

December-23-03-5382
B.Sc. Sem. -I (New) Examination
Course Implemented after June-2020 Dec.-2023
Chemistry : CH - 101

Total Marks : 70 **Time : 2½ Hours**

18	Answer Any Two of the following. Explain the shape of NH_3 on basis of VSEPR and describe limitation of VSEPR theory. What is lanthanide contraction? Explain the effect of lanthanide contraction. What is hybridization? Explain sp^3 hybridization with suitable example.	Que. 1 1. 2. 3.
17	Answer Any Two of the following. Write a short note on hyper conjugation. What is substitution reaction? Explain the electrophilic aromatic substitution reaction. Explain the mechanism of SN^1 .	Que. 2 1. 2. 3.
18	Answer Any Two of the following. Explain the first law of thermodynamics. Write a short note. Efficiency of the Carnot engine. Represent the second law of thermodynamics in different ways.	Que. 3 1. 2. 3.
17	Answer Any Two of the following. Explain the Minot method used for the estimation of chloride ions. Explain the different methods of showing concentration with the right example. What is a Metalochromic indicator? Give two examples. Explain complex metric titrations.	Que. 4 1. 2. 3.

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B.Sc. Sem.-I (New) Examination

Course Implemented after June-2020 Dec.-2023

Chemistry : CH - 101

Total Marks : 70

Time : 2½ Hours

- Que. 1. 1. VSEPR ને આધારે NH_3 ની આકાર અને બંધકોણ સમજાવો. અને VSEPR સિદ્ધાંતની મર્યાદા જણાવો.
2. લેન્થાઇડ સંકીર્ણન એટલે શું? લેન્થાઇડ સંકીર્ણનની શું અસર થાય છે તે સમજાવો.
3. સંકરણ એટલે શું? sp^3 સંકરણ યોગ્ય ઉદાહરણ સહિત સમજાવો.
- Que. 2. 1. H_2 અને O_2 ની આકાર સમજાવો.
2. H_2 અને O_2 ની આકાર સમજાવો.
3. H_2 અને O_2 ની આકાર સમજાવો.
- Que. 3. 1. H_2 અને O_2 ની આકાર સમજાવો.
2. H_2 અને O_2 ની આકાર સમજાવો.
3. H_2 અને O_2 ની આકાર સમજાવો.
- Que. 4. 1. H_2 અને O_2 ની આકાર સમજાવો.
2. H_2 અને O_2 ની આકાર સમજાવો.
3. H_2 અને O_2 ની આકાર સમજાવો.



RO-3160

Seat No. _____

B. Sc. (Sem.-I) Examination

December - 2023

SC23MIDSCHE102 : Chemistry

(Minor Discipline Specific Course Fundamentals
of Chemistry-I) (MIDSC)

Time : 2 Hours] [Total Marks : 25

1. निम्नलिखित में से कौन कठोर है :

- (1) सल्फर है? BF₃ में गैर गैर सल्फर है।
- (2) सल्फर है? BF₃ में गैर गैर सल्फर है।
- (3) N₂ गैर गैर है और कठोर है।

2. निम्नलिखित में से कौन कठोर है :

- (1) क्लोरसिलिकॉन है।
- (2) क्लोरसिलिकॉन है? SiCl₄ में क्लोरसिलिकॉन है।
- (3) सल्फर है? क्लोरसिलिकॉन में गैर गैर सल्फर है।

3. निम्नलिखित में से कौन कठोर है :

- (1) सल्फर है और क्लोरसिलिकॉन में गैर गैर सल्फर है।
- (2) SP सल्फर है।
- (3) सल्फर है और क्लोरसिलिकॉन में गैर गैर सल्फर है।
- (4) क्लोरसिलिकॉन है? क्लोरसिलिकॉन है।
- (5) क्लोरसिलिकॉन है? क्लोरसिलिकॉन है।

- 3 Answer any **three** :
- (1) Explain covalent bond and coordination covalent bond with suitable example.
 - (2) Explain sp hybridization.
 - (3) Explain the effect of dipole-dipole interaction on the properties of organic molecules.
 - (4) Write a short note on Nucleophile reagent.
 - (5) Explain Bimolecular elimination process.
- 2 Answer any **two** :
- (1) Explain Hyperconjugation with example.
 - (2) What is substitution process ? Explain the mechanism of SN^1 process.
 - (3) What is resonance ? Explain the resonance observed for Nitrobenzene.
- 1 Answer any **two** :
- (1) What is hybridization ? Explain the hybridization found in BF_3 .
 - (2) Briefly explain valence bond theory.
 - (3) Explain the energy level diagram for N_2 .
- 8
- 9



RO-3168

Seal No. _____

B. Sc. (Sem-I) Examination

December - 2023

SC23MDCHE-103 : General Chemistry-I

Time : 2.30 Hours

[Total Marks : 70

1. એ તે ભાગ જણાવો.

- (1) પૃષ્ઠીય ક્રમની ક્રિયા મટે ફો-એપોલિસી સમીક્ષણ તરફ.
- (2) $\sigma \neq \pi$ હાય આટ ક્રિયા ક્રમની ક્રિયામાં ફો-એપોલિસી સમીક્ષણ તરફ.
- (3) એડ ક્રિયા ક્રમની ક્રિયાને 50% પૂર્ણ થવા માટે 30 ભાગની સમય લાગે છે. તે 80% પૂર્ણ થવા માટે કેટલો સમય લાગશે?

2

એ તે ભાગ જણાવો.

- (1) ફોલિયન સંયોજકોને શાંતિ એવ પેકેટીંગ મામ, લેન્કા મામ અને પેકેટીંગ મામ આથી.
- (2) ગ્રીટ એટલે શું? તેના પ્રકારો વર્ણવો.
- (3) ગ્રામીટીંગ એકાઇન એકાઇન સંયોજન સંયોજન એટલે એવેક એવેક નીચે આપેલ છે : 16.1, 16.0, 16.2, 16.3, 15.9 છે. આ એટલે મુખ્ય, વિષમ, વિષમ અને સંયોજકો વિષમની ગણતરી કરો.

3

એ તે ભાગ જણાવો.

- (1) ક્રિયા થવા પર એટલે કેટલું પરીણામ પર ફોલિય ક્રમ.
- (2) ક્રિયા ક્રમ અને આલિયકાતી વચ્ચેની તફાવત આથી.
- (3) ફોલિય ક્રમ : આલિયકાતી અને પુનઃક્રિયા.
- (4) એડ ક્રિયાની સમયગાળા પર એવેક પ્રકારની સમીક્ષણ કરો.

RO-3168]

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] Contd...

ENGLISH VERSION

- 1 Answer any two :
- (1) Derive the equation of rate for third order reaction.
 - (2) Derive the equation of rate constant for second order reaction when ($a \neq b$).
 - (3) A second order reaction ($a = b$) takes 30 minutes to complete 50%. Find the time taken for 80% completion.

- 2 Answer any two :
- (1) Write to any three book name of related analytical chemistry with author and publisher name.
 - (2) What is error? Explain its types.
 - (3) The Burette reading found during the estimate of Bromide preparation is as following :
16.1, 16.0, 16.2, 16.3, 15.9
Calculate Mean, Range, Deviation and Average deviation.

- 3 Answer any three :
- (1) Write a short note on "Factor affecting rate of reaction".
 - (2) Give the different between order of the reaction and molecularity.
 - (3) Write a short note on "Accuracy and Precision".
 - (4) The normality of a solution is found as follow four time experiment, 0.1014, 0.1012, 0.1016, 0.1019 can the result cancelled 0.1019 by Q test ($Q_{90} = 0.76$)



RO-3178

Seat No. _____

B. Sc. (Sem.-I) Examination

December - 2023

SC23SECCHE106 : Analytical Chemistry-I

(New Course)

Time : 2 Hours

Total Marks : 25

1 नीचे दी गई प्रश्नों का उत्तर दीजिए : (प्रत्येक प्रश्न 8 अंकों का है)

(1) नीचे दी गई प्रश्नों का उत्तर दीजिए।

(अ) ट्रेस एंश

(ब) शिफ्ट फेज

(क) चयन

(ख) क्लर

(2) नीचे दी गई प्रश्नों का उत्तर दीजिए।

(अ) व्युत्पत्ति

(ब) विधि

(क) चयन

(ख) शिफ्ट

(3) नीचे दी गई प्रश्नों का उत्तर दीजिए।

(अ) क्लर

(ब) व्युत्पत्ति

(क) चयन

(ख) ट्रेस एंश

2 नीचे दी गई प्रश्नों का उत्तर दीजिए : (प्रत्येक प्रश्न 8 अंकों का है)

(1) डाटा, रूढ़ और प्रयोग के अर्थ बताइए।

(2) रूढ़-निर्धारण प्रक्रिया बताइए।

(3) प्रयोग-निर्धारण प्रक्रिया बताइए।

RO-3178]

1

[Contd...

- 3
- (1) Explain note on protic and aprotic solution.
 (2) Write a note on chelating agent.
 (3) Give the difference between water bath and sand bath.
 (4) Note on Kipp's apparatus.
- 2
- Answer the following questions : (any **two**)
 (1) Explain solute solvent and solution with example.
 (2) Explain aqueous and non aqueous solution.
 (3) Explain note on polar and non polar solvent with example.
- 1
- Answer the following questions : (any **two**)
 (a) Test-tube
 (c) Watch glass
 (1) Draw and describe the following glass instruments
 (a) Test-tube
 (c) Watch glass
 (2) Draw and describe the following equipment
 (a) Burette
 (c) volumetric flask
 (3) Draw and describe the following equipment
 (a) Crucibles
 (c) wire gauze
 (b) Pipette
 (d) desiccators
 (a) Burette stand
 (c) test-tube stand
 (d) Funnel
 (b) Conical flask
- 8

ENGLISH VERSION

- 3
- (1) नोट लिखिए : प्रोटिक और अप्रोटिक घोल।
 (2) चेलेटिंग एजेंट पर नोट लिखिए।
 (3) वाटर बाथ और सैंड बाथ में अंतर बताइए।
 (4) किप's यंत्रण पर नोट लिखिए।
- 2
- निम्नलिखित प्रश्नों का उत्तर दें : (कोई दो चुनें)
 (1) घोलक, घोलक और घोलक के साथ उदाहरण के साथ समझाएं।
 (2) जल और अजल घोलक समझाएं।
 (3) ध्रुवीय और अध्रुवीय घोलक के साथ उदाहरण के साथ समझाएं।
 (4) क्विप's यंत्रण पर नोट लिखिए।
- 1
- निम्नलिखित प्रश्नों का उत्तर दें : (कोई दो चुनें)
 (a) टेस्ट-ट्यूब
 (c) वॉच ग्लास
 (1) निम्नलिखित का चित्र और विवरण दें :
 (a) ब्यूरेट
 (c) वॉल्यूमेट्रिक फ्लास्क
 (3) निम्नलिखित का चित्र और विवरण दें :
 (a) क्रुसिबल
 (c) वायर गॉज
 (b) पिपेट
 (d) डिसेकैटर्स
 (a) ब्यूरेट स्टैंड
 (c) टेस्ट-ट्यूब स्टैंड
 (d) फनल
 (b) कॉनिकल फ्लास्क
- 8



RO-3152

Seat No. _____

B. Sc. (Sem-I) Examination

December - 2023

Chemistry : SC23MJDSCHE-101

(Fundamentals of Chemistry-I)

[Total Marks : 50

Time : 2 ¹/₂ Hours]

1 -
1) sp^2 hybridisation and geometry.
2) H^+ hybridisation and geometry of sp^2 hybridisation.

3) N_2 hybridisation and geometry of N_2 hybridisation.

4) sp^3 hybridisation and geometry of sp^3 hybridisation.

5) sp^3d hybridisation and geometry of sp^3d hybridisation.

2 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

3 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

13 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

13 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

13 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

13 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

13 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

13 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

13 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

13 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

13 -
(1) sp^3 hybridisation and geometry of sp^3 hybridisation.
(2) sp^2 hybridisation and geometry of sp^2 hybridisation.
(3) sp hybridisation and geometry of sp hybridisation.

- 12 Answer the following questions : (any two)
- (1) Explain the stability of carbocation and free radical on the basis of hyperconjugation
 - (2) What is elimination reaction? Explain mechanism of E_2 reaction
 - (3) Explain the electrophilic aromatic substitution reaction.

- 13 Answer the following questions : (any two)
- (1) What is hybridization? Explain sp^2 hybridization with suitable example.
 - (2) Explain the energy level diagram for H_2^+ and discuss its magnetic properties.
 - (3) Draw the M.O. diagram for N_2 molecule and describe the bond order and magnetic property of it.

ENGLISH VERSION

- 12 Answer the following questions : (any two)
- (1) Explain the stability of carbocation and free radical on the basis of hyperconjugation
 - (2) What is elimination reaction? Explain mechanism of E_2 reaction
 - (3) Explain the electrophilic aromatic substitution reaction.

- 4 Answer the following questions : (any two) 12
- (1) Discuss advantages and limitations of chemical instrumental methods.
 - (2) Explain accuracy and precision.
 - (3) According to analytical chemistry give details in short from any three books, journals and abstract.
- 3 Answer the following questions : (any two) 13
- (1) Derive the rate equation for third order reaction.
 - (2) A second order reaction ($a = b$) take 30 minutes to complete 50%. Find the time taken for 80% completion.
 - (3) Write a note on factors affecting the rate of reaction.



RO-3151

Seat No. _____

B. Sc. (Sem.-I) Examination

December - 2023

Physics : SC23MJDSCPHY-101

Time : $2\frac{1}{2}$ Hours

[Total Marks : 50

1 (अ) चतुर्भुज का क्षेत्रफल ज्ञात करें।

(1) एक त्रिभुज का क्षेत्रफल ज्ञात करें।

दो त्रिभुजों का क्षेत्रफल

(2) एक त्रिभुज का क्षेत्रफल ज्ञात करें।

(3) एक त्रिभुज का क्षेत्रफल ज्ञात करें।

4 (अ) चतुर्भुज का क्षेत्रफल ज्ञात करें।

(1) क्षेत्रफल ज्ञात करें।

$$(\vec{A} \times \vec{B}) \times \vec{C} + (\vec{B} \times \vec{C}) \times \vec{A} + (\vec{C} \times \vec{A}) \times \vec{B} = 0$$

(2) क्षेत्रफल ज्ञात करें - क्षेत्रफल ज्ञात करें।

क्षेत्रफल ज्ञात करें।

2 (अ) चतुर्भुज का क्षेत्रफल ज्ञात करें।

(1) क्षेत्रफल ज्ञात करें। क्षेत्रफल ज्ञात करें।

क्षेत्रफल ज्ञात करें।

(2) क्षेत्रफल ज्ञात करें। क्षेत्रफल ज्ञात करें।

(3) क्षेत्रफल ज्ञात करें। क्षेत्रफल ज्ञात करें।

3 (अ) चतुर्भुज का क्षेत्रफल ज्ञात करें।

(1) क्षेत्रफल ज्ञात करें। क्षेत्रफल ज्ञात करें।

(2) क्षेत्रफल ज्ञात करें। क्षेत्रफल ज्ञात करें।

क्षेत्रफल ज्ञात करें।

RO-3151

- 3 (a) (1) ... (2) L-C (3) ...
- 4 (a) (1) ... (2) ...
- 5 (a) (1) ... (2) ...
- 6 (a) (1) ... (2) ...
- 7 (a) (1) ... (2) ...
- 8 (a) (1) ... (2) ...

ENGLISH VERSION

- | | | |
|---|--|----|
| 1 | (A) Answer any two :
(1) Define vector triple product and obtain expression for it.
(2) Write and prove Stoke's theorem about Curl.
(3) Explain gradient of a scalar field. | 8 |
| 4 | (B) Answer any one :
(1) Prove that
$(\vec{A} \times \vec{B}) \times \vec{C} + (\vec{B} \times \vec{C}) \times \vec{A} + (\vec{C} \times \vec{A}) \times \vec{B} = 0$ (2) Explain with example Pseudo vector and Polar vector. | 10 |
| 2 | (A) Answer any two :
(1) Write principle of refrigerator. Explain its working and obtain expression for working coefficient.
(2) Explain Kelvin's thermodynamic temperature scale.
(3) What is Entropy? Explain in detail. | 3 |
| 3 | (B) Answer any one :
(1) Write and prove Carnot theorem.
(2) Discuss change in entropy for reversible cyclic process. | 8 |
| 3 | (A) Answer any two :
(1) What is resonance? Explain principle of resonator and obtain necessary expression.
(2) Obtain differential equation for wave propagating through a stretched string.
(3) Describe Piezo-electric effect to produce ultrasonic waves. | 3 |

| Contd...

RO-31511

- (B) Answer any **one** :
- (1) Compare half wave rectifier and full wave rectifier.
 - (2) Explain L-C filter with circuit diagram.
- 3
- (A) Answer any **two** :
- (1) Draw circuit diagram for half wave rectifier and explain its working.
 - (2) Draw circuit diagram for full wave rectifier with inductor filter and obtain expression for ripple factor.
 - (3) Obtain expressions of dc output current, rms value of load current, dc output voltage and working efficiency for full wave rectifier.
- 10
- (B) Answer any **one** :
- (1) Explain Kundt's tube experiment.
 - (2) State uses of Ultrasonic waves.
- 4

- 10 (a) એ ત્રીજા ક્રમની સમીકરણો આપો :
 (1) સમીકરણો આપો :
 (2) સમીકરણો આપો :
 (3) સમીકરણો આપો :
 (4) સમીકરણો આપો :
 (5) સમીકરણો આપો :
 (6) સમીકરણો આપો :
 (7) સમીકરણો આપો :
 (8) સમીકરણો આપો :
- 1 (a) એ ત્રીજા ક્રમની સમીકરણો આપો :
 (1) સમીકરણો આપો :
 (2) સમીકરણો આપો :
 (3) સમીકરણો આપો :
 (4) સમીકરણો આપો :
 (5) સમીકરણો આપો :
 (6) સમીકરણો આપો :
 (7) સમીકરણો આપો :
 (8) સમીકરણો આપો :
- 4 (a) એ ત્રીજા ક્રમની સમીકરણો આપો :
 (1) સમીકરણો આપો :
 (2) સમીકરણો આપો :
 (3) સમીકરણો આપો :
 (4) સમીકરણો આપો :
 (5) સમીકરણો આપો :
 (6) સમીકરણો આપો :
 (7) સમીકરણો આપો :
 (8) સમીકરણો આપો :
- 8 (a) એ ત્રીજા ક્રમની સમીકરણો આપો :
 (1) સમીકરણો આપો :
 (2) સમીકરણો આપો :
 (3) સમીકરણો આપો :
 (4) સમીકરણો આપો :
 (5) સમીકરણો આપો :
 (6) સમીકરણો આપો :
 (7) સમીકરણો આપો :
 (8) સમીકરણો આપો :

સમીકરણ :

Time : 2 Hours

Total Marks : 25

(Mathematical Physics & Heat - thermodynamics)

Physics : SC23MIDSPHY102

December - 2023

B. Sc. (Sem-I) Examination

RO-3159

Seat No.



- Instructions :**
- (1) The symbols used have their usual meaning.
 - (2) Figure on the right indicates marks of sub question.
- (A) Attempt any **two** questions : 8
- (1) Write Gauss' divergence theorem and prove it.
 - (2) Explain the cyclic property of Scalar triple product.
 - (3) Write and prove Stokes' theorem.
- (B) Attempt any **one** question : 4
- (1) Find the value and direction of the gradient of the command field past the point (1, 2, -2) for the given scalar field $\phi = xy^2z^3$.
 - (2) Explain the curl of a vector field.
- (A) Attempt any **two** questions : 10
- (1) What is a refrigerator? Explain its working method and get the formula of working index.
 - (2) Explain Kelvin's thermodynamic scale with formula.
 - (3) Explain T-S graph for Carnot cycle and discuss its uses.

ENGLISH VERSION

- (a) चिह्नों का सामान्य अर्थ है : 3
- (1) चिह्नों का सामान्य अर्थ है।
 - (2) दाहिनी ओर चिह्न दर्शाते हैं प्रश्न के अंकों का अर्थ है।

- (B) Attempt any one question :
- (1) If a refrigerator operates between temperatures 300K and 400K by a reversible cyclic process, calculate the thermal work capacity and the work index.
 - (2) Derive the formula for entropy for an ideal gas system.



RO-3167

Seat No. _____

B. Sc. (Sem.-I) Examination

December - 2023

Physics : SC23MDSCPHY103

(Multidisciplinary Specific Course)

(Waves - Sound & Electronics)

Time : 2 Hours

Total Marks : 25

પ્રશ્ન : (1) બે પદાર્થોની યાંત્રિક ઊર્જા સમાન છે. બંને પદાર્થોની દળતા

સરખામી છે.

(2) સ્વચ્છ પદાર્થની યાંત્રિક ઊર્જા સમાન છે.

(3) પદાર્થોની યાંત્રિક ઊર્જા સમાન છે. બંને પદાર્થોની દળતા સમાન છે.

1 (A) યાંત્રિક ઊર્જાની યાંત્રિક સમાનતા થાય.

8

(1) દરેક પદાર્થની યાંત્રિક ઊર્જા સમાન થાય.

(2) યાંત્રિક ઊર્જા સમાન છે. યાંત્રિક ઊર્જા સમાન થાય.

(3) યાંત્રિક ઊર્જા સમાન છે. યાંત્રિક ઊર્જા સમાન થાય.

બંને પદાર્થોની ઊર્જા સમાન થાય.

(B) યાંત્રિક ઊર્જા સમાન થાય.

4

(1) યાંત્રિક ઊર્જા સમાન થાય.

(2) યાંત્રિક ઊર્જા સમાન થાય.

RO-3167

1

I Contd...

- (3) Describe Melde's experiment and write its three rules explaining conditions "A" and "B" of ultrasonic waves.
- (2) What are ultrasonic waves? Describe the method of magnetic deformation to generate propagating in a string.
- (1) Derive the differential equation of waves

8

- (A) Attempt any two out of three :
- (3) Illustrate your answer with proper diagram/figure.
- (2) Figure at right side indicate marks of question are compulsory.
- (1) This question paper contains two questions. All questions

Instructions :

ENGLISH VERSION

- (A) Write the figure of Melde's experiment and write its three rules explaining conditions "A" and "B" of ultrasonic waves.
- (2) What are ultrasonic waves? Describe the method of magnetic deformation to generate propagating in a string.
- (1) Derive the differential equation of waves

3

10

- (B) Attempt any one out of two : 4
- (1) State the uses of ultrasonic waves.
 - (2) Describe the Kund's tube experiment.
- 2 (A) Attempt any two out of three : 10
- (1) What is a rectifier? Draw the circuit of full wave rectifier and explain its working principle. Its load current I_L of d.c. get the value (I_{dc})
 - (2) L-C filter draw the required diagram and derive its ripple number formula.
 - (3) C-L-C filter draw the required figure and derive its ripple number formula.
- (B) Attempt any one out of two : 3
- (1) State the difference between half wave rectifier and bridge rectifier.
 - (2) Derive the formula for voltage regulation and PIV in a half wave rectifier.

(2) માર્કીંગ્સ સ્કેન કરવાની જગ્યા.

અસપષ્ટ શીટ.

તે તે વર્ગીકરણ કોષ્ટકની વ્યવસ્થા મુજબ માર્ક કરવામાં આવે.

10 કલાક અને વર્ગીકરણ કોષ્ટક પર કુલ 10 કલાક હોય.

(1) જો વર્ગીકરણ કોષ્ટકની મૂળ સ્કેન પર 1 cmની અંદર

4 (બ) બાકે તે એક માર્કની જગ્યા આપી :

(3) સ્કેનિંગ કરી અચૂક.

(2) માર્કીંગ્સ સ્કેન કરવાની જગ્યા.

(1) વર્ગીકરણ કોષ્ટકની સ્કેન કરી વર્ગીકરણ

8 (બ) બાકે તે એક માર્કની જગ્યા આપી :

(3) માર્કીંગ્સની અર્થ માર્કીંગ્સ માર્કીંગ્સ મુજબ છે.

(2) માર્કીંગ્સની અર્થ માર્કીંગ્સ માર્કીંગ્સ મુજબ છે.

તે માર્કીંગ્સની અર્થ માર્કીંગ્સ મુજબ છે.

જવાબ : (1) એક માર્કીંગ્સની અર્થ માર્કીંગ્સ મુજબ છે.

Time : 1 1/2 Hours]

Total Marks : 25

(Instrumentation, Measurement & Analysis)

SC23SECPHY106 : Physics

December - 2023

B. Sc. (Sem.-I) Examination

RO-3176

Seat No. _____



- Instructions :**
- (1) This question paper contains two questions. All questions are compulsory.
- (2) Figures at right side indicate the marks of question.
- (3) Symbols have their usual meanings.
- 1** (a) Answer any **two** questions : **8**
- (1) Describe about the scales of Vernier calipers.
- (2) Explain construction of micrometer screw.
- (3) Explain working of spherometer.
- (b) Answer any **one** question : **4**
- (1) If there are 10 divisions in 1 cm on the main scale of Vernier calipers and total 10 divisions on the Vernier scale, then find out the least count (L.C) of that Vernier calipers with proper unit.
- (2) State the applications of micrometer screw.

ENGLISH VERSION

- (1) इस प्रश्न पत्र में दो प्रश्न हैं। सभी प्रश्न अनिवार्य हैं।
- (2) प्रश्नों के दाहिने ओर अंक दर्शाए गए हैं।
- (3) प्रतीकों का सामान्य अर्थ है।
- 1** (a) निम्नलिखित में से **दो** प्रश्नों का उत्तर दें : **8**
- (1) विनियमक की पैमानों का वर्णन करें।
- (2) सूक्ष्ममापी का निर्माण और कार्य का वर्णन करें।
- (3) गोलक की कार्यविधि का वर्णन करें।
- (b) निम्नलिखित में से **एक** प्रश्न का उत्तर दें : **4**
- (1) यदि मुख्य पैमाने पर 1 सेमी में 10 विभाजन हैं और विनियमक पैमाने पर 10 विभाजन हैं, तो विनियमक की न्यूनतम गणना (L.C) का मान ज्ञात करें।
- (2) सूक्ष्ममापी के उपयोगों का वर्णन करें।

- 2 (a) Answer any **two** questions :
- (1) Draw the circuit diagram of Wheatstone bridge and explain its principle.
 - (2) Explain construction of moving coil galvanometer.
 - (3) Discuss the working of main three parts of spectrometer.
- (b) Answer any **one** question :
- (1) Draw the circuit diagram of post office box.
 - (2) Write down applications of Wheatstone bridge.

10

3



RO-3154

Seal No. _____

B. Sc. (Sem.-I) Examination

December - 2023

SC23MJDBSCBOT101 : Botany

(Microbiology and Phycology)

Time : 2 $\frac{1}{2}$ Hours [Total Marks : 50]

પ્રશ્ન :

- (1) બધા & યુની સ્વસ્થતા છે.
- (2) જ્યારે બધાં કોલોન બંધ થાય ત્યારે તે ગુણ કોલોન છે.
- (3) બંને સ્વસ્થ અને નિર્જીવિત બંને સ્વસ્થ બને છે.

1 (બ) સંસ્કાર કરવા : (સંધ્યા એક) 8

(1) વાસ્તવ્ય વાસ્તવ્ય કરવા

(2) સામાન્ય વાસ્તવ્યના યુક્ત કરવા

(બ) ક્રમ કરવા : (સંધ્યા એક) 4

(1) TMV

(2) વાસ્તવ્યના યુક્ત યુક્ત કરવા

2 (બ) સંસ્કાર કરવા : (સંધ્યા એક) 9

(1) કરવા : લોગી યુક્ત

(2) લોગી યુક્ત વાસ્તવ્ય કરવા

(બ) ક્રમ કરવા : (સંધ્યા એક) 4

(1) વાસ્તવ્યના યુક્ત યુક્ત

(2) ક્રમ, લોગી અને વાસ્તવ્યના યુક્ત લોગી કરવા

કરવા

RO-3154

1

1 Contd...

- 1 (A) Describe in detail : (any one)
 (1) Classification of virus.
 (2) Types of Bacteria based on flagella.
 (B) Describe in short : (any one)
 (1) TMV
 (2) Types of nutrition in bacteria
- 4
- 8 (3) Draw a labelled diagram, if necessary, in answer.
 (2) Right side numbers indicate marks.
 (1) All questions are compulsory.

ENGLISH VERSION

- 3 (A) Describe in detail : (any one)
 (1) Classification of virus.
 (2) Types of nutrition in bacteria
- 4 (B) Describe in short : (any one)
 (1) TMV
 (2) Types of Bacteria based on flagella
- 4
- 6 (3) Draw a labelled diagram, if necessary, in answer.
 (2) Right side numbers indicate marks.
 (1) All questions are compulsory.
- 8 (A) Describe in detail : (any one)
 (1) Classification of virus.
 (2) Types of Bacteria based on flagella

- 2 (A) Describe in detail : (any one)
 (1) Reproduction in algae.
 (2) General character of algae.
- 4 (B) Describe in short : (any one)
 (1) Prokaryotic cell structure.
 (2) Role of algae in the agriculture, industry and biotechnology.
- 9 (A) Describe in detail : (any one)
 (1) Life history of Nostoc.
 (2) General characters of Chlorophyta
- 4 (B) Describe in short : (any one)
 (1) Heterocyst
 (2) Caps cell formation in *Cedogonium*.
- 4 (A) Describe in detail : (any one)
 (1) General characters of class-Rhodophyta.
 (2) Sexual reproduction in *Batrachospermum*.
- 4 (B) Describe in short : (any one)
 (1) Life cycle : Haplontic and Diploontic.
 (2) Plurilocular sporangium *Ectocarpus*.



RO-3162

Seat No. _____

B. Sc. (Sem-I) (Minor) Examination

December - 2023

SC23MIDSCBOT102 : Botany

(Microbes and Algae)

Time : 2 Hours

[Total Marks : 25

સુચના :

(1) બધાં પ્રશ્નોનાં જવાબ આપવાનાં છે.

(2) બધાં જ પ્રશ્નોનાં જવાબ આપવાનાં છે.

(3) બધાં જ પ્રશ્નોનાં જવાબ આપવાનાં છે.

(4) બધાં જ પ્રશ્નોનાં જવાબ આપવાનાં છે.

1 (A) સંસ્કૃતિ પ્રશ્નો : (કોઈ પણ એક)

(1) બાક્ટેરિયોલોજીમાં મન પ્રેમણ ગણેશજીનો ફોટોગ્રાફ દર્શાવો.

(2) બાક્ટેરિયોલોજીમાં મન પ્રેમણનો ફોટોગ્રાફ દર્શાવો.

(B) સંસ્કૃતિ પ્રશ્નો : (કોઈ પણ એક)

(1) TMV વાઈરસ.

(2) કાચામાં આપેલ બાક્ટેરિયોલોજીમાં મન પ્રેમણનો ફોટોગ્રાફ દર્શાવો.

2 (A) સંસ્કૃતિ પ્રશ્નો : (કોઈ પણ એક)

(1) નીચેનાં બોટામાં આપેલો બોટાનો નામ લખો.

(2) બાક્ટેરિયોલોજીમાં મન પ્રેમણનો ફોટોગ્રાફ દર્શાવો.

(B) સંસ્કૃતિ પ્રશ્નો : (કોઈ પણ એક)

(1) કોઈ એક બોટામાં આપેલો બોટાનો નામ લખો.

(2) નીચેનાં બોટામાં આપેલો બોટાનો નામ લખો.

RO-3162

1

[Contd...

- 1 (A) Describe in detail : (any one)
 (1) Classification of virus as per Baltimore.
 (2) Economic importance of bacteria.
 (B) Write a short note : (any one)
 (1) TMV virus.
 (2) Types of bacteria based on flagella.
- 4
- 6 (A) Describe in detail : (any one)
 (1) This question paper contains three questions.
 (2) All questions are compulsory.
 (3) Figures at right side indicate the marks of question.
 (4) Illustrate your answer with labelled diagram.

ENGLISH VERSION

- 3 (1) जीवाणुओं की संरचना का चित्रण कीजिए।
 (2) जीवाणुओं की महत्त्वपूर्ण विशेषताएँ लिखिए।
 (3) जीवाणुओं की वर्गीकरण की आधारभूत बातें लिखिए।
 (4) जीवाणुओं की संरचना का चित्रण कीजिए।
 (5) जीवाणुओं की महत्त्वपूर्ण विशेषताएँ लिखिए।
 (6) जीवाणुओं की संरचना का चित्रण कीजिए।
 (7) जीवाणुओं की वर्गीकरण की आधारभूत बातें लिखिए।

- 3 Do as directed : (any five)
- (1) Give the name of biggest plant virus.
 - (2) Define : Capsid
 - (3) Give the name only the two main types nutrition in bacteria.
 - (4) Define : Conidia
 - (5) Class of *Nostoc*.
 - (6) Family of *Ficocarpus*.
 - (7) Order of *Oedogonium*.
- 2 (A) Describe in detail : (any one)
- (1) Asexual reproduction in *Nostoc*.
 - (2) Sexual reproduction in *Ficocarpus*.
- (B) Write a short note : (any one)
- (1) Thallus structure of *Oedogonium*.
 - (2) Heterocyst of *Nostoc*.
- 4
- 6
- 5

- 2 (A) Describe in detail : (any one)
- (1) Asexual reproduction in *Nostoc*.
 - (2) Sexual reproduction in *Ectocarpus*.
- (B) Write a short note : (any one)
- (1) Thallus structure of *Oedogonium*.
 - (2) Heterocyst of *Nostoc*.
- 3 Do as directed : (any five)
- (1) Give the name of biggest plant virus.
 - (2) Define : Capsid.
 - (3) Give the name only the two main types nutrition in bacteria.
 - (4) Define : Conidia.
 - (5) Class of *Nostoc*.
 - (6) Family of *Ectocarpus*.
 - (7) Order of *Oedogonium*.
- 4
- 5
- 6



RO-3171

Seat No. _____

B. Sc. (Sem.-I) Examination

December - 2023

SC23MDCBOT103 : Botany

(Multi/Inter Disciplinary (MDC))

(Plant in Everyday Life)

(New Course)

Time : 1 Hour]

[Total Marks : 25

1 (1) બીજાના જીવનના સમયગાળામાં કયા કાર્યો થાય છે.

(2) પાન અને શાકભાજીમાં કયા કાર્યો થાય છે.

(3) જાંબુ અને સોલંજીમાં કયા કાર્યો થાય છે.

(4) પાન અને શાકભાજીમાં કયા કાર્યો થાય છે.

6 (a) શાકભાજીમાં કયા કાર્યો થાય છે.

(1) શાકભાજીમાં કયા કાર્યો થાય છે.

(2) શાકભાજીમાં કયા કાર્યો થાય છે.

(a) શાકભાજીમાં કયા કાર્યો થાય છે.

(1) શાકભાજીમાં કયા કાર્યો થાય છે.

(2) શાકભાજીમાં કયા કાર્યો થાય છે.

RO-3171]

1

[Contd...

- (1) Scientific name, used parts and uses of Amla
- (2) Family, Chemical constituents and Medicinal uses of ardas.

6

Instructions :

(1) There are total three questions in this paper.

(2) All questions are compulsory.

(3) Right side numbers indicate marks.

(4) Draw a labelled diagram if necessary in answer.

ENGLISH VERSION

- 3
- (1) शिथिल बालों में अणु।
 - (2) अस्थि उपजोत अणु।
 - (3) शरीर में अणु उपजोत।
 - (4) अणु में अणु उपजोत अणु।
 - (5) अणु में अणु उपजोत अणु।
 - (6) अणु में अणु उपजोत अणु।
 - (7) अणु में अणु उपजोत अणु।
- 4
- (1) शरीर में अणु उपजोत अणु।
 - (2) अणु में अणु उपजोत अणु।
- 5
- (1) शरीर में अणु उपजोत अणु।
 - (2) अणु में अणु उपजोत अणु।
- 6
- (1) शरीर में अणु उपजोत अणु।
 - (2) अणु में अणु उपजोत अणु।

- 3 Do as directed : (any five)
- (1) Give the scientific name of Shimla.
 - (2) State the uses of Behda.
 - (3) Medicinal uses of Tulsi.
 - (4) State the chemical constituents of Ginger.
 - (5) Root nodule is found in plants of the _____ family.
 - (6) Give the scientific name of Jowar.
 - (7) The number of stamens in wheat is _____.
- 4 Write a short note : (any one)
- (1) Used part and Botanical characters of Bajara.
 - (2) Scientific name and botanical characters of Sugarcane.
- 4 Write a short note : (any one)
- (1) Botanical characters and uses of Rice.
 - (2) Scientific name, family, vegetative characters and uses of Cashewnut.
- 2 (a) Describe in detail : (any one)
- (1) Botanical characters and uses of Rice.
 - (2) Scientific name, family, vegetative characters and uses of Cashewnut.
- 6 (a) Describe in detail : (any one)
- (1) Botanical characters and uses of Rice.
 - (2) Scientific name, family, vegetative characters and uses of Cashewnut.
- 4 Write a short note : (any one)
- (1) Used part and uses of Harde.
 - (2) Scientific name, Family and Chemical constituents of Turmeric.

RO-3182

[Contd...]

- 1
- (1) ଉଦ୍ଭିଦ (ପତ୍ର) ରେ ଉପସ୍ଥାପିତ କରାଯାଇଛି।
 (2) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।
- 2
- (1) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।
 (2) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।

- 4
- (1) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।
 (2) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।
- 6
- (1) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।
 (2) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।

- 1
- (1) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।
 (2) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।
 (3) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।
 (4) ଉଦ୍ଭିଦର ଉତ୍ପତ୍ତି ଉପରେ ଚିନ୍ତା କର।

Time : 2 Hours

Total Marks : 25

(Horticulture)
 SEC : SC23SECBOT106 : Botany
 December - 2023

B. Sc. (Sem.-I) Examination

RO-3182

Seat No



- 4 (b) Write a short note : (any one)
 (1) Methods of creating bonsai plants
 (2) Floriculture and its uses.
- 6 (a) Describe in detail : (any one)
 (1) Classification of important horticulture crops of Gujarat State.
 (2) Describe different ways/methods to create garden.
- 4 (b) Write a short note : (any one)
 (1) Horticulture - A science and art.
 (2) Explain any four branches of horticulture.
- 6 (a) Describe in detail : (any one)
 (1) Artificial vegetative propagation methods.
 (2) Nursery management.

Instructions :

- (1) This question paper contains three questions.
 (2) All questions are compulsory.
 (3) Figures at the right side indicate the marks of question.
 (4) Illustrate your answer with labelled diagram.
- 3 (1) પેલ નીમ લખો : NSC
 (2) વાવણી લખો : ઓલિવકોટ (Oliveculture)
 (3) પેલ નીમ લખો : SSC
 (4) વાવણી લખો : વીટિકલ્ચર (Viticulture)
 (5) પેલ નીમ લખો કે વાવણીકોટ લખો નીમ લખો.
 (6) વાવણીકોટ લખો વાવણીકોટ લખો નીમ લખો.
 (7) પેલ નીમ લખો કે ઓલિવકોટ લખો નીમ લખો.

ENGLISH VERSION

- 3 Do as directed : (any five)
- (1) Full form : NSC
 - (2) Define : Olericulture
 - (3) Full form : SSC
 - (4) Define : Viticulture
 - (5) Give any **two** names of fragrance plants.
 - (6) In air plant (*Kalanchoe pinnata*) natural vegetative propagation is occur by _____.
 - (7) Give any **two** names of insecticides.



RO-3157

Seat No. _____

B. Sc. (Sem. I) Examination

December - 2023

Paper - SC23MJDSMIC-101 : Microbiology

(Major Discipline Specific Core Course)

(Fundamentals of Microbiology) (NEP)

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 50

1 Answer any two questions from the following : 10

- (1) Write a detailed note on Koch's postulates.
- (2) Write a note on "Principle of Immunization".
- (3) Write a short note on Biogenesis and Abiogenesis.

2 Answer any two questions from following : 10

- (1) Discuss : Taxonomic and integrative approaches for subdivision of microbiology.
- (2) Short note on distribution of microbes in nature.
- (3) Enlist applied areas of Microbiology. Elaborate any two in detail.

3 Answer any two questions from the following : 10

- (1) Write a note on bright field microscopy.
- (2) Short note on Gram staining.
- (3) Write a note on Fluorescence microscopy.

RO-3157]

- 4 Answer any two questions from following : 10
- (1) Discuss Whittaker's five kingdom classification system.
 - (2) Difference between Prokaryotes and Eukaryotes.
 - (3) What is bacteriophage? Explain in detail of lambda phage.
- 5 Answer any five questions from following : 10
- (1) Write the contribution of Elie Metchnikoff.
 - (2) Write the contribution of Selman A. Waksman.
 - (3) Write uses of microbiology in dairy industry.
 - (4) What is Taxonomic approaches?
 - (5) Define mordant and give its example.
 - (6) Examples of Gram positive and Gram negative bacteria.
 - (7) Draw a labelled diagram of TMV.
 - (8) Who proposed three domain classification system and enlist names of three domains?



RO-3153

Seal No. _____

B. Sc. (Sem. I) Examination

December - 2023

Mathematics : Paper-SC23MJDSMAT101

(Calculus & Vector Analysis)

(NEP-2020)

Time : 2 1/2 Hours

Total Marks : 50

Instructions : (1) All questions are compulsory.

(2) The figures to the right indicate marks of the corresponding question.

10 Attempt any two:

(i) State and prove Leibnitz's theorem.

(ii) If $y = \frac{(x+2)(x+1)(x-1)}{x^2+4x+1}$, find $x^n(0)$ then find $y^n(0)$.

(iii) If $I^n = \frac{d^n}{dx^n} (x^n \log x)$, then prove that

$$I^n = n I^{n-1} + (n-1) I^{n-2} + \dots + \frac{n}{1} \left[\log x + 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots + \frac{1}{n} \right]$$

$$\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z} \right) u = \frac{(x+y+z)^2}{-9}$$

(iii) If $u = \log(x^3 + y^3 + z^3 - 3xyz)$ then prove that point $(1, -1, 2)$.

(ii) If $\phi(x, y, z) = 2xz^2 - 3xy - 4x$ then find $\text{grad} \phi$ at

(i) If \vec{F} is vector functions and ϕ is scalar function then prove that $\text{div}(\phi \vec{F}) = (\text{grad} \phi) \cdot \vec{F} + \phi (\text{div} \vec{F})$.

Attempt any two:

10

$$\{(1, 1, -1), (1, -1, 1), (-1, 1, 1)\}$$

(iii) Obtain reciprocal vector set of the vector set

$$\{\vec{a} \times \vec{b}, \vec{c} \times \vec{d}\} = \{(\vec{a} \cdot \vec{c})(\vec{b} \cdot \vec{d}) - (\vec{a} \cdot \vec{d})(\vec{b} \cdot \vec{c}),$$

(ii) For vectors $\vec{a}, \vec{b}, \vec{c}$ and \vec{d} , prove that

$$(2) \quad (\vec{a} \times \vec{b}) \times \vec{c} = (\vec{a} \cdot \vec{c})\vec{b} - (\vec{b} \cdot \vec{c})\vec{a}$$

$$(1) \quad \vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a} \cdot \vec{c})\vec{b} - (\vec{a} \cdot \vec{b})\vec{c}$$

(i) For vectors $\vec{a}, \vec{b}, \vec{c}$ prove that:

Attempt any two:

10

$$(x-1), 0 < x \leq 2.$$

(iii) Expand $\log x$ in the increasing power of

$$\text{interval } [1, 3] \text{ then prove that } \frac{3}{4} < \frac{\log 3}{\log 2} < 4$$

(ii) If $f(x) = \log x$ and $g(x) = \tan^{-1} x$ are defined on

(i) State and prove 'Cauchy Mean Value Theorem'.

Attempt any two:

10

(vii) Evaluate: $\lim_{x \rightarrow \infty} \frac{x^k}{x^k} (k > 0)$

(vi) Evaluate: $\lim_{x \rightarrow 0} \frac{x}{3x^2 - 2x}$

(v) If $\varnothing(x, y, z) = |z| = r = \sqrt{x^2 + y^2 + z^2}$ then find $\nabla \varnothing$.

(iv) Find the value of $\frac{\partial}{\partial x}(i \times k) + \frac{\partial}{\partial y}(k \times i) + \frac{\partial}{\partial z}(i \times j)$.

$$\log(1+x) - 1 < x \leq 1.$$

(iii) Find the coefficients of x^4 in the expansion of

$$g(x) = 2x + 1, \quad x \in [1, 4]. \text{ Find the value of } c \in (1, 4)?$$

(ii) According to C.M.V. theorem, for $f(x) = \sqrt{x}$ and

(i) If $y = (2x+7)^{11}$ then find the value of y'' .

5 Attempt any five:



RO-3161

Seat No. _____

B. Sc. (Sem. I) Examination

December - 2023

Mathematics/SC23MIDSCMAT102

(Introduction to Calculus)

Total Marks : 25

Time : 2 Hours

Instructions : (1) All questions are compulsory; (2) Figure to the right indicates the marks of the corresponding question.

1 Attempt any two: 10

(a) State and prove Leibnitz's theorem.

(b) If $y = e^{mx^{-1}}$ then prove that

$$(1 + x^2)y^{n+1} + (2nx - 1)y^n + n(n-1)y^{n-1} = 0$$

(c) If $x = \sin \theta, y = \cos \theta$ then prove that

$$(-x^2)^{n+2} - (2nx + 1)xy^{n+1} = (n^2 - m^2)y^n$$

2 Attempt any two: 10

(a) Prove that

$$\sin x = x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \dots$$

(b) If Cauchy's mean value theorem is verified then

prove that

$$\frac{\sin b - \sin a}{\cos b - \cos a} = \cot c, \text{ for } 0 < a < c < b$$

(d) None of these

(c) $\frac{\pi}{4}$

(b) $\frac{\pi}{2}$

(a) 0

approximate value of c isfunctions $f(x) = \sin x$, $g(x) = \cos x$, $\forall x \in \left[0, \frac{\pi}{2}\right]$ then

(3) If Cauchy's mean value theorem is verified for the

(d) None of these

(c) $(-1)^{n+1} e^{-x}$

(b) $(-1)^n e^{-x}$

(a) e^{-x}

(2) n^{th} derivative of $y = e^{-x}$ is

(d) $11x^{10}$

(c) 0

(b) 10!

(a) 11!

(1) If $y = x^{10}$, then $y^{(1)}$ is equal to

3 Attempt any five:

5

$$\lim_{x \rightarrow 0} \left[\frac{x^2}{1 - \cos^2 x} - \cos^2 x \right] = -\frac{1}{3}$$

(c) Prove that

- (5) Taylor's theorem for expansion of function is generalize form of
- Cauchy's theorem
 - Cauchy's theorem
 - Leibnitz's theorem
 - Lagrange's theorem
- (6) Formula for Cauchy's mean value theorem is
- $\frac{f(b) - f(a)}{g(b) - g(a)} = \frac{f'(c)}{g'(c)}$
 - $\frac{f(b) - f(a)}{g(b) - g(a)} = f'(c)$
 - $\frac{f(b) - f(a)}{f'(c)} = \frac{g(b) - g(a)}{g'(c)}$
 - $\frac{f(b) - f(a)}{g'(c)} = \frac{g(b) - g(a)}{f'(c)}$
- (7) To evaluate indeterminate forms we use
- Leibnitz's rule
 - Rolle's formula
 - Taylor's formula
 - L'Hospital's rule



RO-3170

Seat No. _____

B. Sc. (Sem. I) Examination

December - 2023

Mathematics : SC23MDCMAT103

(Mathematics-I)

[Total Marks : 25

Time : 1 Hours]

Instructions : (1) There are three questions. (2) Figures to the right indicate marks of the

corresponding question.

1 Attempt any two : **10**

- (1) State and prove Leibnitz's theorem.
- (2) If $y = \cos(ax+b)$, a and b are constant then obtain y^n .

- (3) If $y = \cos^{-1}x$, $x \in (-1,1)$ then prove that

$$(1-x^2) \left\{ \frac{d^2y}{dx^2} - x \frac{dy}{dx} + p^2 y \right\} = 0.$$

- (4) If $y = e^{\tan^{-1}x}$ then prove that

$$(1+x^2) y^{n+1} + (2nx-1) y^n + n(n-1) y^{n-1} = 0.$$

2 Attempt any two : **10**

- (1) State and prove Cauchy's mean value theorem.
- (2) Suppose $f(x) = \log x$, $g(x) = \tan^{-1}x$, $x \in [1,3]$. Using

Cauchy's mean value prove that $\frac{4}{3} < \frac{\log 3}{\cot^{-1} 2} < 4$.

RO-3170]

- 3 Do as directed : (any five)
- (1) If $y = (3x+5)^{2023}$ then the value of $y^{2024} =$ _____
- (a) 2023! (b) 3^{202} (c) 0 (d) $2022! (3x+5)^2$
- (2) If $y = e^x x^2$ then obtain the value of y'' .
- (3) Verify Cauchy's Mean value theorem for $f(x) = \sqrt{x}$ and $g(x) = 2x+1$ within the interval $[1, 4]$.
- (4) Expand e^x in terms of $(x-1)$.
- (5) Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} \sec x - \tan x$.
- (6) Evaluate $\lim_{x \rightarrow 0} \frac{1}{x} \log \left(\frac{1+x}{1-x} \right)$.
- (7) Expand $\sin x$ in term of $x - \frac{\pi}{2}$.

5

- (4) Evaluate by L'Hospital rule: $\lim_{x \rightarrow \frac{\pi}{2}} \frac{a^{\sin x} - a}{\log(\sin x)}$.
- (3) Using Maclaurin's theorem prove that
- $$\log(1-x^2) = -x^2 - \frac{x^4}{2} - \frac{x^6}{3} - \dots$$



RO-3181

Seat No. _____

B. Sc. (Sem. I) Examination

December - 2023

SC23SECMAT-106 : Mathematics

(Mathematics for Competitive Exams-I)

(New Course)

Time : 2 Hours

[Total Marks : 25

Instructions :

- (1) All questions are compulsory.
(2) Figure to the right indicate the marks of the corresponding question.

I Write the correct option : 15

(1) The sum of place values of 2 in 2424 is.

- (a) 4
(b) 220
(c) 2002
(d) 2020

(2) The unit digit of $(6817)^{754}$ is.

- (a) 8
(b) 4
(c) 2
(d) 9

(3) Find the sum of the squares of first 35 natural numbers.

- (a) 14910
(b) 15510
(c) 14510
(d) 16510

(7) What is the next number in the series 20, 21, 25, 34, 50, _____ ?

- (a) 70
(b) 75
(c) 65
(d) 60

RO-3181

I

[Contd...

- (5) What is the missing number in the series 3, 5, 7, 9, 13, 19, 27, 37, 51, _____ is.
- (6) Next number in the series 6, 16, 36, 76, 156, 316, _____ is.
- (7) Next number in the series 13, 16, 22, 33, 51, _____ is.
- (8) Find the HCF of 30, 42 and 135.
- (a) 89
(b) 78
(c) 102
(d) 69
- (9) Which fraction is larger among $\frac{5}{4}$, $\frac{11}{4}$, $\frac{13}{4}$ and $\frac{17}{4}$?
- (a) $\frac{5}{4}$
(b) $\frac{13}{4}$
(c) $\frac{15}{4}$
(d) $\frac{17}{4}$
- (10) The value of $\frac{1}{3} + \frac{1}{15} + \frac{1}{35} + \frac{1}{53} + \frac{1}{99}$ is
- (a) $\frac{10}{11}$
(b) $\frac{11}{5}$
(c) $\frac{11}{9}$
(d) $\frac{11}{7}$

number?
of all the angles of a triangle. What is the
number itself, it gives the same value as the sum
When $1/7$ of a number is subtracted from the

- (2) When $1/7$ of a number is subtracted from the number itself, it gives the same value as the sum of all the angles of a triangle. What is the number?
(1) If $\frac{\sqrt{7}-\sqrt{5}}{\sqrt{7}+\sqrt{5}} = a+b\sqrt{35}$, then find the value of $(a-b)$.

2 Attempt any five :

10

- (a) 0
(b) $\frac{64}{4097}$
(c) 1
(d) $\frac{9097}{16}$

(15) $(16)^{2/3} + (16)^{-3/2} = ?$

- (a) 16
(b) 8
(c) $2/5$
(d) 10

(14) If $289 = (17)^{x/5}$, then $x = ?$

- (a) $2\sqrt{6}$
(b) $6\sqrt{2}$
(c) 2
(d) None of these

(13) Find the value of $\frac{\sqrt{24} + \sqrt{216}}{\sqrt{96}}$

- (a) 225
(b) 100
(c) 150
(d) 200

sum. Their sum is 45. Find the LCM.

(12) The difference of two numbers is $1/9$ of their

- (a) $x(x+4)(x-2)^2$
(b) $x(x+4)(x-2)$
(c) $x(x+4)(x+2)^2$
(d) $x(x+4)^2(x-2)$

$x^2 + 4x$?

(11) What is the LCM of $x^2 + 2x - 8$, $x^3 - 4x^2 + 4x$ and

- (3) The sum of four consecutive even numbers is 284. What would be the smallest number?
- (4) Find the LCM of $\frac{72}{126}$, $\frac{250}{75}$ and $\frac{162}{165}$
- (5) Find the least number which is exactly divisible by 32, 36, 45, 60 and 80.
- (6) Which one is greatest out of $\sqrt{2}$, $\sqrt[3]{3}$, $\sqrt[4]{4}$ and $\sqrt[5]{5}$?
- (7) If $3^{(x-y)}=27$ and $3^{(x+y)}=243$, then find the value of x .