Nov-Dec - 2024

Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Sc Non Medical (Sem.–1)

MECHANICS-I

Subject Code : BSNM-104-18

M.Code : 75745

Date of Examination: 22-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) Express spherical polar coordinates of a point in terms of its Cartesian coordinates.

   b) What do you mean by isotropy of space?

   c) Give two examples of conservative forces.

   d) State the principle of working of a rocket.

   e) What is range of scattering angle in center of mass frame? Does it depend upon mass of colliding particles?

   f) What is the value of impact parameter on head on collision?

   g) *'Moment of inertia plays same role in rotation as mass does in translation'*. Justify.

   h) What is Gyroscope? Give its example.

   i) Define coefficient of viscosity. Write its dimensional formula in SI units.

   j) Briefly explain the concept of stress and strain at a point.

Nov

SECTION-B

2. Derive the expression of velocity of the rocket moving vertically upward under influence of gravity.

3. a) Explain the law of conservation of energy by taking the example of simple pendulum.

   b) What do you understand by Elastic potential energy?

4. a) Show that the kinetic energies of two colliding particles in center of mass frame are inversely proportional to their masses.

   b) What is main assumption in Rutherford scattering experiment?

5. Derive Euler's equations of rotation of a rigid body in principal axes.

6. Define shear θ. Show that shear strain is equivalent to an extension strain plus a compression strain at right angles to each other, each of value $\theta/2$.

SECTION-C

7. a) What is Galilean transformations? Derive the expression for Galilean transformation equations connecting two inertial frame of references.

   b) A block of mass 4kg attached with one end of string is hanging in elevator. If elevator moves downward with constant acceleration of 1.8 m/s^2 find the tension in the string.

8. a) State and prove parallel axis theorem for a lamina by treating it as continuous rigid body.

   b) Find the moment of inertia of a uniform solid sphere of mass M and radius R about its diameter.

9. a) What are torsional oscillations? Derive an expression for the twisting couple per unit angular twist for a hollow cylinder.

   b) A gold wire, 0.32 mm in diameter, elongates by 1 mm when stretched by a force of 330 gm wt and twists through 1 radius when equal and opposite torques of 145 dyne-cm are applied at its ends. Find the value of Poisson's ratio for gold($g = 981 cm/sec^2$).

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Roll No. | | | | | | | | | | | |

Total No. of Questions : 11

Total No. of Pages : 04

B.Com (Honours)/B.A. (JAMC)/BHMCT (UGC)/B.Sc.Honours (Microbiology)/B.Sc. - Honours (Nutrition and Dietetics)/B.Sc. (AI&ML)/ B.Sc. (BT/FD/IT/G&WD)/MLS/OTT/Radiotherapy Technology/B.Voc. (Child Caregiver)/BTTM/BBA/BBA(SIM)/BCA (Sem–1)

HUMAN VALUES, DE-ADDICTION AND TRAFFIC RULES

Subject Code : HVPE101-18

M.Code : 93322

Date of Examination : 14-01-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. Section-A is compulsory ONE mark each.
3. Section-B contains FIVE questions of FOUR marks each attempt all questions.
4. Section-C contains FIVE questions of SIX marks each attempt all questions.

SECTION-A

(10 × 1 = 10)

1. **Fill in the blanks / True / False :**

i) Right understanding + ... = Mutual prosperity.

सही समझ + ... =पारस्परिक समृद्धि

ठीक मसझ +..... = आपसी खुशहाली

ii) Animal order in nature contains ..... and ..... .

प्रकृति में पशु आदेश में ..... और ..... होता है।

ਕੁਦਰਤ ਵਿੱਚ ਪਸ਼ੁ ਆਦੇਸ਼ ਵਿੱਚ ..... ਅਤੇ ..... ਹੁੰਦਾ ਹੈ।

iii) Self-exploration is the process for ..... Education.

आत्म–अध्ययन ..... शिक्षा के लिए प्रक्रिया है।

ਸਵੈ–ਅਧਿਐਨ ..... ਸਿੱਖਿਆ ਲਈ ਪ੍ਰਕਿਰਿਆ ਹੈ।

iv) To be in a state of liking is ..... .

पसंद के हिसाब से एक अवस्था में होना ..... है।

ਪਸੰਦ ਦੇ ਹਿਸਾਬ ਵਲੋਂ ਇੱਕ ਦਸ਼ਾ ਵਿੱਚ ਹੋਣਾ ..... ਹੈ।

v) Physical facilities are necessary but ..... for humans.

भौतिक सुविधाएँ मनुष्य के लिए आवश्यक हैं, लेकिन ..... हैं।

ਭੌਤਿਕ ਸਹੂਲਤਾਂ ਮਨੁੱਖ ਲਈ ਜ਼ਰੂਰੀ ਹਨ, ਲੇਕਿਨ ..... ਹਨ ।

vi) The value "care" is related with body.

मूल्य ''ध्यान'' शरीर के साथ संबंधित है।

ਮੁੱਲ ਧਿਆਨ ਸਰੀਰ ਦੇ ਨਾਲ ਸਬੰਧਤ ਹੈ।

vii) There is no self-regulation in nature.

प्रकृति में कोई आत्म नियमन नहीं है।

ਕੁਦਰਤ ਵਿੱਚ ਕੋਈ ਆਤਮ ਨਿਯਮਤਾ ਨਹੀਂ ਹੈ।

viii) Developing ethical competence in individual ensures professional ethics.

व्यक्ति में नैतिक क्षमता का विकास पेशेवर नैतिकता सुनिश्चित करता है।

ਵਿਅਕਤੀ ਵਿੱਚ ਨੈਤਿਕ ਸਮਰੱਥਾ ਦਾ ਵਿਕਾਸ ਪੇਸ਼ੇਵਰ ਨੈਤਿਕਤਾ ਪੱਕੀ ਕਰਦਾ ਹੈ।

ix) Holistic technologies should be eco-friendly and people-friendly.

समग्र प्रौद्योगिकियों पर्यावरण के अनुकूल और लोगों के अनुकूल होना चाहिए।

ਸਰਬਾਂਗੀ ਤਕਨੀਕਾਂ ਵਾਤਾਵਰਣ ਦੇ ਅਨੁਕੂਲ ਅਤੇ ਲੋਕਾਂ ਦੇ ਅਨੁਕੂਲ ਹੋਣੀਆਂ ਚਾਹੀਦੀਆਂ ਹਨ।

x) Existence is nature submerged in space.

अस्तित्व अंतरिक्ष में डूबे हुए प्रकृति है।

ਅਸਤੀਤਵ ਖਲਾਅ ਵਿੱਚ ਸਮਾਈ ਹੋਈ ਕੁਦਰਤ ਹੈ।

SECTION-B

(4 × 5 = 20)

2. What do you mean by SVDD, SSDD and SSSS? How is the transformation possible from SSDD to SSSS?

आपका SVDD, SSDD और SSSS से क्या मतलब है? SSDD से SSSS के लिए परिवर्तन कैसे संभव है?

ਤੁਹਾਡਾ SVDD, SSDD ਅਤੇ SSSS ਤੋਂ ਕੀ ਮਤਲਬ ਹੈ? SSDD ਤੋਂ SSSS ਤੱਕ ਦੀ ਤਬਦੀਲੀ ਕਿਸ ਤਰ੍ਹਾਂ ਸੰਭਵ ਹੈ?

3. What are the implications of value based living?

मूल्य आधारित जीवन यापन के अच्छे परिणाम क्या हैं?

ਕਦਰਾਂ ਕੀਮਤਾਂ ਆਧਾਰਿਤ ਜੀਵਨ ਜੀਉਣ ਦੇ ਚੰਗੇ ਨਤੀਜੇ ਕੀ ਹਨ?

4. Describe basic human aspirations. What are the requirements to fulfill basic human aspirations?

बुनियादी मानवीय आकांक्षाएँ क्या हैं? बुनिआदी मानवीय आकांक्षाओं को पूरा करने के लिए आवश्यकताओं का वर्णन करें।

ਬੁਨਿਆਦੀ ਮਾਨਵੀਂ ਇੱਛਾਵਾਂ ਕੀ ਹਨ? ਬੁਨਿਆਦੀ ਮਾਨਵੀਂ ਇੱਛਾਵਾਂ ਨੂੰ ਪੂਰਾ ਕਰਣ ਲਈ ਜਰੂਰਤਾਂ ਦਾ ਵਰਣਨ ਕਰੋ?

5. Explain the process of self-exploration with the help of a suitable diagram.

एक उपयुक्त आरेख की मदद से आत्म-अन्वेषण कि प्रक्रिया को समझाइये।

ਇੱਕ ਢੁਕਵੇਂ ਚਿੱਤਰ ਦੀ ਮਦਦ ਨਾਲ ਆਤਮ-ਅਧਿਐਨ ਦੀ ਪਰਿਕ੍ਰੀਆ ਨੂੰ ਸਮਝਾਓ।

6. What are the salient unethical practices in the profession at present? Analyze the root cause and possible solution.

मौजूदा समय में पेशे के मुख्य अनैतिक तरीके क्या हैं? मूल कारण और संभव समाधान का विश्लेषण करें।

ਮੌਜੂਦਾ ਸਮਾਂ ਵਿੱਚ ਪੇਸ਼ੇ ਦੇ ਮੁੱਖ ਅਨੈਤਿਕ ਤਰੀਕੇ ਕੀ ਹਨ? ਮੂਲ ਕਾਰਨ ਅਤੇ ਸੰਭਵ ਸਮਾਧਾਨ ਦਾ ਵਿਸ਼ਲੇਸ਼ਣ ਕਰੋ।

SECTION-C

(6 × 5 = 30)

7. What are the broad holistic criteria for evaluation of technologies, production systems and management models? How do they map with the comprehensive human goal?

प्रौद्योगिकी, उत्पादन प्रणाली और प्रबंधन मॉडल के मूल्यांकन के लिए व्यापक समग्र मापदंड क्या हैं? कैसे वे व्यापक मानव लक्ष्य के साथ मेल खाती हैं?

ਤਕਨਾਲੋਜੀ, ਉਤਪਾਦਨ ਸਿਸਟਮ ਅਤੇ ਪ੍ਰਬੰਧਨ ਮਾਡਲ ਦੀ ਪੜਤਾਲ ਕਰਨ ਲਈ ਵਿਆਪਕ ਸੰਪੂਰਨ ਮਾਪਦੰਡ ਕੀ ਹਨ? ਕਿਵੇਂ ਉਹ ਵਿਆਪਕ ਮਨੁੱਖੀ ਲਕਸ਼ ਦੇ ਨਾਲ ਮੇਲ ਖਾਂਦੀ ਹੈ।

8. What do you mean by Comprehensive Human Goal? Elaborate.

व्यापक मानव लक्ष्य से आपका क्या अभिप्राय है? विस्तार से बताएं।

ਵਿਆਪਕ ਮਨੁੱਖੀ ਟੀਚੇ ਤੋਂ ਤੁਹਾਡਾ ਕੀ ਭਾਵ ਹੈ? ਵਿਆਖਿਆ ਕਰੋ।

9. What is ethical human conduct? Explain in terms of values, policies and character.

नैतिक मानवीय आचरण क्या है? मूल्यों, नीतियों और चरित्र के संदर्भ में बताएं।

ਨੈਤਿਕ ਸਨੁੱਖੀ ਵਿਹਾਰ ਕੀ ਹੈ? ਕਦਰਾਂ ਕੀਮਤਾਂ, ਨੀਤੀਆਂ ਅਤੇ ਚਰਿੱਤਰ ਬਾਰੇ ਸਮਝਾਓ?

10. What is the expanse of human living? Why it is necessary to understand harmony at all levels? Critically evaluate the current state of living at the level of Self.

मानव जीवन का फैलाव कितना है? सभी स्तरों पर सामंजस्य समझना क्यों जरूरी है? सटीकता से स्वयं के स्तर पर रहने की वर्तमान स्थिति का मूल्यांकन करें।

ਮਨੁੱਖ ਜੀਵਨ ਦੀ ਫੈਲਾਵ ਕਿੰਨਾ ਹੈ? ਸ਼ਾਰੇ ਸਤਰਾਂ ਉੱਤੇ ਤਾਲਮੇਲ ਸਮਝਣਾ ਕਿਉਂ ਜਰੂਰੀ ਹੈ? ਆਪਣੇ ਸਵੈ ਦੇ ਆਧਾਰ ਦੇ ਪੱਧਰ ਉੱਤੇ ਰਹਿਣ ਦੀ ਵਰਤਮਾਨ ਹਾਲਤ ਦਾ ਅਲੋਚਨਾਤਮਿਕ ਮੁਲਾਂਕਣ ਕਰੋ।

11. Compare the Four Orders in Nature on the basis of their salient aspects.

मुख्य पहलुओं के आधार पर प्रकृति में चार आदेशों की तुलना करें।

ਮੁੱਖ ਪਹਿਲੂਆਂ ਦੇ ਆਧਾਰ ਉੱਤੇ ਕੁਦਰਤ ਵਿੱਚ ਚਾਰ ਆਦੇਸ਼ਾਂ ਦੀ ਤੁਲਣਾ ਕਰੋ।

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Roll No. | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Sc.(Non-Medical) (Sem.–2)

ELECTRICITY AND MAGNETISM

Subject Code : BSNM-204-18

M.Code : 76302

Date of Examination : 11-12-2024

Time : 3 Hrs.

Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying ONE mark each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

a) What are the properties of test charge?

b) A charge $q_1 = 4\ \mu C$ is located at the origin. Another charge $q_2 = 1\ \mu C$ is placed at a distance 0.2 m from the origin along the X-axis. Find the location at which electric field is zero.

c) What is a dielectric medium?

d) Define Magnetic susceptibility.

e) State Ampere's circuital law.

f) Show that divergence of curl of a vector field is zero.

g) Does the mutual inductance of two coils depend upon their relative orientation? Explain.

h) A coil of 100 turns is pulled in 0.04 sec from between the poles of a magnet where its area includes a flux of 40×10^{-6} Wb. Calculate the induced e.m.f. in the coil.

i) Define Poynting vector.

j) What is polarization?

SECTION-B

2. State and prove Gauss's theorem in dielectrics.

3. Show that the intensity of the electric field at a point equals the negative gradient of potential at that point.

4. What is mutual-induction? Define co-efficient of mutual-induction between two coils.

5. Derive the differential form of Faraday's law of electromagnetic induction.

6. Obtain the equation of continuity of current and discuss it.

SECTION-C

7. What is an electric dipole? What is dipole moment? Calculate the electric field due to a dipole at a point on the axial line.

8. Using Biot and Savart's law find the magnetic field due to an infinite straight wire carrying current.

9. State Maxwell's equations and solve them to obtain velocity of the electromagnetic waves in a homogeneous isotropic dielectric medium.

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Sc (Non Medical) (Sem.–2)

INTEGRAL CALCULUS

Subject Code : BSNM/205/18

M.Code : 76303

Date of Examination : 19-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Solve the following:**

a) Evaluate $\int_0^{\frac{\pi}{2}} \sin^8 x \, dx$.

b) Evaluate $\int_0^{\frac{\pi}{2}} \cos^8 x \sin^4 x \, dx$.

c) Evaluate the area bounded by the parabola $y = x^2$ and the line $y = 2x + 3$.

d) Explain explicit functions.

e) Integrate $\cos^2 x$

f) Evaluate $\int_0^{\pi} \int_0^{x} \sin y \, dy \, dx$.

g) Integrate $\sin 5x \sin 3x$.

h) Explain the geometrical meaning of integration.

i) State properties of Definite integral.

j) Evaluate $\int_0^5 \frac{\log x}{x} \, dx$

SECTION-B

2. Change into polar coordinates land evaluate

3. Evaluate $\int \frac{1}{7 - 6x - x^2} \, dx$.

4. Evaluate $\int \frac{1}{a + b \tan x} \, dx$.

5. Evaluate $\int_0^1 \int_0^{2\sqrt{z}} \int_0^{\sqrt{4z - x^2}} \frac{dz \, dx \, dy}{(x + y + z + 1)^3}$.

6. Find the area of a loop of the curve $r^2 = a^2 \cos 2\theta$.

SECTION-C

7. Find the volume common to the sphere $x^2 + y^2 + z^2 = a^2$ and the cylinder $x^2 + y^2 = ay$.

8. If $I_n = \int_0^{\frac{\pi}{4}} \tan^n x \, dx$, show that $I_n + I_{n-2} = \frac{1}{n-1}$, and hence deduce I_5.

9. Change the order of integration in $\int_0^a \int_0^x \frac{f'(y) \, dy \, dx}{\sqrt{(a - x)(x - y)}}$ and hence find its value.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (Non Medical) (Sem.–3)

ORGANIC CHEMISTRY-II

Subject Code : BSNM-301-18

M.Code : 76900

Date of Examination : 28-11-2024

Time : 3 Hrs.

Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

   a) What do you mean by aromacity?

   b) Define electrophile with one example.

   c) Give one example of nucleophilic substitution reactions.

   d) Give one reaction of nitration in Arenes.

   e) Give method of formation of ketones using 1,3-dithianes.

   f) What do you mean by SN1 reaction?

   g) Give one reaction using $[Pb(OAC)^4]$ as reagent.

   h) Explain one method of formation of aldehyde.

   i) Explain the Wolff-Kishner reaction.

   j) What do you mean by deactivating reagents?

SECTION-B

2. Explain the Cannizaro reaction.

3. Explain the three reactions formation of on alcohol.

4. Explain the physical properties of aldehydes.

5. Explain the Witting reaction and Mannich reaction.

6. Explain the Gatterman reaction.

SECTION-C

7. Explain the :

   a) Perkin reaction

   b) Clemmensen reaction.

8. Explain the side reactions of benzene derivatives.

9. Explain the Mechanism of Fries Rearrangement.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (Non Medical) (Sem.–3)

DIFFERENTIAL EQUATIONS

Subject Code : BSNM-306-18

M.Code : 76905

Date of Examination : 10-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE mark each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) Solve $(y - px)(p - 1) = p$.

   b) Write Legendre's Linear Equation.

   c) Write Clairaut's form.

   d) Show that x, x^3, x^4 are linearly independent if x is non-zero.

   e) Form partial differential equations by eliminating arbitrary constants

   $z = ax + by + a^3 + b^3$.

   f) Solve $(D - D')z = 0$.

   g) Define Lagrange's equation.

   h) Define complete integral and general integral.

   i) Solve $\frac{d^3y}{dx^3} - \frac{7dy}{dx} - 6y = 0$.

   j) Find I.F of $(xy^2 - e^{1/x^3})\,dx - x^2y\,dy = 0$.

SECTION-B

2. $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = e^{e^x}$

3. Find integrating factor and hence solve the equation $(x^2y - 2xy^2)\,dx - (x^3 - 3x^2y)\,dy = 0$

4. Solve $\frac{d^2y}{dx^2} + \frac{1}{x}\frac{dy}{dx} = \frac{12\log x}{x^2}$.

5. Solve $(y + z)\,p + (z + x)\,q = x + y$

6. Find the complete integral of $zpq = p + q$.

SECTION-C

7. Solve the following equation $\frac{d^2y}{dx^2} + \cot x\frac{dy}{dx} + 4y\,\mathrm{cosec}^2x = 0$.

8. Find equation of the integral surface of the differential equation $2y(z - 3)\,p + (2x - z)\,q = y(2x - 3)$ which passes through $x^2 + y^2 = 2x, z = 0$

9. a) Solve $r - 2s + t = \sin(2x + 3y)$

   b) Solve $(D^2 + DD' + D' - 1)z = 4\sin hx$

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (Non Medical) (Sem.–3)

ANALYSIS-I

Subject Code : BSNM-305-18

M.Code : 76904

Date of Examination : 13-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE mark each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Solve the following :**

a) Discuss convergence/divergence of $\sum\left(\sqrt{n^2+1}-n\right)$.

b) Show that $\sum \frac{x^n}{n!}$ Converges absolutely for all x.

c) What do you mean by Riemann integrable?

d) If f is integrable on $[a, c]$ and $[c, b]$, then prove that f is integrable on [a, b].

e) Express $\int_0^1 x^3\left(1-x^2\right)^{3/2} dx$ in terms of Beta function.

f) Prove that $\Gamma\frac{1}{2}=\sqrt{\pi}$

g) What is conditional convergence?

h) Discuss convergence of integral $\int_1^\infty \frac{x}{x^3+1} dx$.

i) State second mean value theorem of integral calculas.

j) Test the convergence of integral $\int_a^\infty \frac{dx}{1+x^2}$.

SECTION-B

2. Show that the series $x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}\ldots\ldots\infty$ is convergent for $-1<x\leq 1$.

3. Prove that necessary and sufficient condition for bounded function to be Riemann integrable on [a, b] is that for given $\in > 0$ $\exists$ small partition P such that $U(P,f)-L(P,f)<\in$

4. Examine the convergence of improper integral $\int_0^1 \frac{\log x}{1+x} dx$

5. State and prove relation between beta and gamma function.

6. Prove that every monotonic function defined on closed interval is Riemann integrable.

SECTION-C

7. Use Drichlet's test to discuss convergence of $\int_0^\infty \frac{\sin x}{x} dx$

8. Examine the convergence of integral $\int_0^\infty \left(\frac{1}{x}-\frac{1}{\sin hx}\right)\frac{1}{x} dx$

9. Using Cauchy integral test, discuss convergence or divergence of

$\sum_{n=1}^{\infty}\frac{1}{n^p}$, $p>0$.

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Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

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B.Sc. (Non-Medical) (Sem.–3)

THERMAL PHYSICS

Subject Code : BSNM-304-18

M.Code : 76903

Date of Examination : 17-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly:**

   a) Explain the concept of impossibility of unattaining absolute zero.

   b) Define Carnot's theorem.

   c) What do you mean by liquefaction of gases?

   d) State Second law of thermodynamics.

   e) What is adiabatic demagnetization?

   f) Define probability of a system.

   g) What are accessible and inaccessible states?

   h) What are intensive and extensive parameters? Give one example of each.

   i) Define Phase space.

   j) What is the condition of thermal equilibrium between two systems.

SECTION-B

2. State and derive Weins's displacement law.

3. Discuss Joule-Thomson effect.

4. Prove that $TV^{\gamma-1}$ = constant.

5. Calculate the work done in adiabatic and isothermal process.

6. Explain the concept of microstate and macrostate giving a suitable example.

SECTION-C

7. Derive Maxwell's equations. Further derive Clausius Clapeyron equation.

8. Discuss in detail and obtain the distribution function for Bose-Einstein statistics.

9. Describe different stages of Carnot cycle in detail along with p - V and T - V diagrams.

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (Non-Medical) (Sem.–4)

ORGANIC CHEMISTRY-III

Subject Code : BSNM402-18

M.Code : 77680

Date of Examination :24-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly:**

a) What are the acid chlorides?

b) Explain the acidity of carboxylic acids.

c) What are Phase transfer catalyst?

d) What do you mean by ethers and epoxides?

e) Write two method of formation of furan.

f) Explain one method of formation of organozinc compounds.

g) Write one reaction of Grignard reagent.

h) How acid chlorides and acid esters differ in acidity?

i) Write the formula of Grignard reagent.

j) What are organolithium compounds?

SECTION-B

2. Why pyrrole classified as aromatic compound?

3. Explain the reduction amination of ketonic compounds.

4. Explain the HVZ reaction.

5. Explain the mechanism of electrophilic sustitituiion mechanism.

6. Explain the separation of mixture of primary, secondary and tertiary amines.

SECTION-C

7. Explain the mechanism of Hofmann bromide reaction.

8. Explain the orientation of epoxide ring opening.

9. Explain the Ziesel's method.

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Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (Non-Medical) (Sem.–4)

INORGANIC CHEMISTRY-III

Subject Code : BSNM-401-18

M.Code : 77679

Date of Examination: 09-12-2024

Time : 3 Hrs.

Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly:**

a) Name two widely distributed oxygen carrier proteins.

b) What is cooperativity?

c) Explain auto-ionization of acetic acid.

d) Define complexes of acitinides.

e) What is the self ionization reaction of Sulphur dioxide?

f) Why are lanhanides called f-block elements?

g) Explain the catalytic property of transition elements.

h) What is a redox reaction?

i) Give the example of naturally occurring actinide.

j) Which isotope of uranium is used as fission fuel?

SECTION-B

2. Explain valence bond theory of transition metal complexes.

3. Discuss optical isomerism in square planer and octahedral complexes.

4. Differentiate between lanthanides and actinides.

5. Give the advantages of using liquid ammonia.

6. Why we don't come across geometrical isomers in tetrahedral complexes?

SECTION-C

7. Define oxy and deoxyhaemoglobin. What are the effects on geometry of heme group during oxy and deoxyhaemoglobin.

8. Write a short note on Na+ -K + Pump. What is Bohr effect?

9. What is lanthanide contraction? How would you account for it? What are its consequences and effects?

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

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Bachelor of Science (Non-Medical) (Sem.–4)

ELECTRONICS

Subject Code : BSNM404-18

M.Code : 77682

Date of Examination: 11-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly:**

   a) Draw and explain NOR logic gate with its truth table.

   b) What is the significance of biasing?

   c) Differetiate FET and MOSFET with neat diagram.

   d) What is the importance of feedback amplifier?

   e) Draw and explain a full wave rectifier circuit.

   f) What is emitter follower?

   g) What is Light emitting diode?

   h) What is thermal runaway?

   i) Draw and explain the collector to base bias circuit for a BJT.

   j) What is the application of number system?

SECTION-B

2. Evaluate following operation in binary :

   a) $(10111)^2$-$(01101)^2$

   b) $(11011)^2$+ $(11001)^2$

3. What is universal gate logic? Draw the AND, OR and NOT logic gate using NAND logic gate.

4. Draw and explain the principle of operation of zener diode with neat diagram. Also differentiate it with general purpose diode.

5. Convert $(76)_{10}$ and $(38)_{10}$ into binary, octal, and Hexadecimal.

6. Draw and explain the operation of a photodiode with an application.

SECTION-C

7. Draw and explain the operation of a PNP-BJT amplifier with CE configuration.

8. Draw and explain the operation of a wien bridge oscillator with its applications.

9. Draw and explain equivalent h parameter model of a BJT with neat diagram and mathematical expressions.

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B.Sc. (Non-Medical) (Sem.–4)

ANALYSIS-II

Subject Code : BSNM405-18

M.Code : 77683

Date of Examination: 14-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE mark each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly:**

a) Find the gradient of the function $\phi = x^3 + y^3 + 3xyz$ at $(1, -2, -1)$.

b) A fluid motion is given by $\vec{v} = (y\sin z - \sin x)\hat{i} + (x\sin z + 2yz)\hat{j} + (xy\cos z + y^2)\hat{k}$. Is the motion irrotational?

c) State Stoke's theorem.

d) Show that the vector field given by $\vec{F} = (-x^2 + yz)\hat{i} + (4y - z^2x)\hat{j} + (2xz - 4z)\hat{k}$ is solenoidal.

e) State the importance of fourier series.

f) State Dirichlet test.

g) State Weierstrass approximation theorem.

h) Explain half range series.

i) Explain the difference between point wise and uniform convergence.

j) State Dirichlet's condition for a fourier series.

SECTION-B

2. **Prove that :**

a) $curl\,(\phi\vec{A}) = (grad\,\phi)\times\vec{A} + \phi\,curl\,\vec{A}$.

b) $\nabla^2 f(r) = f''(r) + \frac{2}{r}f'(r)$.

3. Find the fourier cosine series for the function, $f(x) = \pi - x$, $0 < x < \pi$.

4. $1 + \frac{e^{-2x}}{2^2-1} - \frac{e^{-4x}}{4^2-1} + \frac{e^{-6x}}{6^2-1} \ldots\ldots\ldots \infty$ is uniformly convergent with regard to x in $x > 0$.

5. Discuss the uniform convergence of $\sum \frac{1}{n^p + n^q x^p}$, for all real x amd $p > 1$.

6. Discuss the convergence of $\int_0^\infty \frac{\cos xy}{x+y}\,dx$, $y > 0$.

SECTION C

7. Find the Fourier series expansion of the periodic function of period 2π, $f(x) = x^2$, $-\pi < x < \pi$ hence finds the sum of the series $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots\ldots\ldots\ldots$

8. Apply Cauchy's General principle of convergence to show that $\{a_n\}$ where $a_n = 1 + \frac{1}{2} + \frac{1}{3} \ldots\ldots\ldots\ldots \frac{1}{n}$ does not converges.

9. Verify Greens theorem for $\oint_C (x^2 - \cosh y)\,dx + (y + \sin x)\,dy$, where C is the boundary for a rectangle whose vertices are $O(0, 0)$, $A(\pi, 0)$, $B(\pi, 1)$, $C(0, 1)$.

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Total No. of Questions : 09

B.Sc (Non Medical) (Sem.–5)

PUNJAB HISTORY AND CULTURE-V

Subject Code : BSNM-508-18B

M.Code : 78623

Date of Examination : 24-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a. Internal Trade.

   b. Development of the means of Transport.

   c. Drain of India's wealth to England.

   d. Define Aristocarcy.

   e. Main Artisan Classes.

   f. Condition of Peasent women.

   g. Contribution of Dr. B. R Ambedkar.

   h. Khilfat Movement and Gandhiji.

   i. Gurudwara Reform Movement.

   j. Impact of Naujwan Bharat Sabha.

SECTION-B

2. Trace the main stages in the growth of trade and commerce under the British Rule in Punjab.

3. Critically examine the condition of Agriculture under the British rule.

4. Assess the contribution of the artisans and agricultural labourers in the economy of Punjab.

5. Give an account about the Ghadar Movement. What were the causes of its failure?

6. What do you know about the Naujwan Bharat Sabha movement and its impacts?

SECTION-C

7. Analyse the various stages in the development of Education in Punjab during your study period.

8. Examine the role of Mahatma Gandhi in the Freedom Movement of India.

9. Write a detailed note on the origin and growth of the Akali Movement. Throw light on its impacts also.

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Total No. of Pages : 03

Total No. of Questions : 09

B.Sc (Non Medical) (Sem.–5)

THEORY OF PROBABILITY

Subject Code : BSNM-505-18

M.Code : 78619

Date of Examination : 20-12-2024

Time : 3 Hrs.

Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) An urn contains 4 tickets numbered 1,2,3,4 and another contains 6 tickets numbered 2, 4, 6, 7, 8, 9 if one of the two urns is chosen at random and a ticket is drawn at random from the chosen urn, find the probability that the ticket drawn bears the number 2 or 4.

   b) Prove probability of the complementary event $\bar{A}$ of A is given by $P(\bar{A}) = 1 - P(A)$.

   c) If F is the distribution function of one dimensional random variable X then show that $F(x) \leq F(y)$ if $x < y$.

   d) Define probability mass function of discrete random variable.

   e) Write Mathematical Exception of continuous random variable X with $P.d.f\ f(x)$.

   f) In Binomial distribution mean = 2 and Variance is 3. Comment.

   g) Six coins are tossed 6400 times using the poisson distribution. Find the approximate probability of getting six heads r times.

   h) Find the area under the normal curve $z = -0.68$ and $z = 2.27$.

   i) Define Beta distribution of first kind.

   j) Write difference between binomial distribution and negative binomial distribution.

SECTION-B

2. A continuous random variable X has a P.d.f

   $f(x) = 3x^2\ 0 \leq x \leq 1$ find a and b such that $P(X \leq a) = P(X > a)$ and $P(X > b) = 0.05$.

3. The contents of urns I, II, and III are as follows

   a) White, 2 black and 3 red balls

   b) White, 1 black and 1 red ball

   c) White, 5 black and 3 red balls

   One urn is chosen at random and two balls drawn. They happen to be white and red. What is the probability that they come from urns I, II or III?

4. Show that in poison distribution mean = variance.

5. Given a hypothetical distribution

No. of cells	0	1	2	3	4	5	Total
Frequency	213	128	37	18	3	1	400

   Fit a negative binomial distribution and calculate Expected Frequencies.

6. Find the expression of mean in Beta distribution of first kind.

SECTION-C

7. In an examination-taken by 500 candidates, the average and the standard deviation of marks obtained (normally distributed) are 40% and 10%. Find approximately

   a) How many will pass, if 50% is fixed as a minimum?

   b) What should be the minimum if 350 candidates are to pass?

   c) How many have scored marks above 60%?

8. Drive the Recurrence formula for the Kth moments of the Binomial distribution.

DEC 201

9. a) Three groups of children contain respectively 3 girls and 1 boy, 2 girls and 2 boys and 1 girl and 3 boys. One Child is selected at random from each group. Show that the chance that the three selected consist of 1 girl and 2 boys is 13/32.

b) From a lot of 10 items containing 3 defectives, a sample of 4 items is drawn at random. Let the random variable X denote the number of defective items in the sample. Answer the following when the sample is drawn without replacement.

i) Find the probability distribution of X.

ii) Find $P(X \leq 1)$, $P(X < 1)$ and $P(0 < X < 2)$.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (Non-Medical) (Sem–5)

NUMERICAL ANALYSIS

Subject Code : BSNM-506-18

M.Code : 78620

Date of Examination : 17-12-2024

Time : 3 Hrs.

Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE mark each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) What do you mean by eigen value?

   b) Find the third divided difference with arguments 2, 4, 9, 10 of $f(x) = x^3 - 2x$.

   c) Prove that $\Delta = E - 1$

   d) What is interpolation?

   e) What is intial value problem?

   f) What is the difference between Single step method and Multi step methods?

   g) What is relation between Newton forward and Newton divided difference formula?

   h) What is numerical integration?

   i) Find by Taylor series method the value of y at $x = 0.1$ of $\frac{dy}{dx} = x^2y - 1$, $y(0) = 1$

   j) Write the formula for Milne's method.

SECTION-B

2. Solve by Relaxation method the equations :

$9x - 2y + z = 50$

$x + 5y - 3z = 18$

$-2x + 2y + 7z = 19$

3. Obtain the cubic spline interpolation for the data :

x	1	2	3	4
y	1	2	5	11

Evaluate $y(1.5)$ and $y'(3)$.

4. Given that $\frac{dy}{dx} = \frac{y - x}{y + x}$ with initial condition $y = 1$ at $x = 0$. Find y for $x = 0.1$ by Euler's method.

5. Find the value of y_{28} given $y_{20} = 49225$, $y_{30} = 48316$, $y_{30} = 47236$, $y_{35} = 45926$, $y_{40} = 44306$.

6. Find $\frac{dy}{dx}$ at $x = 1.1$.

x	i	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

SECTION-C

7. Solve the equations $20x + y - 2z = 17$ by Guass Jacobi and Gauss Seidal method.

   $3x + 20y - z = -18$

   $2x - 3y + 20z = 25$

8. Derive Newton cotes quadrature formula. Evaluate $\int_0^6 \frac{dx}{1 + x^2}$ by Trapezoidal and Simpson's rules.

9. Using R.K. method of order 4 find y for $x = 0.1$, 0.2 and 0.3 given that $\frac{dy}{dx} = x - y^2$, $y(0) = 1$. Obtain $y(0.4)$ by Adam's method.

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Total No. of Pages : 02

Total No. of Questions : 09

Bachelor of Science (Non/Medical) (Sem.–5)

INORGANIC CHEMISTRY-IV

Subject Code : BSNM/501/18

M.Code : 78615

Date of Examination : 13-12-2024

Time : 3 Hrs.

Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly:**

   a) Cu(I) is diamagnetic whereas Cu(II) is paramagnetic. Why?

   b) Zn form only Zn^{+2} not Zn^{+3}. Why?

   c) Write a short note on spectrochemical series.

   d) What is stepwise overall stability constant?

   e) What are labile complexes?

   f) Explain ferromagnetism.

   g) What is Laporte forbidden rule?

   h) Define R-S coupling.

   i) Name two pi acid ligands.

   j) Give the example of three and four electron donor ligands.

SECTION-B

2. What are factors affecting stability of complexes?

3. Discuss Gouy's method for measuring magnetic susceptibility.

4. Explain the vibronic coupling. Give one example of this phenomena.

5. Explain the significance of Neel temperature.

6. Describe the bonding in metal carbonyls and evidence in support of such bonding.

SECTION-C

7. Discuss the mechanism of substitution reaction in square planar complexes.

8. Explain how the orientation of d-orbitals in space leads their splitting in octahedral field of ligands.

9. What do you mean by homogeneous hydrogenation? Name three homogeneous catalysts used for homogeneous hydrogenation of alkenes.

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Bachelor of Science (Non/Medical) (Sem.–5)

PHYSICAL CHEMISTRY-III

Subject Code : BSNM-502-18

M.Code : 78616

Date of Examination : 10-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE mark each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) What do you understand by nuclear fussion?

   b) The mass of neutron is 1.0087μ. Calculate its density.

   c) Define regions of electromagnetic spectrum.

   d) What is harmonic oscillator?

   e) Explain single electrode potential.

   f) Explain radioactivity.

   g) What are weak electrolytes?

   h) Define battery.

   i) Define reference electrode.

   j) Explain migration of ions.

SECTION-B

2. Calculate the E.M.F of concentration cell without transference.

3. Calculate the energy released in kJ as well as in KWH, by fission of 1 gm of uranium. Energy per fission may be taken as 200Mev.

4. Explain the term artificial radioactivity, nuclear forces and binding energy of a nucleus.

5. Explain the important applications of electrochemical cell.

6. The dissociation constants of formic and acetic acids are 1.77×10^{-4} and 1.75×10^{-5} respectively. Calculate the relative strength of two acids.

SECTION-C

7. Explain the terms conductance, specific conductance and molar conductance as applied to solution of electrolytes. How is specific conductance related to molar conductance? In which units these are expressed?

8. What is diffusion current? State and explain Fick's first and second laws of diffusion. Describe the limiting diffusion current in polarography.

9. Explain the method for determination of force constant, bond length. State Born-Oppenheimer approximation.

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Bachelor of Science (Non Medical) (Sem.–5)

QUANTUM MECHANICS

Subject Code : BSNM/504/18

M.Code : 78618

Date of Examination : 05-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) What is the physical significance of Ψ and $|\Psi|^2$?

   b) Differentiate between normal and anomalous qeeman effect.

   c) What does Hamiltonian operator represent?

   d) What is the range of r, θ and φ in spherical polar co-ordinates?

   e) '*The linear momentum of the particle inside infinite square well is quantized*'. Comment

   f) What are eigen functions and eigen values of an operator?

   g) Find the ground state energy of an electron in a box of length 1Å .

   h) What is the physical significance of probability current density?

   i) What do you mean by the terms electron magnetic moment and magnetic energy?

   j) Distinguish between phase velocity and group velocity.

SECTION-B

2. Show that the zero-point energy of linear harmonic oscillator is a manifestation of the uncertainty principle.

3. What is Linde's g-factor? Give its importance. Calculate its value for s-electron.

4. Discuss various conditions for which the wave function is said to be physically acceptable wave function. Also, find the probability to locate the particle between x = 2 and x = 4, if the wave function of a particle is given by $\psi(x) = e^{5x}$.

5. Derive an expression for the splitting of levels due to a normal Zeeman effect.

6. For hydrogen atom $\psi_{100} = \left(\frac{1}{\pi a_0^3}\right)^{1/2} \exp(-r/a_0)$, find the probability of finding the electron in a sphere of radius $r = a_0$.

SECTION-C

7. Solve the radial part of the Schrodinger wave equation for hydrogen atom to obtain its energy levels. Also, explain about the quantum numbers involved and their significance.

8. a) Derive an expression for Schrodinger equation for stationary states.

   b) A particle of mass 'm' confined to move in a potential $V(x) = 0$ for $0 \leq x \leq a$ and $V(x) = \infty$ otherwise. The wave function of the particle at time $t = 0$ is given by

   $$\psi(x, 0) = A \sin\frac{5\pi x}{a} \cos\frac{2\pi x}{a}.$$

   i) Normalize $\psi(x, 0)$ and

   ii) Is $\psi(x, t)$ a stationary state?

9. What is the basis of the origin of vector model of atom? What are its salient features? How they experimentally verified?

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Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (NM) (Sem.–5)

DRUG ABUSE-I (PROBLEM & MANAGEMENT)

Subject Code : BSNM-509-18

M.Code : 78624

Date of Examination : 02-12-2024

Time : 3 Hrs.

Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) Define drug dependence.

   b) What are withdrawal symptoms?

   c) List two narcotics and their common effects.

   d) What is the prevalence of drug abuse in Punjab?

   e) Name one medical management method for drug abuse.

   f) What is drug addiction?

   g) Differentiate between physical and psychological dependence.

   h) What is the role of cognitive therapy in managing drug abuse?

   i) Name two stimulant drugs and their effects.

   j) Mention two signs of drug abuse in adolescents.

SECTION-B

2. Discuss the historical perspective of drug abuse.
3. Explain the effects of amphetamines and cocaine as stimulant drugs.
4. Describe the physical and behavioural signs of drug abuse.
5. What are the different social management strategies for drug abuse?
6. Discuss the prevalence of drug abuse among vulnerable groups in India.

SECTION-C

7. Explain in detail the psychiatric management of drug abuse.
8. Discuss the effects and dangers of hallucinogens such as LSD and MDMA.
9. Discuss in brief the role of families in management and prevention of drug abuse.

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Total No. of Questions : 09

Total No. of Pages : 03

DEC 2024

Bachelor of Science (Non-Medical) (Sem.–5)

ENGLISH-V

Subject Code : BSNM-507-18

M.Code : 78621

Date of Examination : 28-11-2024

Time : 3 Hrs.

Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Do as Directed :**

a) Use "commit" as noun in a sentence.

b) Write full form of DA.

c) Write full form of ROFL.

d) Write full form of ASAP.

e) Complete the following Idiom : To kill two birds with_____.

f) Write the sentence in present continuous : Rohan stood in the balcony while waiting for his mother.

g) Write the sentence in Future indefinite : Anu visits her Aunt.

h) Change the following sentence into negative : Everyone loves ones country.

i) Change the following sentence into comparative : She is the tallest in the class.

j) Change the voice of the following sentence : Who broke the jug?

SECTION-B

2. Draft a notice for the students informing them about the special chance given to them to clear their reappears.

3. Write a dialogue between a doctor and a patient.

4. Write a letter to an Editor of the Newspaper requesting him to publish your views on the corruption prevailing in the Government offices.

5. **Translate the following passage into English :**

ਪ੍ਰਦੂਸ਼ਣ ਜੀਵਨ ਦੀ ਗੁਣਵੱਤਾ ਨੂੰ ਇਸ ਤੋਂ ਵੱਧ ਪ੍ਰਭਾਵਿਤ ਕਰਦਾ ਹੈ ਜਿਸਦੀ ਕੋਈ ਕਲਪਨਾ ਨਹੀਂ ਕਰ ਸਕਦਾ ਹੈ। ਇਹ ਰਹੱਸਮਈ ਤਰੀਕਿਆਂ ਨਾਲ ਕੰਮ ਕਰਦਾ ਹੈ, ਕਈ ਵਾਰ ਜੋ ਨੰਗੀ ਅੱਖ ਨਾਲ ਨਹੀਂ ਦੇਖਿਆ ਜਾ ਸਕਦਾ ਹੈ। ਹਾਲਾਂਕਿ, ਇਹ ਵਾਤਾਵਰਣ ਵਿੱਚ ਬਹੁਤ ਜ਼ਿਆਦਾ ਮੌਜੂਦ ਹੈ,ਉਦਾਹਰਨ ਲਈ, ਤੁਸੀਂ ਹਵਾ ਵਿੱਚ ਮੌਜੂਦ ਕੁਦਰਤੀ ਗੈਸਾਂ ਨੂੰ ਦੇਖਣ ਦੇ ਯੋਗ ਨਹੀਂ ਹੋ ਸਕਦੇ ਹੋ, ਪਰ ਉਹ ਅਜੇ ਵੀ ਉੱਥੇ ਹਨ। ਇਸੇ ਤਰ੍ਹਾਂ, ਜੋ ਪ੍ਰਦੂਸ਼ਕ ਹਵਾ ਵਿੱਚ ਗੜਬੜ ਕਰ ਰਹੇ ਹਨ ਅਤੇ ਕਾਰਬਨ ਡਾਈਆਕਸਾਈਡ ਦੇ ਪੱਧਰ ਨੂੰ ਵਧਾ ਰਹੇ ਹਨ, ਉਹ ਮਨੁੱਖਾਂ ਲਈ ਬਹੁਤ ਖਤਰਨਾਕ ਹਨ। ਕਾਰਬਨ ਡਾਈਆਕਸਾਈਡ ਦਾ ਵਧਿਆ ਪੱਧਰ ਗਲੋਬਲ ਵਾਰਮਿੰਗ ਵੱਲ ਲੈ ਜਾਵੇਗਾ।

6. **Answer the questions on the basis of your reading of the following paragraph :**

The Indian youth is accused of being impatient, undisciplined, disrespectful to the elders, and irresponsible towards society and authority. It was felt that to curb these tendencies the youth required to be motivated in nation-building activities and made responsive to the social concerns. For this purpose, National Service Scheme (NSS) was introduced in 1969. Its main aim was to involve the students of the colleges and +2 level on a voluntary and selective basis in programmes of social services and developmental activities. Gradually it was adopted by all the states and union territories. Today it covers more than 5000 colleges all over the country. Under this scheme, rural and slum reconstruction, repair of roads, school buildings, ponds, tanks, plantation of trees, environment protection, health and family planning and education of adults and women are undertaken. The NSS students aid local authorities in implementing various relief and rehabilitation schemes. In the times of natural calamities like famines, floods, droughts, epidemics and earthquakes volunteers helped by NSS students play a very positive and constructive role. It instills in them the spirit of social service and the sense of responsibility. The tribal youth are given vocational training under a special scheme to enable them to become self-employed. Then, there are youth hostels set up all over the country to provide cheap accommodation to the youth to inspire them into undertaking educational tours and excursions to visit the cultural and historic sites to revisit our glorious past. 446 Nehru Yuvak Kendras strewn around the country provide vocational training to non-student rural youth and improve their personality. 'Bharat Scouts and Guides' and 'All India Boy Scouts Association' are teaching Indian youth the importance of loyalty and goodwill for others under the international scouting and guiding movement.

Questions:

a) What is the Indian youth accused of?

b) What scheme was introduced to involve students in social service and developmental activities?

c) What works are undertaken under this scheme?

d) For what purpose youth hostels with cheap accommodation are set up?

e) Give a suitable title to the Paragraph.

SECTION-C

7. Comment how Nissim Ezekiel makes a stark comment on the use of English by Indians in "*Goodbye Party for Miss Pushpa T.S.*".

8. Critically analyse Prem Chand's story "*The Voice of God*".

9. Discuss in detail the thematic concerns of W B Yeats' poem "*He Wishes for the Cloths of Heaven*".

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Bachelor of Science (Non-Medical) (Sem.–5)

ELEMENTS OF MODERN PHYSICS

Subject Code : BSNM-503-18

M.Code : 78617

Date of Examination : 25-11-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

   a) What is the significance of Planck's constant?

   b) State Heisenberg uncertainty principle.

   c) State Bohr's quantization rule.

   d) What is the importance of the normalization of the wave function?

   e) Why Schrodinger's wave equation is not valid for relativistic particles?

   f) What do you mean by correspondence principle?

   g) What is the significance of Zeeman effect?

   h) What do you mean by 'Simultaneity'?

   i) What are the outcomes of Michelson Morley experiment?

   j) At what speed must a particle move for its mass to be two times its rest mass?

SECTION-B

2. An X-ray photon is found to have doubled its wavelength on being scattered by 90°. Find the energy and wavelength of incident photon.

3. By applying uncertainty principle, explain non-existence of electrons in the atomic nucleus.

4. An electron is constrained to move in a one dimensional box of length 1 nm. Find the first the three energy eigen values and the corresponding de-Broglie wavelength.

5. Describe spin orbit coupling and how it affects the atomic spectra?

6. With what velocity should a rocket move so that every year spent on it corresponds to 4 years on earth?

SECTION-C

7. State Schrodinger wave equation for a free particle in a one dimensional closed box with infinitely hard walls. State the boundary conditions and solve it to obtain normalized wave function for the particle. Calculate the eigen functions and corresponding energy eigen values.

8. Discuss Stern Gerlach experiment with necessary theory. What was the aim of the experiment? Discuss its significance.

9. Starting from Lorentz transformation equations for space and time coordinates, derive equations for relativistic addition of velocities.

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Total No. of Questions : 09

B.Sc. (Non-Medical) (Sem.–6)

ORGANIC CHEMISTRY-IV

Subject Code :BSNM601-18

M.Code : 79493

Date of Examination : 16-12-2024

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

   a. What do you mean by alkylation?

   b. Explain the selection rules of IR spectroscopy.

   c. What do you mean by Beer's Lambert Law?

   d. Difference between thiols and thioethers.

   e. Define isoelectric point.

   f. Explain the 1,3-alkylation.

   g. Difference between ribose and deoxyribose.

   h. Define auxochromeh

   i. Define mutarotation.

   j. What are selection rules for NMR?

SECTION-B

2. Explain the effect of conjugation in UV-visible spectroscopy.

3. Explain the nuclear shielding and deshielding.

4. Explain the IR technique for structure analysis.

5. Explain the Zigegler-Natta polymerization.

6. Explain the mechanism of mutarotation.

SECTION-C

7. Explain alkylation and acylation of enamines.

8. Explain the Epoxy resins and polyurethanes.

9. Explain the structure of double helical DNA.

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Total No. of Questions : 09

B.Sc. (Non-Medical) (Sem.–6)

NUCLEAR AND PARTICLE PHYSICS

Subject Code : BSNM-604-18

M.Code : 79496

Date of Examination : 18-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

(a) Calculate the energy carried by an electron in MeV.

(b) What do you understand by nuclear quadrupole moment?

(c) Alpha rays and gamma rays have same energy. What is the difference between them?

(d) What is β-ray emission?

(e) Does the Compton shift depend upon the nature of scatter?

(f) Determine the range of 2 MeV α-particles in air.

(g) What is the important difference between the gluons and photons?

(h) How do you distinguish between Fermions and Bosons?

(i) Which type of counter is best for detecting high energy β-particles?

(j) What happens to the atomic number and mass number of a nucleus when it emits positron?

SECTION-B

2. What is electron-proton hypothesis? Discuss the reasons for its failure.

3. What is the process of electron capture and internal conversion?

4. Name different gamma ray interaction processes. Discuss any of them.

5. What are quarks? Write down the quark content of protons, neutrons and pions.

6. What are nuclear magic numbers? What is their experimental evidence?

SECTION-C

7. Discuss the principle, construction and working of scintillation counter. Differentiate between GM counter and scintillation counter.

8. What is meant by range of α-particles? Discuss the theory for α-decay. Explain Geiger-Nuttal law by giving its importance.

9. Explain binding energy and binding energy per nucleon. Derive an expression for the binding energy of nucleus based on liquid drop model.

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Total No. of Questions : 09

Total No. of Pages : 02

DEC 2024

B.Sc (Non-Medical) (Sem.–6)

MODERN ALGEBRA

Subject Code : BSNM605/18

M.Code : 79497

Date of Examination : 20-12-2024

Time : 3 Hrs.

Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a) Show that a group upto order 2 is abelian.

   b) Define Proper Subset

   c) If a is a generator of cycle group G then prove that a^{-1} is also a generator of G.

   d) Let S = {1 2 3}. Write down even permutations

   e) Define integral domain

   f) Show that every subgroup of an abelian group is normal.

   g) Give an example of prime ideal which is not a maximal ideal.

   h) Prove that every homomorphic image of a commutative ring is commutative.

   i) Define cyclic group.

   j) Define characteristics of a ring.

SECTION-B

2. Prove that the order of a subgroup of a finite group divides the order of the group.

3. Let H and K be two subgroups of a group G, then HK is a subgroup of G if HK = KH.

4. Prove that the map $f: G \to G$ given by $f(x) = x^{-1}$, $x \in G$, is a homomorphism of the Group G if G is abelian.

5. If D is an integral domain and if $na = 0$ for some $a \neq 0$ in D and some integer $n \neq 0$, prove that D is of finite characteristic.

6. Let R be a Commutative Ring with unity. Then prove that every maximal ideal of R is prime ideal.

SECTION-C

7. Prove that every homomorphic image of a ring R is isomorphic to a quotient ring of R.

8. If G is a finite group, then the number of elements conjugate to a in G is the index of the normalizer of a in G.

9. If in a ring R, $x^2 = x$ for all $x \in R$, then show that

   (a) $x + x = 0$, for all $x \in R$ i.e each element of R is its own additive inverse.

   (b) R is commutative

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