **3x10=30**

8. Explain the importance of germplasm conservation and the establishment of gene banks in preserving genetic diversity.

9. Discuss the potential uses of stem cells in regenerative medicine.

10. Explore the role of somatic cell cloning in advancing medical research and biotechnology.

11. Provide examples of successful applications of transgenic animals in addressing real world challenges.

12. Explore the future prospects and advancements in vectors for gene transfer in animals.

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No. of Printed Pages : **2**

21BSC5C6ZOL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

ZOOLOGY

DSC6 : Z-5.2 : Chordates and Comparative Anatomy

(NEP)

Time : 2 Hours Maximum Marks : 60

Note : *(i) Answer **all** sections.*

*(ii) Draw labelled diagram wherever **necessary**.*

SECTION - A

Answer the following sub-questions. **10x1=10**

1. (a) What is Atlas ?

(b) Define Hibernation.

(c) What is Catadromous Migration ?

(d) Define Pedogenesis.

(e) Mention the basic chordate characters.

(f) What are Sea Squirts ?

(g) Define Ichthyology.

(h) What is Agnatha ?

(i) What do you mean by Retrogressive Metamorphosis ? Give example.

(j) Define Cutaneous respiration.

SECTION - B

Answer **any four** of the following questions. **4x5=20**

2. Give the brief account of the parental care in Amphibians.

3. Enumerate the general characteristics of chordates.

4. Write the differences between cartilage and bony fishes.

5. Explain the comparative account of the heart of Fishes and Aves.

6. Briefly explain the interesting features of Sphenodon.

7. Write the salient features of Cyclostomata.

P.T.O.

SECTION - C

Answer **any three** of the following questions. **3x10=30**

8. Describe the retrogressive metamorphosis of Ascidian Tadpole larva with the help of labelled diagram.

9. Write the unique features of the class Amphibia and classify upto orders with examples.

10. Give the detail account of migration of birds with examples.

11. Write the comparative account of the brain of Scoliodon and Frog.

12. Enumerate the salient features of the class Mammalia.

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No. of Printed Pages : **2**

21BSC5C5PHL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

PHYSICS

DSC 5 : Classical Mechanics and Quantum Mechanics-I

(NEP)

Time : 2 Hours Maximum Marks : 60

Note : *(i) Answer **all** questions.*

(ii) Non-programmed Scientific Calculators are Allowed.

I. Answer **all** the Sub-questions : **10x1=10**

1. (a) Define Non-Inertial Frame of Reference.

(b) State Law of conservation of Angular Momentum.

(c) State D'Alembert's principle.

(d) What is Fictitious Force ?

(e) Mention the relation of variation of mass with velocity.

(f) What are matter waves ?

(g) State Heisenberg's Uncertainty principle.

(h) What is phase velocity ?

(i) What is Zero point Energy ?

(j) State Ehrenfest theorem.

II. Answer **any four** of the following questions : **4x5=20**

2. State and explain the law of conservation of linear momentum of a system of particle.

3. Derive an expression for time Dilation.

4. Explain the Debroglie Hypothesis.

5. Write a note on Normalisation and orthogonality of wave function.

6. State and explain law of conservation of Energy.

7. Derive an expression for apparent frequency in case of longitudinal Doppler.

P.T.O.

III. Answer **any three** of the following questions : **3x10=30**

8. (a) Explain Linear Harmonic Oscillator with neat diagram. **7+3**

(b) What are Holonomic and Non-holonomic constraints.

9. With a neat diagram explain Michelson's Morley experiment and write its negative results. **10**

10. What is Compton Effect. Derive an expression for Compton Shift. **10**

11. Derive an expression for Energy Eigen Value of a particle in an one dimensional Box. **10**

12. (a) Derive an expression for time independent Schrodinger wave equation. **8+2**

(b) What are Eigen value and Eigen functions.

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No. of Printed Pages : **2**

21BSC5C6PHL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

PHYSICS

DSC 6 : Elements of Atomic, Molecular and Laser Physics

(NEP)

Time : 2 Hours Maximum Marks : 60

Answer the following sub-questions. Each sub-question carries **one** mark. **10x1=10**

1. (a) Define Bohr's radius.

(b) State correspondence principle.

(c) State Paulis exclusion principle.

(d) Define Stark effect.

(e) Define rigid rotator.

(f) Define Stoke's lines.

(g) Give one application of Raman effect.

(h) Expand LASER.

(i) Define Stimulated emission.

(j) Define ionisation potential.

Answer **any four** of the following. Each question carries **five** marks. **4x5=20**

2. Write a note on theory of alpha particle scattering.

3. Derive an expression for magnetic dipole moment due to orbital motion of an electron.

4. Write a note on phosphorescence.

5. Give the experimental setup of Raman effect.

6. Write the requisites of LASER.

7. Write the classical theory of normal Zeeman effect.

P.T.O.

Answer **any three** of the following. Each question carries **ten** marks. **3x10=30**

8. (a) Derive an expression for Bohr's radius and total energy of an electron. **7**

(b) Write a note on Frank-Hertz experiment. **3**

9. (a) Explain stark effect with experimental study. **5**

(b) Explain Stern-Gerlach experiment. **5**

10. (a) Derive an expression for classical and quantum theory of Raman effect. **7**

(b) Explain Fluorescence. **3**

11. (a) Write the construction and working of Nd:YAG Laser. **6**

(b) Write four applications of LASER. **4**

12. (a) Derive an expression for Einstein's Co-efficients. **5**

(b) Using Bohr's model calculate the speed of the electron in a hydrogen atom in the n = 1, 2 and 3 levels. **5**

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No. of Printed Pages : **2**

21BSC5C6BOL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

BOTANY

DSC 6 : Genetics and Plant Breeding

(NEP)

Time : 2 Hours Maximum Marks : 60

Note : *(i) Answer **all** the Sections.*

(ii) Draw neat labelled diagrams whenever necessary.

SECTION - A

Answer **all** the questions. **10x1=10**

1. (a) What is Pedigree Analysis ?
(b) Who is Father of Genetics ?
(c) What are Autosomes ?
(d) What is Polygenic Inheritance ?
(e) What is Crossing Over ?
(f) What is Gene Mapping ?
(g) Define Mutation.
(h) Define Speciation.
(i) Define Self Pollination.
(j) What is Hybridization ?

SECTION - B

Answer **any four** of the following questions. **4x5=20**

2. What is Incomplete Dominance ? Describe with suitable example.

3. Write a note on Chromosomal Theory of Inheritance.

4. Write a note on Cytological basis of Crossing Over.

5. Write a note on DNA Repair Mechanism.

6. Describe the objectives of Plant Breeding in detail.

7. Write a note on Vegetative Propagation in Plants.

P.T.O.

SECTION - C

Answer **any three** of the following questions. **3x10=30**

8. What is Dihybrid Cross ? Describe Dihybrid Cross with suitable example.

9. Write a note on Quantitative Inheritance with special reference to Kernel Colour in Wheat.

10. Write a short note on :

(a) Recombination frequency

(b) Interference and Coincidence

11. (a) State Hardy - Weinberg Law

(b) Types of Mutation

12. Write a short note on :

(a) Plant Genetic Resources

(b) Genetic basis of Inbreeding Depression

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No. of Printed Pages : **2**

21BSC5C5CHL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

CHEMISTRY

DSC - 5 : Inorganic Chemistry and Spectroscopy

(NEP)

Time : 2 Hours Maximum Marks : 60

Note : *Answer **all** the sections.*

SECTION - A

1. Answer the following sub-questions. Each sub-question carries **one** mark. **10x1=10**

(a) What is symbiosis ? **1**

(b) What are zeolites ? **1**

(c) Define nuclear potential. **1**

(d) What is magic number ? **1**

(e) What is emission Spectroscopy ? **1**

(f) Define fundamental vibrations. **1**

(g) State Born-oppenheimer approximation. **1**

(h) What is Raman effect ? **1**

(i) What is chemical shift ? **1**

(j) What is mass Spectroscopy ? **1**

SECTION - B

Answer **any four** of the following questions. Each question carries **five** marks. **4x5=20**

2. Explain structure and bonding in diborane. **5**

3. Explain salient features of Nuclear shell model. **5**

4. Discuss the applications of IR Spectroscopy in functional group analysis. **5**

5. Discuss the fundamental frequencies for vibrational Spectroscopy. **5**

6. Explain vibrational Raman Spectra. **5**

7. Explain the different scales of NMR Spectroscopy. **5**

P.T.O.

SECTION - C

Answer **any three** of the following questions. Each question carries **ten** marks. **3x10=30**

8. (a) What is HSAB principle ? Explain the basis of HSAB concept. **6**

(b) Explain the wades rules. **4**

9. (a) Explain the classification of nuclides based on Z and N. **6**

(b) Write a note on liquid drop model. **4**

10. (a) Discuss Woodwards rules for the calculation of λ_{max} with example. **6**

(b) Explain fundamental and non-fundamental vibrations. **4**

11. (a) Explain Energy level diagrams of Rotational Spectra. **6**

(b) Discuss Morse potential equation for vibrational Spectroscopy. **4**

12. (a) Explain instrumentation and applications of mass Spectroscopy. **6**

(b) Discuss the principles of NMR Spectroscopy. **4**

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No. of Printed Pages : **2**

21BSC5C5ZOL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

ZOOLOGY

DSC-5 : Z.5.1 : Non-Chordates and Economic Zoology

(NEP)

Time : 2 Hours Maximum Marks : 60

Note : *(i) Answer **all** sections.*

(ii) Draw labelled diagrams wherever necessary.

SECTION - A

Answer the following sub-questions. **10x1=10**

1. (a) What is the chemical composition of the spicules of sponges ?

(b) In which phylum do you find Mesogloea ?

(c) What are the locomotory organs in the phylum Annelida ?

(d) Mention the respiratory organs in Arthropods.

(e) Which is the second largest phylum in the Animal Kingdom ?

(f) Define mantle.

(g) Define Vermicompost.

(h) What is Termitaria ?

(i) What is the scientific name of Roundworm ?

(j) What do you mean by Conjugation ?

SECTION - B

Answer **any four** of the following questions. **4x5=20**

2. Briefly explain the classification of the phylum Protozoa upto classes with examples.

3. Write the salient features of Ctenophora.

4. Explain briefly about the morphology of Pentoceros.

5. Write a short note on Mosquitoes and their control measures.

6. Give the brief account of Ascon type of canal system.

7. Write the salient features of the phylum Arthropoda.

P.T.O.

SECTION - C

Answer **any three** of the following questions. **3x10=30**

8. Give the detail account of the life history of Obelia with the help of labelled diagram.

9. Describe the classification of the phylum Annelida upto classes with examples.

10. Explain the nervous system of Pila with a neat labelled diagram.

11. Write an explanatory note on Gundi bug.

12. What is Apiculture ? Explain briefly about the medicinal value of Honey.

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No. of Printed Pages : **2**

21BSC5C6CHL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

CHEMISTRY

DSC-6 : Organic and Physical Chemistry

(NEP)

Time : 2 Hours Maximum Marks : 60

Note : *Answer **all** Sections.*

SECTION - A

1. Answer the following sub-questions. Each sub-question carries **one** mark. **10x1=10**

(a) Define hyper conjugation.

(b) What is tautomerism ?

(c) What is conformational analysis in Stereochemistry ?

(d) Give an example for Polysaccharide.

(e) Write the structure of Pyrazole.

(f) Mention the chemical name of vitamin-B6.

(g) What is Laplacian operator ?

(h) Define quantum mechanical tunneling.

(i) Define homogeneous catalysis.

(j) What are enzyme catalysed reactions ?

SECTION - B

Answer **any four** of the following questions. Each question carries **five** marks. **4x5=20**

2. Explain briefly method of determining mechanisms based on isotopic labelling.

3. Write a note on conformational analysis of cyclohexane.

P.T.O.

4. Describe the structure and reactivity of oxazole.

5. Write a brief note on synthesis of Vitamin - A.

6. Briefly explain the solution of Schrodinger wave equation for a free particle.

7. Describe the mechanism of thermal and photochemical reactions between hydrogen and chlorine.

SECTION - C

Answer **any three** of the following questions. Each question carries **ten** marks. **3x10=30**

8. (a) Explain the method of determining mechanisms based on isotopic effects from stereochemical evidences. **6**

(b) Write a note on energy levels for benzyl cation. **4**

9. (a) Describe Ruff degradation method in chain shortening in aldoses. **6**

(b) Explain briefly the synthesis of aldaric acids in carbohydrates. **4**

10. (a) Describe the synthesis of Vitamin-B_1. **6**

(b) Write a short note on biological importance of Vitamin-E. **4**

11. (a) Describe the application of schrodinger equation to rigid rotator. **6**

(b) Write a note on angular momentum operators. **4**

12. (a) Write a note on comparison of enzyme catalysed and chemical catalysed reactions. **6**

(b) Describe briefly the Lineweaver-Burk plot in case of enzyme catalysis. **4**

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21BSC5C5BTL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

BIOTECHNOLOGY

Bt - 5.1 : Plant Biotechnology

(NEP)

Time : 2 Hours Maximum Marks : 60

Note : *(i) Answer **all** sections.*

(ii) Draw labelled diagrams wherever necessary.

SECTION - A

1. Answer the following sub-questions : **10x1=10**

(a) Expand IVF.

(b) What is Totipotency ?

(c) Define Plant Biotechnology.

(d) What do you mean by secondary metabolites ?

(e) What is transenic plant ?

(f) Define Gene Stacking.

(g) What is Agriculture ?

(h) Define the term transenic expression.

(i) Expand GMOs.

(j) Define CRISPR.

SECTION - B

Answer **any four** of the following questions : **4x5=20**

2. Explain the term "Callus" and its importance in the regeneration of plants in vitro.

3. Explain briefly about the applications of secondary metabolites in pharmaceuiticals.

4. Give the brief account of the Role of Foreign genes in transenic plants.

5. Analyse the methods employed for verifying transgene expression in plants.

6. Discuss the role of emerging trends in plant biotechnology.

7. Write a short note on socio-economic impacts of transgenic crops on farmers.

P.T.O.

SECTION - C

Answer **any three** of the following questions : **3x10=30**

8. Compare and contrast direct and indirect organogenesis in plant tissue culture.

9. Elaborate on the techniques used for yield enhancement in vitro cultures.

10. Explore the ethical considerations associated with the use of transenic plants.

11. Analyse the challenges and limitations faced in the field of transgenic plant research.

12. Discuss the economic benefits of transgenic crops for farmers.

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No. of Printed Pages : **2**

21BSC5C5BOL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

BOTANY

DSC 5 : Plant Morphology and Taxonomy

(NEP)

Time : 2 Hours Maximum Marks : 60

I. Answer **all** the following questions. **10x1=10**

1. (a) What is stolon ? Give an example.

(b) What is imbricate Aestivation ?

(c) Define Taxonomy.

(d) What is false fruit ?

(e) What is fusiform root ? Give an example.

(f) What is tetradynamous ? Give an example.

(g) What is spadix ?

(h) What are bracts ?

(i) Write botanical name of chick pea.

(j) What is tubers ? Give an example.

II. Answer **any four** of the following : **4x5=20**

2. What is placentation ? Explain the different types with suitable example.

3. Distinguish between cappardiaceae and myretaceae families.

4. What is phyllotaxy ? Explain the different types with suitable examples.

5. Write the floral diagram and floral formula of family caesalpinaceae.

6. Mention economic importance and write botanical names of any five oil yeilding plants.

7. Explain evolution of angiosperms.

P.T.O.

III. Answer **any three** of the following : **3x10=30**

8. Explain in detailed about principle and rule of ICBN.

9. Explain types, structure and variation of flower (Inflorescence).

10. Explain the AGP-IV system (2016) of classification.

11. Explain in detailed about molecular taxonomy in respect to DNA sequence or chloroplast genes.

12. Explain about plant identification using dichotomous key.

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No. of Printed Pages : **3**

21BSC5C5MTL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

MATHEMATICS

DSC-5 : Real Analysis-II & amp; Complex Analysis

(NEP)

Time : 2 Hours Maximum Marks : 60

Note : *Answer **all** sections.*

SECTION - A

Answer the following sub-questions, each sub-question carries **one** mark. **10x1=10**

1. (a) Define closed interval and give example.

(b) Let [a, b] = [2, 8] and P = {2, 4, 6, 8} and sub interval [2, 4], [4, 6], [6, 8] find the norm.

(c) State Second Mean Value Theorem.

(d) Complete state if $f(x)$ and $g(x)$ are differentiable function on [a, b] and $f'(x)$ and $g'(x)$ are continuous on [a, b] then $\int_a^b f(x).g'(x)\,dx =$ _____.

(e) Write complex number in polar form.

(f) What is complex variable ?

(g) Define open set.

(h) Define Jacobian of a transformation.

(i) What is Contour ?

(j) What is Simple Curve ?

P.T.O.

SECTION - B

Answer **any four** of the following questions. **4x5=20**

2. Prove that if $f(x)$ is a real valued bounded function defined on [a, b] and $p \epsilon \phi$[a, b] then $m(b-a) \leq L(p, f) \leq U(p, f) \leq M(b-a)$ where M and m are respectively the superimum and infimum of $f(x)$ on [a, b].

3. Can we evaluate $\int_{-1}^{1} \frac{dx}{1+x^2}$ by substituting $x = \frac{1}{t}$?

4. Show that $\omega = z + e^z$ is analytic and hence find $\frac{d\omega}{dz}$.

5. Prove that Bilinear transformation preserve the cross-ratio of four points.

6. Evaluate $\int_C z^2 dz$ where C is the line join point 0 and $3+i$.

7. By applying Mean Value Theorem to the integral $\int_0^{1/4} \frac{dx}{\sqrt{1-x^2}}$ show that

$$\frac{1}{4} \leq \int_0^{1/4} \frac{dx}{\sqrt{1-x^2}} \leq \frac{1}{\sqrt{15}} .$$

SECTION - C

Answer **any three** of the following questions. **3x10=30**

8. (a) Show that the function $f(x) = x^2$ is integrable on [0, a] and $\int_0^a x^2 dx = \frac{a^3}{3}$.

(b) If $f(x) = 2x - 1$ $0 \leq x \leq 1$ and $P = \left\{0, \frac{1}{7}, \frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}, 1\right\}$ find L(p, f).

9. (a) Show that $\int_0^1 \frac{1+x}{(2+x)^2}\,dx = \frac{e}{3} - \frac{1}{2}$ by integration by part Method.

(b) Prove that if $f(x) \in P[a, b]$ and $\phi(x)$ is a primitive of $f(x)$ then $\int_a^b f(x)\,dx = \phi(b) - \phi(a)$

10. (a) Find the analytic function whose real part is $x^3 - 3xy^2$.

(b) Evaluate $\lim_{z \to e^{i\pi/4}} \frac{z^2}{z^4 + z + 1}$.

11. (a) Find the image of the circle $|z| = 1$ and $|z| = 2$ [equivalently $x^2 + y^2 = 1$; $x^2 + y^2 = 4$] under the mapping $\omega = z + (1/z)$.

(b) Find the bilinear transformation which map the points $z = 1, i, -1$ into $\omega = i, 0, -i$.

12. (a) Evaluate $\int_C \frac{z}{(z^2+1)(z^2-9)}$ where C is the circle $|z| = 2$

(b) Prove that if $f(z)$ is analytic within and on a simple closed curve c and $z = a$ is a point within C then $f'(a) = \frac{1}{2\pi i} \int_C \frac{f(z)}{(z-a)^2}\,dz$.

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No. of Printed Pages : **3**

21BSC5C6MTL

B.Sc. V Semester Degree Examination, Sept./Oct. - 2024

MATHEMATICS

DSC-6 : Vector Calculus and Analytical Geometry

(NEP)

Time : 2 Hours | Maximum Marks : 60

Note : *Answer **all** sections.*

SECTION - A

1. Answer the following sub-questions, each sub-question carries **one** mark. **10x1=10**

(a) Find the volume of parallelopiped whose co-terminous edges are $2i-3j+k$, $i-j+2k$, $2i+j-k$.

(b) Prove that, if two of three vectors are equal or parallel their scalar triple product vanishes.

(c) Find div $\vec{F}$ if $\vec{F} = 3x^2i + 5xy^2j + xyz^3k$ at (1, 2, 3).

(d) Prove that $\text{div}\left(\text{curl } \vec{f}\right) = 0$.

(e) State Stoke's theorem.

(f) Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ using Green's theorem.

(g) Find the angle between the planes $3x-6y+2z+5=0$ and $4x-12y+3z-3=0$

(h) Write the equation of the plane passing through the point (x_1, y_1, z_1).

(i) Define right circular cylinder.

(j) Write the standard equation of the sphere, its centre and radius.

P.T.O.

SECTION - B

Answer **any four** of the following questions. Each question carries **five** marks. **4x5=20**

2. Find the value of P. Show that the vectors $2i-j+k$, $i+2j-3k$ and $3i+pj+5k$ are coplanar.

3. If $\vec{r} = xi + yj + zk$ such that $\left|\vec{r}\right| = r$ prove that $\nabla f(r) = \left(\frac{f^1(r)}{r}\right)\vec{r}$

4. Evaluate $\int_c \vec{F} \cdot d\vec{r}$ where $\vec{F} = xyi + \left(x^2 + y^2\right)j$ along the path of a straight line from (0, 0) to (1, 0) and then to (1, 1).

5. Find the equation of the plane passing through the point $3i+3j+4k$ and perpendicular to the vector $12i-4j+3k$. Reduce the equation to the normal form.

6. Find the equation of the sphere which passes through the point (1, 0, 0), (0, 1, 0), (0, 0, 1) and its centre on the plane $x+y+z=6$.

7. $\text{Curl}\left(\text{curl}\,\vec{f}\right) = \text{grad}\left(\text{div}\,\vec{f}\right) - \nabla^2\vec{f}$

SECTION - C

Answer **any three** of the following questions. Each question carries **ten** marks. **3x10=30**

8. (a) Show that $\vec{a} \times \left(\vec{b} \times \vec{c}\right) = \left(\vec{a} \cdot \vec{c}\right)\vec{b} - \left(\vec{a} \cdot \vec{b}\right)\vec{c}$

(b) For the curve $x=t$, $y=t^2$, $z=t^3$ find the equation of the normal plane at $t=1$.

9. (a) Find the directional derivative of $\phi = \frac{xz}{x^2 + y^2}$ at (1, −1, 1) in the direction of $\vec{A} = i - 2j + k$

(b) Find the angle between the surfaces $x^2+y^2+z^2=9$ and $z=x^2+y^2-3$ at the point (2, −1, 2).

10. (a) Verify Green's theorem $\oint_c (3x^2 - 8y^2)\,dx + (4y - 6xy)dy$ where c is the boundary of the region defined by $y = \sqrt{x}$ and $y = x^2$.

(b) Using Gauss divergence theorem Evaluate $\iint_s (xi + yj + z^2k)\vec{n}\,ds$, where s is the closed surface bounded by the cone $x^2 + y^2 = z^2$ and the plane Z = 1.

11. (a) Find the equation of the plane which passing through the points (2, 2, −1) and parallel to the line joining the points A(3, −1,0), B(2, 1, 0) and C(1, −1,0), D(−1, 2, 0).

(b) Find the equation of the line passing through the point (2, 5, 8) and (−1, 6, 3).

12. (a) Find the equation of the tangent plane to the cone $9x^2 - 4y^2 + 16z^2 = 0$ which contain the line $\frac{x}{32} = \frac{y}{72} = \frac{z}{72}$

(b) The radius of the normal section of the right circular cylinder is 2 units and the axis lies along the straight line $\frac{x-1}{2} = \frac{y+3}{-1} = \frac{z-2}{5}$ find its equation.

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