44326

Reg. No. | | | | | | | | |

VI Semester B.Sc. (CBCS) Degree Examination, October - 2023

PHYSICS (Elective) - III

Quantum Mechanics - II, Condensed Matter Physics-I and Nanomaterials

Paper - II(A)

(Regular)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

1) Scientific calculator can be used to solve problems.
2) Write the itermediate steps while solving problems.
3) Give physical meaning of each symbol used.

PART - I

1. Answer any **TEN** of the following questions. **(10×2=20)**

a) Define wave function.

b) Write the condition of orthogonality of wave functions.

c) Calculate the energy of harmonic oscillator which has frequency 10^{12} Hz(in the first excited state only). Given : $h = 6.625 \times 10^{-34}$ JS.

d) What are miller indices?

e) State the weidman-Franz law and give its expression.

f) What are super conductors? Define critical field.

g) Define magnetic permeability and magnetic susceptibility.

h) Draw the nature of hysteresis curve. What does the area of hysteresis loop represent?

i) Dielectric constant of a material is 5. Calculate its susceptibility.

j) What are nano materials?

k) What do you mean by quantum dots.

l) Mention two different types of liquid crystals.

PART - II

2. Answer 'a' and 'b' or 'c' and 'd'.

a) Derive the expression for eigen values and eigen funcitons for a particle in one dimensional box. **(10)**

b) Explain the physical significance of wave function. **(5)**

(OR)

P.T.O.

c) Derive schrodinger's time dependent wave equation. (10)

d) Electron is confined to one dimensional box of side lnm.Obtain the Eigen values in the ground state. (5)

3. Answer 'a' and 'b' or 'c' and 'd'.

a) Explain the construction and working of Bragg's spectrometer. (10)

b) Calculate glancing angle on the cube face (100) of a crystal where spacing constant is 2.81 A° corresponding to second order reflection of x-rays. Wavelength of X-rays is 0.710 A° (5)

(OR)

c) Explain Einstein's theory of specific heat. (10)

d) Mention the application of superconductors. (5)

4. Answer 'a' and 'b' or 'c' and 'd'.

a) Write down the differences between diamagnetic , paramagnetic and Ferromagnetic materials. What are soft and hard magnetic materials? (10)

b) Calculate magnetic susceptibility of $NiSo_4$ at temperature 300 K when magnetic intensity is 1 Tesla. The magnetic substance has 5×10^{25} dipoles per unit volume. (5)

(OR)

c) Explain dielectric polarization and derive the expression for Lorentz field. (10)

d) Mention the applications of piezo electric effect. (5)

5. Answer 'a' and 'b' or 'c' and 'd'.

a) Explain different methods of synthesis of nano materials. (10)

b) List the properties that distinguishes nano materials from bulk materials. (5)

(OR)

c) Explain Fullerence, carbon Nano tube and graphene. (10)

d) Mention the applications of nano materials. (5)

583545

42643/35643

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VI Semester B.Sc. Degree Examination, October - 2023

PHYSICS

Paper - II

(Repeaters 2019-20)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

i. Use calculators for calculations.
ii. Write intermediate steps.
iii. Give physical meaning for symbol and notations.

Part - I

Answer any **ten** questions. **(10×2=20)**

1. a. Define fourier transform.
   b. State parseval's identity of fourier transform.
   c. What is photo diode? Draw its circuit symbol.
   d. Mention applications of optical fibre.
   e. What is Modulation?
   f. What are key - words in C-language.
   g. What is flow chart?
   h. What is break statement? Where it is used?
   i. What is differential amplifier?
   j. Find the Lapalce - transform of e^{at}.
   k. In an optical fiber, refractive index of cladding is 1.4355 and retractive index of core is 1.4500.1. the numerical aperture.
   l. Calculate the modulation factor for AM wave if $V_{max} = 4V$ and $V_{min} = 2V$.

Part - II

Answer any **four** of the following. **(4×5=20)**

2. Distinguish between step index and grated index fit.
3. Find the lapalce transform of $F(t) = t^2$ using transform derivative.

P.T.O.

4. Explain the space wave propagation.
5. With neat circuit diagram, explain the working IC-555 as rectangular wave generator.
6. Write a C-program to find the sum of 'n' na numbers.
7. An audio signal of 5KHz is used to amplitude modulated of 600 KHz find.
   a. Side band frequence.
   b. Band width.

Part - III

Answer any **four** of the following. **(4×10=40)**

8. State and explain basic properties of Laplace transform.
9. Define acceptance angle and numerical aperture, obtain an expression for numerical aperture of optical fiber.
10. What is frequence modulation? Derive an expression for frequence modulation.
11. a. Explain basic data types used in C-language.
    b. Write a C - program to find largest of three numbers.
12. What is multivibrators? Mention any two uses of multivibrators. Explain the working monostable multivibrator with neat diagram.

141615

44307/F0270

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VI Semester B.Sc. 5 (CBCS) Degree Examination, September/October - 2023

CHEMISTRY - I (Optional)

Paper : I

(Regular)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

1) All questions are compulsory.
2) Answer all questions in the same answer book.
3) Draw neat diagrams and give equations wherever necessary.

I. Answer any **Ten** Questions. **(10×2=20)**

1. Mention any two limitations of crystal field theory.
2. What are trace elements? Give two examples.
3. Mention any two biological role of sodium.
4. Write the D and L conformers of Alanine.
5. Define mutarotation.
6. What are epimers and epimerisation?
7. What is induced dipole moment?
8. What do you mean by symmetry forbidden transition?
9. Define de-Broglie hypothesis.
10. What are terpenes? Give two examples.
11. Write the structural formula of ferrocene.
12. Give the synthesis of barbituric acid.

II. Answer any **Three** Questions. **(3×5=15)**

1. Account for the crystal field splitting of d-orbitals in tetrahedral complexes.
2. Discuss the consequences of crystal field splitting on ionic radii of M^{+2} ions.
3. Write a note on colour and magnetic properties of co-ordinate complexes.
4. Discuss the structure and function of hemoglobin.

[P.T.O.

III. Answer any **Three** questions. **(3×5=15)**

1. Give Killiani's - Fischer synthesis.
2. Explain Bergmann synthesis of a dipeptide.
3. Give the synthesis of Vitamin - C from D(+) glucose.
4. Write a note on structure of proteins.

IV. Answer any **Three** questions. **(3×5=15)**

1. Explain respective electronic transitions.
2. Explain experimental verification of Davisson-Germen.
3. Discuss Franck-condon principle for electron transitions of diatomic molecule.
4. Describe the methods of determination of dipole moment by temperature variation method.

V. Answer any **Three** questions. **(3×5=15)**

1. Give the synthesis of citral.
2. Discuss 18-electron rule with respect to ferrocene and $[Mn(Co)_5]^+$.
3. How do you synthesize following from Diethylmalonate?
   i) Ketones
   ii) Dicarboxylic acids.
4. Discuss the advantages of organic reagents over inorganic reagents.

219395

42625/F250

Reg. No. | | | | | | | | | |

VI Semester B.Sc. Degree Examination, September/October - 2023

CHEMISTRY - I

Paper : I (Optional)

(Non - CBCS Repeaters)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

1. *All sections are compulsory.*
2. *Answer all questions in the same answer book.*
3. *Draw neat diagrams and give questions whenever necessary.*

SECTION - A

Answer any **Ten** of the following. **(10×2=20)**

1. a) Mention the factors that affect 10 Dq.

b) Write any two characteristics of chelates.

c) What are strong field and weak field ligands?

d) Write the structural formula of zeise's salt.

e) Write the conformational formula of $\alpha - D(t)$ Glucose.

f) Write the configurational formula of L-alanine.

g) What are terpenes? Give examples.

h) What are epimers and epimerisation.

i) Write any two importance of vitamin B6.

j) What is thermoplastic polymer? Give an example.

k) What is meant by photoelectric effect?

l) Give Einstein photoelectric equation and explain the terms in it.

SECTION - B

Answer any **Four** of the following questions. **(4×5=20)**

2. Account for the crystal field splitting of d - orbitals in tetrahedral complexes.

3. Discuss 18-electron rule with respect to ferrocene and $[Mn(CO)_5]^+$.

4. Give the conversion of glucose into fructose.

P.T.O.

5. Explain the synthesis of vitamin - A by Van-dropetal method.
6. Give the classification of polymers.
7. Explain the measurement of dipole moment by temperature variation method.

SECTION - C

Answer any **Four** of the following questions. **(4×10=40)**

8. a) Explain the crystal field splitting of d-orbitals in square planar complexes according to crystal field theory.
   b) What are chelates? Explain the factors affecting chelate stability.

9. a) Write a note on color and magnetic properties of co-ordination complexes.
   b) Give the synthesis of citral.

10. a) Explain Bergmann synthesis of dipeptide.
    b) Give Kiliani - Fischer synthesis.

11. a) How do you determine the molar mass of macromolecules by Donnan - Membrane method?
    b) Explain with a suitable potential energy curve the Franck - Condon principle.

12. a) Deduce Einstein's photoelectric equation.
    b) Explain how the dipole moment helps in predicting shapes of molecules.

217367

42626/F260

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VI Semester B.Sc. Degree Examination, September/October - 2023

CHEMISTRY

Paper - II

(Repaters) (Non - CBCS)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :
1. *All questions are compulsory.*
2. *Draw neat diagrams and give questions whenever necessary.*

SECTION - A

1. Answer any **Ten** questions. **(10×2=20)**

   a. What is R_f value? Mention two factors affecting it.

   b. What are micro nutrients? Name micro nutrients of soil

   c. What is thermogravimetry?

   d. Mention the types of electronic transitions.

   e. What is Barfoed reagent? Write its use.

   f. Write two differences between soaps and detergent.

   g. What is favorskii rearrangement? Give equation.

   h. Write the standard reference of NMR spectra and why it is choosen as standard reference.

   i. What is reversible cell? Give an example.

   j. What is liquid junction potential?

   k. State einstein's law of photochemical equivalence.

   l. Define quantum efficiency.

SECTION - B

Answer any **Four** of the following questions. **(4×5=20)**

2. Give a brief account of column chromatography.
3. Explain the flame photometric determination of sodium.

[P.T.O.

4. What are drugs? Write about following with example
   i. Antipyretics.
   ii. Antibiotics.
5. Describe the manufacture of soap by modern process.
6. Derive an expression for EMF of concentration cell without transference.
7. Explain :
   i. Photosensitization.
   ii. Chemiluminescence.

SECTION - C

Answer any **Four** of the following questions. **(4×10=40)**

8. a. How Nitrogen present in soil is determined by alkaline permanganate method.
   b. Explain the electronic spectra of $[Ti(H_2O)_6]^{3+}$ complex ion.
9. a. Explain the mechanism of Benzidine rearrangement.
   b. Explain the nuclear shielding and deshielding with example.
10. a. Explain the determination of pH of solution using quinhydrone electrode.
    b. State Beer - Lambert's law and derive its mathematical expression.
11. a. Explain the electrogravimetric determination of copper.
    b. Interpret the PMR spectra of following
       i. Ethanol.
       ii. Acetaldehyde.
12. a. Give the synthesis and use of Novocaine.
    b. Write a note on Potentiometric redox titrations.

175759

44308/F0280

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VI Semester B.Sc. (CBCS) Degree Examination, September/October - 2023

CHEMISTRY

Paper : IIA

(Regular)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.

1. Answer any Ten questions. **(10×2=20)**

a) What is Rf value of mention two factors influencing it.

b) What are micro nutrients? Mention micro nutrients of soil.

c) What is thermogravimetry?

d) Mention the types of electronic transitions.

e) Write Arrhenius theory of bases and mention its limitation.

f) Write the solvent system concept of acids and bases with a example.

g) What is barfoed reagent? Give its use.

h) Write two difference between soaps and detergents.

i) What is Favorskii rearrangement? Give reaction.

j) What is chemical shift? Write two factors affecting it.

k) What is nuclear deshielding?

l) Name two non-aqueous solvents and mention the properties of good solvents.

II. Answer any three questions. **(3×5=15)**

a) Explain the flame photometric determination of potassium.

b) Describe the electrogravimetric determination of copper.

c) Explain the determination of pH of soil.

d) Mention the types of Fertilizers and how superphosphate of lime is prepared.

[P.T.O.

III. Answer any **Three** questions. (3×5=15)

a) Explain the selection rules for d-d transitions.

b) Explain the electronic spectrum of $[Ti(H_2o)6]^{3+}$ complexion.

c) Explain the following of acids and bases with example.

i) Lewis theory

ii) Pearson's HSAB concept.

d) Write the following theories and their limitation

i) Bronsted - Lowry theory

ii) Lux-Flood theory

IV. Answer any **Three** questions. (3×5=15)

a) What are drugs? Write about following with examples.

i) Antipyretics

ii) Antimalarials

b) Give the synthesis and use of Novocaine

c) Describe the manufacture of soap by modern process.

d) Explain the mechanism of Benzidine rearrangement.

V. Answer any three questions. (3×5=15)

a) Write the following

i) Electro magnetic spectrum region and criteria of NMR spectra.

ii) Information obtained from PMR spectrum of molecule.

b) Interpret the PMR spectra of following

i) Ethanol

ii) Ethanal.

c) State Beer-Lambert's law and derive its mathematical expression.

d) State Einstein's law of photochemical equivalence. Calculate the energy in Joules absorbed by one mole of the reactant.

536719

42639/F390

Reg. No. | | | | | | | | |

VI Semester B.Sc.4. Degree Examination, October - 2023

MATHEMATICS (OPTIONAL)

Topology and Laplace Transforms

Paper - III

(Repeaters)

(w.e.f. 2016-2017 and 2019-20)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates : *Answer All parts.*

PART - A

1. Answer any Ten of the following. **(10×2=20)**

a. Define discrete and indiscrete topology on a set X.

b. Let X = {1,2,3} and $T = \{X, \phi, \{1\}, \{2\}, \{1,2\}\}$ and let A = {1,3} then find neighbourhood points of A.

c. Prove that $\overline{A \cap B} \subset \overline{A} \cap \overline{B}$.

d. Define T_1 and T_2 - space.

e. Prove that subspace of indiscrete space is indiscrete.

f. Define Laplace transformation and find $L(e^{at})$.

g. Find $L(Sin^2 4t)$.

h. State and prove first shifting property of laplace transformation.

i. Find $L^{-1}\left[\frac{1}{S^2 - 2S + 5^-}\right]$.

j. Show that $L[f'(t)] = SF(s) - f(o)$ where f(t) is continuous function.

k. Define Heaviside function H(t-a) and find its Laplace transform.

l. Solve $y'' + 9y = 0$ given $y(0) = 0$, $y'(0) = 2$.

PART - B

Answer any Four of the following. **(4×5=20)**

2. If (X,T) is a topological space and A, B are subsets of X, then prove that

i. $A \subset B \Rightarrow d(A) \subset d(B)$.

ii. $d(A \cup B) = d(A) \cup d(B)$

3. Prove that every T_2 - space in T_1 - space but the converse is not true.

P.T.O.

4. Find Laplace transform of the function $f(t)=\begin{cases} e^t \text{ for } 0<t<5 \\ 3 \text{ for } t>5 \end{cases}$.

5. Find the Laplace transform of
   i. $Sin5t.Cos3t$.
   ii. $e^{4t}(t^2-7t+3)$.

6. If L{f(t)}=F(S), then prove that $L\{t^n.f(t)\}=(-1)^n\frac{d^n}{ds^n}[F(S)]$.

7. Solve the equation using Laplace transformation $y''-2y'-3y=\sin t$, given y(0) = 0 and $y'(0)=0$.

PART - C

Answer any Four of the following. **(4×10=40)**

8. a. If (X,T) is a topological space, prove that
      i. Every intersection of closed set is a closed set.
      ii. Every finite union of closed set is a closed set.
   b. If X = {a,b,c,d,e} $T=\{X,\phi,\{a\},\{c,d\},\{a,c,d\},\{b,c,d,e\}\}$ is topology on X. A = {a,b,e} find derived set of A.

9. a. Prove that every subspace of T_2 - space is T_2 - space.
   b. If X = {a,b,c,d}, $T=\{X,\phi,\{a\},\{a,b\},\{a,b,c\}\}$ then find closure of the set {b,c}.

10. a. State and prove second shifting property.
    b. Find $L^{-1}\left[\frac{1}{(S+2)(S+4)}\right]$.

11. a. If f(t) is periodic function with period T>0, then prove that
    $$L\{f(t)\}=\frac{1}{1-e^{-ST}}\int_0^T e^{-st}f(t).dt$$
    b. Find $L\left[\frac{\cos at-\cos bt}{t}\right]$.

12. a. State and prove convolution theorem.
    b. Verify convolution theorem for f(t) = t and g(t) = cost.

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44324/F0440

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VI Semester B.Sc. 5 Degree Examination, October - 2023

MATHEMATICS(Optional)

Topology and Laplace Transforms

Paper : II B

(Fresh New Syllabus w.e.f. 2022-23)

(Regular)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

Answer all parts.

PART - A

1. Answer any ten of the followings(2 marks each) **(10×2=20)**

a) Write the discrete and indiscrete topology on a set $X=\{1,2,3\}$

b) If $X=\{a,b\}$ *and* $T=\{x,\phi,\{a\}\{b\}\}$ find all neighborhoods of 'a'.

c) Let (X,T) be a topological space and $A\subseteq X$, then prove that A is always a subset of $\overline{A}$

d) Define base and sub-base for a topology.

e) Let $X=\{a,b,c\}$ and $T=\{X,\phi,\{a\}\{b\}\{a\,b\}\}$. Then show that (X,T) is not a T_1-space.

f) If $L[f(t)]=F(s)$ then $L(e^{at})=F(s-a)$.

g) Find $L(\sin 2t.\cos 3t)$

h) Find $L[\sinh at]$ using definition.

i) Prove that $L[f'(t)]=SF(s)-f(0)$. When f(t) is Continuous function

j) Evaluate $L^{-1}\left(\frac{1}{(s+4)^3}\right)$.

k) Define " Dirac-delta" function and find $L\{\delta(t-a)\}$.

l) Solve $y'+y=0$ given $y(0)=1$.

[P.T.O.

PART - B

Answer any FOUR of the following(5 marks each) **(4×5=20)**

2. In a topological space (X,J), If A,B,C then prove that

   i) If $A \subset B$ then $\overline{A} \subset \overline{B}$.

   ii) $\overline{A \cup B} = \overline{A} \cup \overline{B}$.

3. Prove that every subspace of T_1-space is also T_1-space.

4. Find the Laplace transform of the function $f(t) = \begin{cases} e^t & for \quad 0 < t < 5 \\ 3 & for \quad t > 5 \end{cases}$

5. If $L[f(t)] = F(s)$ then prove that $L(t^n f(t)) = (-1)^n . \frac{d^n}{ds^n}[F(s)]$ and evaluate $L[te^t]$.

6. Prove that $\int_0^b te^{-2t} \cos t dt = \frac{3}{25}$

7. Solve by using Laplace transforms $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = e^{3t}$ given $y(0) = 0$ and $y'(0) = 0$. when t = 0

PART - C

Answer any FOUR of the following(each 10 marks) **(4×10=40)**

8. a) In a topological space (X,T) If $A, B \subset X$, then prove that

   i) $A \subset B \Rightarrow A^o \subset B^o$

   ii) $(A \cap B)^o = A^o \cap B^o$.

   b) Let $X = \{1,2,3,4\}$ and $T = \{X, \phi, \{2\}\{1,2\}\{1,2,3\}\{2,4\}\{1,2,4\}\}$ be a topology on X.

   Let $A = \{1,3,4\}$ then find

   i) A ii) $d(A)$ iii) A^o

9. a) Prove that $T_Y = \{Y \cap G : G \in T\}$ a topology on y in a topological space (X,T) where $Y \subset X$.

   b) Let $X = \{a,b,c,d\}$ and $T = \{X, \phi, \{a,b\}, \{c\}, \{a,b,c\}, \{c,d\}\}$. Then prove that $\beta = \{\phi, \{a,b\}, \{c\}, \{c,d\}\}$ is a base for T, and find its sub-base.

10. a) If $L[F(t)] = F(s)$ then prove that $L\left[\frac{F(t)}{t}\right] = \int_s^0 F(s)ds$. If $\lim_{t\to\infty}\left(\frac{1}{t}f(t)\right)$ exists.

b) Find

i) $L\left[(t^2+1)^2\right]$

ii) $L^{-1}\left(\frac{s+2}{s^2+4s-2}\right)$.

11. a) Derive the expression for Laplace Transform of a periodic function of period $T > 0$.

b) Find $L\left[\frac{\cos at - \cos bt}{t}\right]$

12. a) State and prove convolution theorem.

b) Verify convolution theorem for functions $f(t) = \sin t, g(t) = e^{-t}$.

42638/F380

Reg. No. | | | | | | | | |

VI Semester B.Sc.4. Degree Examination, October - 2023

MATHEMATICS

Complex Analysis and Ring Theory

Paper - II

(Repaters w.e.f. 2019-20)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates : *1. Question paper has 3 parts namely A,B and C.*
2. Answer all parts.

Part - A

1. Answer any **ten** of the following. **(10×2=20)**

a. Prove that an analytic function with constant imaginary part is constant.

b. Show that $f(z)=z^2$ is analytic.

c. Show that $\frac{-y}{x^2+y^2}$ is harmonic.

d. Show that $\int_0^{1+i} z^2 dz$.

e. State 'Morera's theorem.

f. Define :

i. Pole.

ii. Essential Singularity.

g. Find the residue of $f(z)=\frac{z}{(z-1)(z-2)}$ at $z=2$.

h. Prove that zeros of an analytic function are isolated.

i. State 'Jordan's lemma'.

j. Define a 'Sub ring' and give an example.

k. Define left and right ideals.

l. In a ring $(R,+,\bullet)$ prove that $a.0=0\ \forall a \in R$ and 0 is the identity element w.r.t +.

P.T.O.

Part - B

Answer any **four** of the following. **(4×5=20)**

2. With usual notation derive the C-R equations $\frac{\partial u}{\partial x}=\frac{\partial v}{\partial y}$ and $\frac{\partial u}{\partial y}=-\frac{\partial v}{\partial x}$.

3. If $u=e^{-x}(x\sin y-y\cos y)$ find f(z) in terms of z by using Milne - Thomson method.

4. State and prove 'Cauchy's integral formula'.

5. If f(z) has a pole of order m at z = a, then show that

$$\operatorname{Res}\{f(z):a\}=\lim_{z\to a}\left\{\frac{1}{(m-1)!}\frac{d^{m-1}}{dz^{m-1}}\left[(z-a)^m f(z)\right]\right.$$

6. Using contour integration, prove that $\int_0^{\infty}\frac{dx}{(1+x^2)^2}=\frac{\pi}{4}$.

7. Show that the set of all matrices of the form $\begin{bmatrix} a & b \\ 0 & 0 \end{bmatrix}\forall a,b\in R$ is a ring w.r.t. matrix addition and matrix multiplication.

Part - C

Answer any **four** of the following. **(4×10=40)**

8. a. Prove that an analytic function with constant modulus is constant.

   b. If f(z) is analytic, then prove that

$$\left[\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right]|f(z)|^2=4|f'(z)|^2.$$

9. a. State and prove 'Cauchy's inequality'.

   b. Evaluate $\int_C\frac{dz}{(z-1)(z+3)}$ where $C:|z|=1$, using Cauchy's integral theorem.

10. a. State and prove 'Taylor's theorem'.

b. Expand the function $f(z)=\frac{1}{z^2-3z+2}$ by Laurent's series for

i. $1<|z|<2$.

ii. $|z|>2$.

11. a. State and prove 'Cauchy's residue theorem'.

b. Using contour integration, prove that $\int_0^{2\pi}\frac{d\theta}{3+2\cos\theta}=\frac{2\pi}{\sqrt{5}}$.

12. a. Prove that a non empty subset S of a ring R is a sub ring iff

i. $a,b\in S\Rightarrow a-b\in S$.

ii. $a,b\in S\Rightarrow ab\in S$.

b. Define homomorphism of ring R into R'. If $f:R\to R'$ is a homomorphism, then prove that

i. $f(0)=0'$ where 0 and $0'$ are identity elements of R and R' respectively.

ii. $f(-a)=-f(a)\ \forall a\in R$.