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Roll No. [ ]

Total No. of Questions : 09

Total No. of Pages : 02

B.Sc (Non Medical) (Sem.–5)

THEORY OF PROBABILITY

Subject Code : BSNM-505-18

M.Code : 78619

Date of Examination : 30-11-2023

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 mutually exclusive and exhaustive events.

b) If a sample space $S = A \cup B$, $P(A) = \frac{1}{2}$ $P(B) = \frac{3}{4}$ Find $P(A \cap B)$.

c) Write ant two properties of Distribution function.

d) A random variable X has the density function

$$F(X) = \frac{c}{x^2+1} \qquad -\infty < x < \infty. \text{ Find } c.$$

e) Prove that Cov (X,Y) = E(XY) – E(X)E(Y).

f) Explain properties of Binomial distribution.

g) If X is a normal variate with mean 30 & standard deviation 5. Find probability that $26 \le x \le 40$.

h) Explain additive property of Gamma distribution.

i) Prove that the probability of null set is Zero.

j) Let X have the P.d.f.

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$$F(x) = \begin{cases} \frac{x}{6} & x = 1,2,3 \\ 0 & elsewhere \end{cases}. \text{ Find } E(X^3).$$

SECTION-B

2. A & B are two very weak students of statistics and their chances of solving a problem correctly are 1/8 and 1/12 respectively. If the probability of their making a common mistake is 1/1001 and they obtain the same manner. Find the chance that their answer is correct.

3. Let X be a continuous random variable with probability density function given by :

$$F(x) = \begin{cases} kx & 0 \le x < 1 \\ k & 1 \le x < 2 \\ -kx + 3k & 2 \le x < 3 \\ 0 & elsewhere \end{cases}. \text{ Find k.}$$

4. Two unbiased dice are thrown. Find the expected values of the sum of numbers of points on them.

5. The mean and variance of binomial distribution are 4 and 4/3 respectively. Find $P(X \ge 1)$.

6. If X and Y are independent gamma variates. Find the distribution of X/(X+Y).

SECTION-C

7. The probability of getting no misprints in a page of book is 0.223. What is the probability that a page contains more than two misprints?

8. Fit a normal distribution to the Allowing data

Class :	15-20	20-25	25-30	30-35
Frequency :	8	13	19	10

9. If A & B are two non-mutually exclusive events. If $P(A) = \frac{1}{4}$, $P(B) = \frac{2}{3}$ and $P(A \cup B) = \frac{1}{2}$. Find the values of $P(A \cap B)$, $P(A \cap B^C)$ and $P(A^C \cap B)$.

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Roll No. [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

Total No. of Pages : 01

Total No. of Questions : 05

B.Voc. (Beauty Therapy and Aesthetics)/ B.A. (JAMC)/ BBA/(SIM)/ B.Com (Honours)/ BCA/ BHMCT (UGC)/ B.Sc. - Honours (Nutrition and Dietetics)/ B.Sc. (AI&ML)/ (Bio Technology)/ (Fashion Design)/ (Graphics & Web Designing)/ (IT)/(Medical Lab Sciences)/ BTTM (Sem-1)

ENGLISH

Subject Code : BTHU-103-18

M.Code : 75085

Date of Examination : 22-06-2023

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. All questions are COMPULSORY.
2. Q1, Q2 and Q3 carry TEN marks each.
3. Q4 and Q5 carry FIFTEEN marks each.

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1. What is Communication? Explain in detail the types and modes of Communication.
2. How is Verbal communication different from non-verbal Communication? Discuss in detail the importance of non-verbal communication as a leader.
3. In FOUR sentences, summarise and paraphrase the following passage in an answer to the following question:

   How can smokers quit smoking? What steps can smokers follow to quit smoking?

   "No pain No gain". Quitting smoking needs a strong will and a lot of effort. Many smokers want to quit smoking. They know it is bad for their health. But it is difficult for them to do so. Doctors advise heavy smokers to reduce smoking gradually starting to cut down two to three cigarettes a day reaching the ultimate goal. Others find that chewing a gum keeps a smoker busy all day long and consequently, he can reduce the number of cigarettes consumed. Sports can improve the health and give smokers the strength to quit this bad habit. Some people go for group support where all smokers provide support for each other to quit smoking.
4. Write a letter to an applicant for the post of Chief Accountant to present himself for a personal interview.
5. You, as a marketing manager have been given the responsibility of conducting and preparing a market research to know the market potential of a new product which your company is intending to launch in the market in near future. Prepare a draft report.

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Roll No. [ ]

Total No. of Questions : 09 Total No. of Pages : 02

B.Sc. (Non Medical) (Sem.–2)

PUNJAB HISTORY AND CULTURE

Subject Code : BSNM208A-18

M.Code : 76307

Date of Examination : 19-06-2023

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) Name the sons of Guru Nanak Dev ji.

b) What do you mean by 'Sangat'?

c) Who was the second Guru of the Sikhs?

d) Who got constructed the 'Baoli of Goindwal'?

e) Who was Mian Mir?

f) Who compiled Adi Granth?

g) Who was the Head Granthi of Adi Granth?

h) When and who founded the city of Amritsar?

i) What is Guru Tegh Bahadar's period of Guruship?

j) Who wrote 'Zafarnama'?

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SECTION-B

2. What is the importance of Guru in Sikhism?

3. What was the contribution of second Guru to Sikhism?

4. Explain Manji System.

5. Describe the contribution of Guru Arjan Dev to Sikh religion.

6. Discuss Guru Gobind Singh's relations with the Mughals.

SECTION-C

7. Write a detailed note on the development of sikh institutions like Langar, Sangat, Pargat and Gurudwaras.

8. Discuss the causes and significance of the martyrdom of Guru Tegh Bahadur ji.

9. Describe transformation of Sikhism under Guru Hargobind and the features of New Policy adopted by him.

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Roll No. [ ]

Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. Hons. (N & D) (Sem-2)

ENVIRONMENTAL SCIENCE

Subject Code : EVS-102-18

M.Code : 77762

Date of Examination : 02-06-2023

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) Explain the significance of "*interaction of systems*" in environmental studies.

b) Differentiate between food chain and food web.

c) Define land degradation. List any four causes.

d) List any four environmental impacts due to mining.

e) Give two examples each of endangered and endemic species of India.

f) What is meant by ozone layer depletion?

g) List four human health risks associated with nuclear hazards

h) List the mitigation measures of natural disasters.

i) What is meant by composting? Give its suitability.

j) What is meant by sustainable development?

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SECTION-B

2. How does soil pollution differ from water pollution in effects and control?

3. Discuss the environmental effects of over-exploitation of groundwater.

4. Why is biodiversity conservation important? Discuss the measures for biodiversity conservation.

5. Discuss the energy flow in forest ecosystem.

6. Explain the phenomenon of climate change. What are its major causes?

SECTION-C

7. Explain the importance of value education, awareness and community participation in environmental protection activities in India

8. Write notes on :

a) Public participation and NGO initiatives in India for environmental protection

b) Environmental laws and regulations in India.

9. What are the major bio-geochemical cycles in nature that recycle nutrients and minerals in nature? Explain any one of the cycles.

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Total No. of Questions : 09

Total No. of Pages : 02

B.Sc (Non Medical) (Sem-2)

INTEGRAL CALCULUS

Subject Code : BSNM-205-18

M.Code : 76303

Date of Examination : 17-06-2023

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 :**

a) Solve $\int_0^{\pi/2} \cos^8 x dx$

b) Solve $\int_{-5}^{5} |x-2| dx$

c) Evaluate $\int_1^2 \int_3^4 \left(xy + e^y\right) dy dx$

d) Evaluate $\int_0^1 \int_0^1 \frac{dx}{\sqrt{\left(1-x^2\right)\left(1-y\right)^2}}$

e) Write relation between cartesian co-ordinates and cylinder co-ordinates.

f) Write formula for volume as a double integral in cylindrical co-ordinate.

g) Write any two properties of definite integral.

h) Write formula for $\int \frac{dx}{\sqrt{x^2 - a^2}}$

i) Evaluate $\int (x+2)\sqrt{x^2+4x+5} dx$

j) Write expression for length of arc of curve in parametric co-ordinates.

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SECTION-B

2. Solve $\int \frac{x^3+5x+3}{x^2+3x+2} dx$

3. Solve $\int \frac{\cos\theta}{(2+\sin\theta)(3+4\sin\theta)} d\theta$

4. Find the reduction formula for $\int \frac{x^m}{(\log x)^n} dx$.

5. Change the order of integration and hence evaluate $\int_0^{4a} \int_{\frac{x^2}{4a}}^{\sqrt[2]{ax}} dy dx$.

6. Evaluate $\iiint \frac{dx dy dz}{(x+y+z+1)^3}$ over tetrahedron bounded by the coordinate planes and the plane $x+y+z=1$.

SECTION-C

7. a) Evaluate using spherical polar co-ordinates $\iiint \frac{dx dy dz}{\sqrt{1-x^2-y^2-z^2}}$ the integral being extended to the positive octant of the sphere $x^2+y^2+z^2=1$.

b) Find the volume enclosed between the cylinders $x^2+y^2=2ax$ and $z^2=2ax$.

8. a) Find the area of the surface of revolution formed by revolving the curve $r = 2a\cos\theta$ about the intial line.

b) Find the area of the region bounded by curves $y^2 = 4a(x+a)$ and $y^2 = 4b(b-x)$.

9. Find a reduction formula for $\int e^{ax} \cos^n dx$ and hence evaluate $\int e^{9x} \cos^4 x dx$.

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Total No. of Questions : 09

B.Sc. (Non-Medical) (Sem–2)

MECHANICS-II

Subject Code : BSNM-203-18

M.Code : 76301

Date of Examination : 22-06-2023

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) Write the principle of GPS.

b) Define law of Gravitation.

c) What is an inertial frame of reference?

d) What are geosynchronous orbits?

e) What is the difference between Kinetic energy and Potential energy?

f) Define Quality Factor.

g) State the two postulates of special theory of relativity.

h) What do you mean by mass-energy equivalence?

i) What were the limitations of Michelson Morley experiment?

j) Define Resonance.

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SECTION-B

2. Derive an expression for gravitational energy of a uniform sphere.

3. Calculate the components of velocity in cylindrical coordinates.

4. Discuss different types of Damping in Simple Harmonic Oscillator.

5. Explain the working of a satellite in circular orbit. List some applications.

6. Derive Lorentz Transformations. Show that Galilean transformations are limiting case of Lorentz transformations.

SECTION-C

7. How two body problem can be reduced to one one body problem under central force? Find its solution.

8. Derive Differential equation for a forced oscillator. Explain transient and steady states.

9. Explain in detail the principle, construction and working of Michelson Morley experiment.

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Roll No. [ ]

Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (Non Medical) (Sem–2)

ENGLISH-II

Subject Code : BSNM-207-18

M.Code : 76305

Date of Examination : 10-06-2023

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. Conjunction

   b. Adverbs of time

   c. Example of adjective in a sentence

   d. Example of preposition in a sentence

   e. Use of colon

   f. Difference between active and passive voice

   g. Complex sentence

   h. Role of poise in public speaking

   i. Memorandum

   j. Example of comparative degree of adjective

SECTION-B

2. Who is the ego in Jekyll and Hyde?

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3. **Combine 2 simple sentences into one compound sentence :**

   a. He is mad. He feigns madness.

   b. He is not an idler. He is not a gambler.

   c. He is poor. He is contended.

   d. He is rich. He is unhappy.

   e. Wise men love truth. Fools shun it.

4. Write a letter to the Head of your Institute suggesting him/her ways for the celebration of National Science Day.

5. **Punctuate the following paragraph :**

   i knew that by the time they found me there would be nothing left of me but my hanky i imagined them taping it to a postcard and mailing it home to my dad when i ran out of tears i started singing oh they built the ship titanic to sail the ocean blue and just then a flashlight found me my patrol leader asked what i was doing out here in the woods and i spit on my palms and said don't worry about me i can take care of myself that night i dreamed of dragons in the pines and i woke up screaming.

6. How does Jekyll and Hyde link to psychology?

SECTION-C

7. Write a report on a recent science competition organized by your department. Invent the necessary details.

8. **Write the meanings of the following technical words :**

   Alpha Decay, Atomic Number, Radioactivity, Btu, Reactor, Fusion, Gamma Radiation, Ionize, Neutron, Half-life.

9. What is the main conflict in "*The Strange Case of Dr. Jekyll and Mr. Hyde*"?

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Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (Non-Medical) (Sem–2)

PHYSICAL CHEMISTRY-I

Subject Code : BSNM202-18

M.Code : 76300

Date of Examination : 09-06-2023

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 collision frequency?

b) Explain most probable velocity.

c) Define coefficient of viscosity

d) What are lyophilic colloids?

e) What are ideals solutions??

f) What is Van't Hoff factor?

g) What are Azeotropes.

h) Explain Elastic Gels?

i) Explain intrinsic viscosity.

j) Explain the law of corresponding states.

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SECTION-B

2. Calculate the root mean square velocity, average velocity of SO_2 molecules at 427°C.

3. Explain one kinetic property and one optical property of colloidal state.

4. Differentiate between unreversible and reversible sols.

5. Latent heat of fusion of water (ice) is 1436.3cal/mol. Calculate the molal freezing point depression constant of water.

6. Describe the principle and apparatus used for the measurement of surface tension.

SECTION-C

7. Derive the relationship between :

   Depression in freezing point and lowering of vapour pressure.

8. State and explain: Boyle's law, Charles law and concept of absolute zero.

9. Define vapour pressure, boiling point, Trouton's Rule.

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Roll No. [ ]

Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (Non Medical) (Sem-2)

THEORY OF EQUATIONS

Subject Code : BSNM-206-18

M.Code : 76304

Date of Examination : 05-06-2023

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) Compute the discriminant of $x^3 + px + q = 0$.

b) Discuss the nature of roots of equation $x^3 - 9x - 6 = 0$.

c) Solve of equation $x^3 + 6x + 20$, one root being $3i + 1$.

d) Express $f(x) = x^3 - 6x^2 + 8x + 7$ as a polynomial in powers of $(x + 3)$.

e) Prove that equation $x^3 + 3x + 2$ has two non real roots.

f) Find decimal number corresponding to binary number $(111.011)_2$

g) What do you mean by numerical instability?

h) Using Regula falsi method compute the smallest positive root of equation $xe^x - 2 = 0$.

i) Evaluate $\sqrt{12}$ to four decimal places by Newton Raphson method.

j) Compare Bisection method with Regula falsi method.

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SECTION-B

2. Solve the equation $x^4 - 4x^3 - 6x^2 + 36x - 27 = 0$ given that it has multiple root.

3. Solve $x^3 - 3x^2 - 12x + 16 = 0$ by Cardan's method.

4. State Discrete's rule of signs. Find least possible number of imaginary-roots of equation $x^9 - x^5 + x^4 + x^2 + 1 = 0$

5. Find smaller root of equation $x^2 - 400x + 1$ using four digit arithmetic.

6. Use secant method to determine the root of equation $\cos x - xe^x = 0$.

SECTION-C

7. Solve by Ferrari's method the equation $2x^4 + 6x^3 - 3x^2 + 2 = 0$.

8. Find condition that second and fourth terms of equation $a_0x^2 + 4a_1x^3 + 6a_2x^2 + 4a_3x + a_4 = 0$ may be removed by same transformation. Hence solve the equation $x^4 + 16x^3 + 83x^2 + 152x + 84 = 0$.

9. Find the rate of convergence of Secant method.

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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 : 02-06-2023

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 is conservative field?

b) What do you mean by curl of vector field?

c) Comment on the direction of Poynting vector.

d) What is reciprocity theorem of mutual induction?

e) Two long parallel wires separated by a distance 10 cm, are each carrying a 5 A of current. Calculate force per unit length between them.

f) Define intensity of magnetization.

g) Write Maxwell's equations for isotropic dielectric medium.

h) Differentiate between transverse and longitudinal nature of wave.

i) What is Bohr magneton?

j) Write down the expression for electrostatic energy per unit volume.

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SECTION-B

2. The potential function is given by $V(x,y,z) = 4x + 3y - z$. Find the electric field vector.

3. Distinguish between para, ferro and diamagnetic substances.

4. State Poynting vector and prove Poynting theorem.

5. What is dielectric? Derive the relation between $\vec{D}$, $\vec{E}$ and $\vec{P}$.

6. Calculate the capacitance of an isolated spherical conductor.

SECTION-C

7. a) State and explain Biot Sanvart's law. Derive an expression for the magnetic field at a point on the axis of a circular coil carrying current. (7)

b) Calculate magnetic field at the ends of a 35 cm long solenoid having 500 turns and carrying current of 6 A. (3)

8. State the Faraday's laws of electromagnetic induction. Derive the differential and integral form of the Faraday's law.

9. Write integral form of Maxwell's equations. Describe the physical significance of each equation.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (Non Medical) (Sem.–2)

INORGANIC CHEMISTRY-II

Subject Code : BSNM-201-18

M.Code : 76299

Date of Examination : 30-05-23

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) Give the name of alkali metal which when kept in hand melts.

b) Define amalgam.

c) What is the electronic configuration of Indium(In)?

d) What is freon?

e) Which should be the stronger acid, HOCN or HCN?

f) What is HOBr called?

g) What are paramagnetic substances?

h) Why do transition metals form alloy?

i) Why can water be both a Bronsted base and a Lewis base?

j) Explain the orthoboric acid ionization in water.

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SECTION-B

2. Why BF3 is not hydrolysed as compared to BCl3 and BBr3?

3. What is diagonal relationship and how does it arise in higher s-block and p-block elements?

4. How is beryllium chloride prepared? Draw the structure of beryllium chloride in the solid state and in the vapour state.

5. Why are alkali metals less dense and less harder than alkaline earth metals? What are the factors that give the relative strength of lewis acids and bases?

6. How do coordination compounds differ from double salts? Why square planar complexes do not exhibit optical isomerism?

SECTION-C

7. What is EDTA? How this chelating ligand is capable of complexing with Ca^{+2} ion? Draw the structure of complex.

8. How is diborane prepared? Discuss the bonding in this unique molecule. How does diborane react with ammona?

9. How does relative strength of an acid vary with the oxidation number of the central atom?

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Roll No. [ ]

Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (Non Medical) (Sem–3)

DIFFERENTIAL EQUATIONS

Subject Code : BSNM-306-18

M.Code : 76905

Date of Examination : 01-06-2023

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) Define Exact differential equation.

b) Solve $p^2 - 7p + 12 = 0$.

c) Define Clairaut's equation.

d) Write Cauchy's Homogeneous linear equation.

e) Show that $e^{ax}\cos bx$, $e^{ax}\sin bx$ are linearly independent over all reals.

f) Form partial differential equation by eliminating arbitrary constants $z = (2x + a)(2y + b)$

g) Define Lagrange's equation.

h) Define complete integral and general integral.

i) Find the P.I of $(D^3 - 3D^2 + 4)y = e^{2x}$.

j) Find I.F of $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$.

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SECTION-B

2. State and prove necessary and sufficient condition for the differential equation $Mdx + Ndy = 0$ to be exact.

3. Solve $(D^2 - 4D + 4)y = 8x^2e^{2x}\sin 2x$.

4. Solve the differential equation $p\cos(x+y)+q\sin(x+y) = z$

5. Solve $(1+x)^2\dfrac{d^2y}{dx^2} + (1+x)\dfrac{dy}{dx} + y = Sin\,[2log(1+x)]$.

6. Find the complete integral of $px+qy = pq$

SECTION-C

7. Solve $x^6\dfrac{d^2y}{dx^2} + 3x^5\dfrac{dy}{dx} + a^2y = \dfrac{1}{x^2}$

8. Find equation of the family of surfaces which Cut orthogonally the cones of family $x^2 + y^2 + z^2 = \lambda xy$, λ, xy, A is a parameter.

9. a) Solve $(D^3 - 4D^2D' + 4DD'^2)Z = 2sin(3x + 2y)$.

b) Solve $(D^3 - DD'^2 - D^2 + DD')Z = \dfrac{x+2}{x^3}$.

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B.Sc. (Non Medical) (Sem.–3)

PUNJAB HISTORY & CULTURE-III

Subject Code : BSNM-308-18

M.Code : 76908

Date of Examination : 03-06-23

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. **Answer briefly :**

a) How old are Indo-Aryans?

b) Economic life during Rig Vedic period.

c) Worship in later Vedic period.

d) Where was Alexander the Great born?

e) Why is emperor Ashoka called the Great?

f) Name of main capital of Kushans?

g) Who destroyed Gupta dynasty?

h) Discuss historical significance of Vardhana dynasty?

i) Write about the main cultural features of Punjab in eighth century.

j) Significance of ancient Punjab's architecture.

SECTION-B

2. What are the main theories about the original home of the Aryans? Which is the most accepted theory?

3. *The roots of Hindustan go down into the Rig Vedic Age.* Explain it.

4. What was the political condition of India at the time of Alexander' invasion?

5. Briefly describe the career of Kanishka, discuss his contribution to the art and literature.

6. Compare the works of Ashoka and Kanishka as Buddhist missionaries.

SECTION-C

7. Give an account of the Vedic literature and highlight its importance.

8. Describe the administrative system of the Mauryas and estimate its main features.

9. Throw light on the traditional forms of art with special references to painting and handicraft.

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Total No. of Questions : 09

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B.Sc. (Non Medical) (Sem-3)

OPTICS

Subject Code : BSNM-303-18

M.Code : 76902

Date of Examination : 06-06-2023

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) When two sources of light are said to be coherent?

b) Define path difference.

c) What is thin film?

d) Define optic axis.

e) Define circularly polarized light.

f) What is Rayleigh criterion?

g) Write different types of diffraction.

h) Define laser.

i) What is holography?

j) What is an optical resonator?

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SECTION-B

2. Describe Young's double slit experiment.

3. How many principal orders are possible with a diffraction grating having 30000 lines an inch and using a source of light of wavelength 600nm? In addition, explain, what will happen if a transparency is made equal to an opacity?

4. What is double refraction? What type of material can experience it?

5. Discuss Ruby laser with energy level diagram

6. Discuss the resolving power of a telescope.

SECTION-C

7. Discuss possible transitions between two energy levels of an atomic system and deduce the expressions for Einstein Coefficients.

8. What is Brewster's law? Prove that every reflecting surface has a unique index.

9. With a suitable diagram, explain principal and working of Michelson interferometer. How can we find thickness of film using Michelson interferometer?

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Total No. of Questions : 09 Total No. of Pages : 02

B.Sc. (Non Medical) (Sem.–3)

PHYSICAL CHEMISTRY-II

Subject Code : BSNM-302-18

M.Code : 76901

Date of Examination: 25-05-2023

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 intensive properties?

b) What is the phase?

c) Explain the heat capacity at constant volume.

d) What are state functions?

e) What is law of mass action?

f) What is the degree of freedom?

g) Define the entropy.

h) What is eutectic point?

i) Explain the bond dissociation energy.

j) What is the residual entropy?

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SECTION–B

2. Define and derive the second law of thermodynamics.

3. Explain the Henry Law's.

4. Explain the Gibbs phase rule.

5. What is the Nernst heat theorem?

6. Explain the relationship between K_p and K_c.

SECTION–C

7. Derive the relationship between C_p and C_v.

8. Derive the Carnot cycle and its efficiency.

9. Explain the phase diagram of water system.

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B.Sc. (Non-Medical) (Sem.–3)

ORGANIC CHEMISTRY-II

Subject Code : BSNM-301-18

M.Code : 76900

Date of Examination : 22-05-23

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. Compare the reactivity of chlorobenzene and benzyl chloride.

   b. Why is the formation of benzyne intermediate necessary during the conversion of chlorobenzene into aniline with sodium amide in liquid ammonia?

   c. What is the role of σ and π complexes?

   d. Cyclobutadiene is a cyclic compound and has alternate double and single bonds but it is not included among aromatic compounds. Explain.

   e. What happens when glycol is treated with HIO_4?

   f. Discuss any two methods for the synthesis of phenol.

   g. Why is phenoxide ion more resonance stabilized than phenol?

   h. How do you synthesize ketone using 1,3-dithiane?

   i. Draw the mechanism of Wittig reaction.

   j. $LiAlH_4$ is more reactive but less selective than $NaBH_4$. Explain with example.

SECTION-B

2. Nucleophilic aromatic substitution occurs by two mechanisms namely addition-elimination mechanism and elimination-addition mechanism. Explain with suitable example and mechanisms.

3. Discuss the mechanisms of :

   i) nitration

   ii) halogentation of aromatic electrophilic substitution reactions.

4. Write a short note on :

   i) Claisen rearrangement

   ii) Pinacol-pinacolone rearrangement.

5. Discuss the mechanism of :

   i) Perkin reaction

   ii) Mannich reaction.

6. How methyl group is activating the benzene ring? Explain the orientation of methyl group towards the aromatic electrophilic substitution reaction.

SECTION-C

7. i) Explain the synthesis and reactions of vicinal glycols.

   ii) Write a short note on halogenation of enolizable ketones.

8. Show the mechanism of following reactions :

   i) Benzoin condensation

   ii) Clemmensen reduction

   iii) Knoevenagel condensation.

9. i) Compare the mechanism of nucleophilic substitution reactions of alkyl halides.

   ii) How do acetals use as a protecting group? Explain.

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Total No. of Questions : 09

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B.Sc. (Non Medical) (Sem.–3)

ENGLISH-III

Subject Code : BSNM-307-18

M.Code : 76906

Date of Examination : 20-05-2023

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) Note making

   b) Gerunds

   c) Write two types of Participles with examples.

   d) Exchanging greetings

   e) Importance of writing skills

   f) Technical vocabulary

   g) Self introduction

   h) Telephone etiquettes

   i) Formal greeting

   j) Abstract writing.

SECTION-B

2. Guidelines to inquire on the phone.

3. Do's and don'ts when introducing people to others.

4. How to introduce oneself in a social setting?

5. What things need to be considered when taking leave?

6. How to deal with a wrong number?

SECTION-C

7. Discuss in detail, the summary and analysis of *'The Gift of the Magi'*.

8. What is the importance of writing abstracts and summaries? Cite examples.

9. State the message depicted in 'Stay Calm' to the readers.

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B.Sc (Non Medical) (Sem.–3)

THERMAL PHYSICS

Subject Code : BSNM-304-18

M.Code : 76903

Date of Examination : 18-05-2023

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 concept of reversible engine?

(b) Efficiency of Carnot's engine does not depend upon the properties of the working substance. Why?

(c) Entropy of universe always increases. Why?

(d) Why only four thermodynamical variables are defined.

(e) Define critical temperature of a gas.

(f) What is the probability of drawing a king from a pack of 52 cards?

(g) What is meant by the term thermodynamic probability of a microstate?

(h) What are the main points of difference between classical and quantum statistics?

(i) What are bosons?

(j) What is adiabatic demagnetization?

SECTION-B

2. State and prove Carnot's theorem for a reversible heat engine.

3. Derive Claussius Clapeyron's latent heat equation using thermodynamic relations.

4. Explain the terms Macrostate and Microstate. Illustrate by distributing four particles in two compartments.

5. Calculate the number of different arrangements of 8 indistinguishable particles in 10 cells of equal a priori probability considering that one cell contains only one particle.

6. Name the three kind of statistics. Explain the distinguishing features of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics.

SECTION-C

7. What is Joule-Thomson effect? Obtain an expression for change in temperature during Joule-Thomson effect. Give thermodynamical treatment to explain cooling and heating effect.

8. Discuss the distribution of 'n' distinguishable particles into 'k' compartments of unequal size each one of which is further subdivided into 'g' cells of equal a priori probability.

9. Treating the ideal gas as a system governed by classical statistics derive the Maxwell Boltzmann law of distribution of molecular energies.

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B.Sc. (Non Medical) (Sem-3)

ANALYSIS-I

Subject Code : BSNM-305-18

M.Code : 76904

Date of Examination: 27-05-2023

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 :**

a) State Cauchy's integral test.

b) Define conditionally convergent series.

c) State first mean value theorem.

d) Give an example of a Riemann integrable function having infinite number of points of discontinuity.

e) Compute $\Gamma\left(-\frac{3}{2}\right)$.

f) State relationship between Beta and Gamma function.

g) State Abel's test.

h) Prove symmetry of beta function.

i) Explain conditional convergence of improper integrals of second kind.

j) Prove that $\sum \frac{n}{n^2-2n}$ is divergent.

SECTION-B

2. Test the convergence of $\sum \frac{(n!)^2 x^{2n}}{(2n)!}$

3. Test the convergence of $\sum_{n=2}^{\infty} \frac{1}{[\log(\log n)]^n}$

4. Prove that every continuous function is integrable.

5. Show that the function $\int_0^{\infty} x^{n-1} e^{-x} dx$ is convergent if and only if $n > 0$.

6. Prove that $\int_0^1 x^{m-1}\left(1-x^2\right)^{n-1} dx = \frac{1}{2}\beta\left(\frac{1}{2}m, n\right)$

SECTION-C

7. a) If f is Reimann integrable function on [a, b], Show that the function F defined by $F(x) = \int_a^x f(t)\,dt \forall x \in [a,b]$ is differentiable from the right at each x_0 such that $a < x_0 < b$ for which f is continuous from the right.

b) Prove that the function f defined on [0, 4] by $f(x) = [x]$, where $[x]$ denotes the greatest integer not greater than x, is integrable on [0, 4] and $\int_0^4 f(x)\,dx = 6$.

8. Show that $\int_0^{\infty} \frac{\sin x}{\log x} dx$ conditionally covergent.

9. Prove that $\Gamma(n)\,\Gamma\left(n+\frac{1}{2}\right) = \frac{\sqrt{\pi}}{2^{2n-1}}\,\Gamma(2n), n > 0$.

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B.Sc. (Non-Medical) (Sem–4)

ANALYSIS-II

Subject Code : BSNM-405-18

M.Code : 77683

Date of Examination : 13-06-2023

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 the series $\sum_{n=1}^{\infty} \frac{\sin nx}{n^p}$ is uniformly convergent for all real values of x if $p > 1$.

b) Show that the sequence $\{f_n\}$ where $fn(x) = \frac{x^n}{1+x^n}$ converges uniformly on $[0, \frac{1}{2}]$.

c) State Weierstrass's M test.

d) Show that the sequence $\{f_n\}$ where $f_n(x) = nx(1-x)^n$ converges point wise but not uniformly on [0,1].

e) Find the curl of vector field $v = \{x^2y^2 - z^3\}i + 2xyz\,j + e^{xyz}\,k$.

f) Prove that curl(curl v) = $\nabla(\nabla.v) - \nabla^2 v$, where f is scalar function.

g) Compute grad f where $f(x,y,z) = x + y - 2z^2$. Also verify $curl\{\text{grad} f\} = 0$.

h) If $\vec{F} = 3xy\hat{i} - y^2\hat{j}$, evaluate $\int_C \vec{F}.\vec{dr}$ where C is curve in xy plane $y = 2x^2$ from (0,0) to (1,2).

i) Obtain the half range sine series for $f(x) = e^x$ in $0 < x < 1$.

j) What do you mean by Fourier series?

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SECTION-B

2. Show that the sequence $\{f_n\}$ where $f_n(x) = x^n$ is uniformly convergent on [0,k], k<1 and only point wise convergent on [0,1].

3. Show that the series $\sum_{n=1}^{\infty} \frac{1}{n^3 + n^4 x^2}$, is uniformly convergent for all x and it can be differentiated term by term.

4. Test for uniform convergence and continuity of sum function of series $\sum_{n=1}^{\infty} xe^{-nx}$ on [0/1].

5. Find fourier series expansion of $f(x) = |\sin x|$ on $(-\pi,\pi)$.

6. State and prove Gauss divergence theorem.

SECTION-C

7. Use Abel's test to show that the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}|x|^n$ is uniformly convergent on [–1,1].

8. Evaluate $\oint_C xydx + xy^2dy$ Stoke's theorem, where C is the square in xy-plane with vertices (1,0), (–1,0),(0,1),(0,–1).

9. Find the Fourier series to represent the function f(x) given by

$$f(x) = \begin{cases} x, & 0 \le x \le \pi \\ 2\pi - x, & \pi \le x \le 2\pi \end{cases}$$ and deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8}$.

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Total No. of Questions : 09

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B.Sc. (Non Medical) (Sem–4)

WAVE VIBRATIONS

Subject Code : BSNM-403-18

M.Code : 77681

Date of Examination :09-06-2023

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) *All periodic motions are harmonic*. Is the reverse true?

b) Define quality factor of forced oscillator.

c) What do you mean by steady state behaviour of forced oscillator?

d) What are units the of mechanical reactance?

e) What is phase velocity?

f) What are stationary waves?

g) The sinusoidal wave is $y = 0.1 \sin 2\pi\ (0.01\ x\text{-}100\ t)$ where x, y is in meter and t is in second. Calculate the speed of the wave.

h) What are the applications of impedance matching?

i) Write condition for critical damping in a damped electrical oscillator.

j) Define absorption band width.

SECTION-B

2. Define relaxation time and obtain the expression for it.

3. Derive the differential equation and its solution for damped harmonic mechanical oscillator.

4. Find the frequency of oscillations for a circuit having an inductor, capacitor and resister of values 0.2 H, 1 μ.F and 800 ohms connected in series.

5. What do you mean by characteristic impedance of the string? Show that it is given by product of mass per unit length of string and wave velocity.

6. Discuss the oscillations of two pendulums coupled through a spring of stiffness S. Write the equations of motion of the system in different cases.

SECTION-C

7. Show that the average power supplied by the external periodic force is equal to the average power dissipated by the forced oscillator against damping force.

8. What is compound pendulum? Derive an expression for its time period. Show that centre of suspension and centre of oscillation are interchangeable in compound pendulum.

9. Define transverse waves. Derive the wave equation for such waves in a string.

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Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (Non Medical) (Sem-4)

LINEAR ALGEBRA

Subject Code : BSNM-406-18

M.Code : 77684

Date of Examination : 07-06-2023

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) Explain linearly dependent vectors with example.

b) What is mean by vector space? Give two examples.

c) What is mean by basis of a vector space?

d) Examine whether or not (1,1, 0), (1, 0, 3), (2, -1,1) is basis of R^3.

e) Construct subspaces of $R^4(R)$ such that; dim $W_1 = 2$, dim $W_2 = 2$, $\dim(W_1 \cap W_2) = 1$.

f) What is meant by Linear Operator?

g) Show that there is no non-singular linear transformation from R^5 to R^4.

h) Explain Isomorphic spaces with two examples.

i) Write down Rank nullity theorem.

j) Explain Invariant subspace with two examples.

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SECTION-B

2. Reduce the matrix $A = \begin{bmatrix} 1 & -1 & -2 & -3 \\ 4 & 1 & 1 & 2 \\ 0 & 3 & 1 & 4 \\ 0 & 1 & 0 & 2 \end{bmatrix}$ to the normal form and find the rank.

3. Prove that characteristic roots of a unitary matrix are of unit modulus.

4. Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 3 & -7 \\ 4 & 5 \end{bmatrix}$.

5. Examine whether the following set of vectors in $V_3(R)$ forms a basis or not;

a) (1, 0, 0), (0,1, 0), (1,1, 0), (1,1,1)

b) (1, 1, 1), (1, 2, 3), (–1, 0, 1)

6. $T_1 : R_3 \to R_2$ and $T_2 : R^3 \to R^2$ be defined by :

$T_1(x,y,z) = (3x + y,z)$ and $T_2(x,y,z) = (-y + z, x - y)$

Compute $T_1 + T_2$, $4T_1$, $3T_1$-T_2, T_1T_2, $T_2\,T_1$ if possible.

SECTION-C

7. Test for consistency

$2x + 3y + z = 9$

$x + 2y + 3z = 6$

$3x + y + 2z = 8$

If consistent, solve for x, y, z by finding the inverse of the coefficient matrix.

8. Determine eigen values and the corresponding eigen-vectors for the matrix

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 1 & 2 & -1 \\ -1 & 1 & 4 \end{bmatrix}$$

9. Prove that any two basis of a finite dimensional vector space have same number of elements.

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

PUNJAB HISTORY & CULTURE-IV

Subject Code : BSNM-408-18B

M.Code : 77995

Date of Examination : 01-06-2023

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. **Answer Briefly :**

a) Discuss Pre-Khalsa period.

b) Conquest of Sirhind by Banda Singh Bahadur.

c) Who was Henry Lawrence.

d) Coins of Banda Singh Bahadur.

e) Discuss fighting skills of the Sikhs.

f) Who was Bhag Singh.

g) Examine Religious policy of Ranjit Singh.

h) What do you know about Wood's Act?

i) Foundation of Arya Samaj.

j) Highlight the contribution of Dr. Saifuddin Kitchlu.

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SECTION-B

2. Estimate works and achievements of Banda Singh Bahadur.

3. Study the origin and meaning of word Misl. How for the misls organized.

4. Discuss nature of administration in Punjab under the Board of Administration.

5. Write a note on the achievements of Chief Khalsa Diwan.

6. Throw light on the main events of Freedom movement in Punjab from 1919-1947.

SECTION-C

7. Describe the Military achievements of Banda Singh Bahadur.

8. Examine causes of the First Anglo-Sikh War.

9. Throw light on Peasant movement in Punjab with special reference to Pagri Sambhal Jatta movement.

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Total No. of Pages : 02

B.Sc. (Non-Medical) (Sem.–4)

ORGANIC CHEMISTRY-III

Subject Code : BSNM402-18

M.Code : 77680

Date of Examination : 29-05-2023

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 esters?

b) What do you mean by autoxidation?

c) What are Phase transfer catalyst?

d) What do you mean by heterocyclic compounds?

e) Write two method of formation of furan.

f) Explain one method of formation of organozinc compounds.

g) Write one reaction of reduction of carboxylic acids.

h) How acid chlorides and acid amides 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 general method of formation of pyrrole.

4. Explain the basicity of pyridine, piperdine, and pyrrole.

5. Write a note on the thiophene.

6. Explain the HVZ reaction.

SECTION-C

7. Explain the mechanism of decarboxylation.

8. Explain the mechanism of esterification.

9. Explain the Ziesel's method.

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Total No. of Pages : 02

Total No. of Questions : 09

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

PUNJAB HISTORY & CULTURE-IV

Subject Code : BSNM-408-18B

M.Code : 77995

Date of Examination : 01-06-2023

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. **Answer Briefly :**

a) Discuss Pre-Khalsa period.

b) Conquest of Sirhind by Banda Singh Bahadur.

c) Who was Henry Lawrence.

d) Coins of Banda Singh Bahadur.

e) Discuss fighting skills of the Sikhs.

f) Who was Bhag Singh.

g) Examine Religious policy of Ranjit Singh.

h) What do you know about Wood's Act?

i) Foundation of Arya Samaj.

j) Highlight the contribution of Dr. Saifuddin Kitchlu.

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SECTION-B

2. Estimate works and achievements of Banda Singh Bahadur.

3. Study the origin and meaning of word Misl. How for the misls organized.

4. Discuss nature of administration in Punjab under the Board of Administration.

5. Write a note on the achievements of Chief Khalsa Diwan.

6. Throw light on the main events of Freedom movement in Punjab from 1919-1947.

SECTION-C

7. Describe the Military achievements of Banda Singh Bahadur.

8. Examine causes of the First Anglo-Sikh War.

9. Throw light on Peasant movement in Punjab with special reference to Pagri Sambhal Jatta movement.

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Total No. of Questions : 09

B.Sc. (Non-Medical) (Sem.–4)

ENGLISH-IV

Subject Code : BSNM407-18

M.Code : 77685

Date of Examination : 24-05-23

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. Spoken skills to seek clarification

   b. Analytical report

   c. Types of past tense

   d. Difference between active and passive voice

   e. Difference between prose and poetry

   f. Complex sentence

   g. Difference between affirmative and negative sentence

   h. Difference between Resume and CV

   i. Spoken skills while apologizing

   j. Spoken skills for making request

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SECTION-B

2. Write the meanings of following words and make sentences using these words: filthy, disgusting, faint, liar, concealed

3. **Change the active voice into passive voice:**

   a. Seeta is singing a song.

   b. They have cut all telephone wires.

   c. Do cats catch mice?

   d. They were making a noise.

   e. Had the boys eaten all the cakes?

4. Draft your resume for the post of Assistant Professor in a reputed college. Invent the necessary details.

5. **Transform the following sentences:**

   Change the adverb too:

   a. He is too honest to accept a bribe.

   b. The news is too good to be true.

   Change the degree of comparison:

   c. Mumbai is one of the biggest towns in India.

   d. Lead is heavier than any other metal.

   Change into assertive sentence:

   e. What a fool you are!

6. Discuss the spoken skills required in day-to-day conversation and while working at a professional place.

SECTION-C

7. Write a report on a survey done to analyze the reasons behind the drastic increase in number of students going to foreign countries for higher education. Invent the necessary details.

8. Write any 20 dialogues shared between a photographer and a customer.

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9. **Correct the errors in the use of tenses:**

a. The Mughals have won the battle of Panipat.

b. We had gone to the cinema last night.

c. I finished my work before he came to see me.

d. He will reach home before the sun will set.

e. He told me that she was ill for 6 days.

Change direct speech into indirect speech:

f. Afzal said, "This is the pen I like".

g. Bali said, "Here is the stick we have been looking for".

h. He said to me, "I can easily beat you in the long jump".

i. Rama said to me, "When will you return"?

j. He said to me, "Do you play football"?

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

ELECTRONICS

Subject Code : BSNM-404-18

M.Code : 77682

Date of Examination : 19-05-2023

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. Define diffusion current in a semiconductor.

   b. What is a p-n junction?

   c. Define the following for CE Amplifier (i) Current gain (ii) Voltage gain.

   d. Draw the symbol of n-channel and p-channel FET.

   e. Sketch the labeled Forward and reverse characteristics of PN Junction Diode.

   f. Draw the symbol of N-channel and P-channel enhancement type MOSFET.

   g. What do you understand about analog *vs.* digital oscilloscopes?

   h. Define modulation index of AM.

   i. Convert the hexadecimal number $(1CD.2A)_{16}$ to binary and decimal numbers

   j. Realize AND and OR gates using only NAND gates.

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SECTION-B

2. Explain how a process of avalanche break down occurs in a PN junction? How it is different from zener breakdown?

3. Draw the circuit diagram of full wave rectifier using center-tap connection and bridge connection. Explain the working of each. What is the PIV voltage in each case?

4. In a transistor circuit I_E=5mA, I_C=4.95mA and I_{CEO}=200μA. Calculate β_{dc} and leakage current I_{CBO}.

5. Draw the construction of p-channel FET & describe it's working.

6. Draw the circuit diagram of Hartley oscillator. Explain the function of each component?

SECTION-C

7. Draw and explain the working of R-C phase shift oscillator and also derive an expression for its frequency of oscillations.

8. a. Draw the circuit diagram of simple transistor amplifier in CE configuration. Write down the equation of a dc load line.

   b. Minimize the following expression using K-map.

   $F(P, Q, R, S) = \sum m(0, 1, 4, 5, 7, 8, 9, 12, 13, 15)$.

9. Write short notes on any two :

   a. MOSFET

   b. Photodiode

   c. Feedback amplifiers.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (Non Medical) (Sem.–4)

INORGANIC CHEMISTRY-III

Subject Code : BSNM401-18

M.Code : 77679

Date of Examination : 17-05-2023

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) Define nitrogen fixation.

c) Transition elements show variable valency. Explain.

d) Define coordination isomers.

e) What is the principle effect of dielectric constant?

f) Why are lanthanides called inner transition elements?

g) Explain the term oxidation number.

h) What is a redox reaction?

i) Why do actinides form oxygenated cations?

j) What is a porphyrin?

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SECTION-B

2. Discuss the factors in ligands that determine the stability of complex. Discuss the salient features of CFT.

3. What are hemoglobin and myoglobin? Explain the oxidation and oxygenation of Hb and Mb.

4. What do you understand by the term electrode potential? Describe the factors which govern the value of electrode potential.

5. Discuss the methods of preparation and stability of anomalous oxidation states of lanthanides.

6. What do you understand by solvent system concept? *"Liquid ammonia is better solvent than water"*. Explain.

SECTION-C

7. Name some important properties that determine the utility of liquid NH_3 as a solvent. Why does NH_3 readily form complex but NH^{4+} does not?

8. State some general rules to predict whether a reduction will occur or not. How do you write a cell?

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

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B.Sc. (Non-Medical) (Sem.–6)

DRUG ABUSE-II (MANAGEMENT AND PREVENTION)

Subject Code : BSNM-609-18

M.Code. : 79502

Date of Examination : 16-05-2023

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 drug abuse.

   b. What are the physical indications of drug abuse?

   c. What is the long-term effect of drugs?

   d. How a teacher can be a role model in the prevention of drugs?

   e. How drug abuse can be controlled?

   f. "*Education and awareness can be the reason for prevention from drug abuse*". Explain.

   g. What is drug addiction?

   h. How drug abuse is different from drug addiction?

   i. What is the objective of a schooling-based drug prevention program?

   j. What is the role of family supervision in drug prevention?

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SECTION-B

2. Short note on time-bound trials?

3. Why young children are more prone to drug addiction?

4. How the school can be an important agency for the prevention of drug abuse?

5. What are the ways of dealing with the withdrawal effects of drugs?

6. Write a note on campaigns against drug abuse and enforcement of laws.

SECTION-C

7. Discuss the role of legislation in the prevention of drug abuse.

8. Family can play a major role in preventing relapse of drug abuse. Comment.

9. Discuss the loopholes in NDPS act?

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Total No. of Questions : 09

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B.Sc. (Non-Medical) (Sem.–6)

ENGLISH-VI

Subject Code : BSNM-607-18

M.Code. : 79499

Date of Examination : 18-05-2023

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. Whose horoscope is Frank Lubey making at the beginning of the play?

   b. Quality of good report

   c. Body language for interviews

   d. Objectives of oral presentation

   e. Functions of communication at workplace

   f. Difference between active and passive voice.

Substitute the following with one word :

   g. An imaginary ideal society free of poverty and suffering.

   h. A room or building equipped for gymnastics & other physical exercise .

   i. A storehouse for threshed grain.

   j. A piece of enclosed land planted with fruit trees .

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SECTION-B

2. Write the meanings of following words and make sentences using these words: Considerate, inspiration, overwhelming, outstretched, overcome

3. Fill in the blanks with either past continuous or simple past form of the verbs given in brackets :

   a. When I _____ (enter) the class, the students _____ (draw) cartoon of the teacher on the blackboard.

   b. When I _____ (teach) in the class, some students _____ (make) a noise.

   c. When my mother _____(cook) food in the kitchen, some boys _____ (play) football in the street.

   d. When I _____ (water) the plants, some birds_____ (chirp).

   e. He _____ (watch) television, when I _____ (reach) home.

4. Discuss how a formal presentation can be made most effective?

5. Correct the following sentences :

   a. The woman which works here is from Japan.

   b. Every students like the teacher.

   c. Although it was raining, but we had the picnic.

   d. I enjoyed from the movie.

   e. Where I can find a bank?

6. What does Ann tell George about her leaving the Kellers?

SECTION-C

7. Write a report on a survey conducted to analyze the reasons why majority of the students want to go to foreign countries. Invent the necessary details.

8. Explain why Joe Keller upholds wealth in high regard. Do you think that his perspective of money good? Give reasons to justify your answer.

9. Describe all the Do's and Don'ts while appearing for an interview.

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Total No. of Questions : 09

Total No. of Pages : 02

B.Sc (Non-Medical) (Sem.–6)

PHYSICAL CHEMISTRY-IV

Subject Code : BSNM-602-18

M.Code : 79494

Date of Examination : 20-05-2023

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 black body?

   b) Explain zero point energy.

   c) Define Lattice energy.

   d) What are mille indices?

   e) Explain the term quantum yield.

   f) What is chemiluminescence?

   g) What is an operator?

   h) What is the significance of a normalized eigen function?

   i) What is the key feature of wave mechanics?

   j) What are lasers?

SECTION-B

2. A 0.005M aqueous solution of a certain substance absorbs 15% of the incident light in a Lambert - Beer law cell of path length 2cm. Calculate the concentration required for 90% absorption of the incident light.

3. An electron is confined to a potential wall (one dimentional) having width of 0.2nm. Determine the ground state energy for this electron.

4. Calculate the angles at which first, second and third order reflections are obtained from planes 500pm apart using X-rays of wavelength 100pm.

5. Explain the laws of photochemistry.

6. Give the postulates of quantum mechanics.

SECTION-C

7. Derive the Bragg equation for X-ray crystallography and what is superconductivity?

8. Explain the terms photosensitization and quenching. Discuss the mechanism of photosensitization and quenching taking suitable examples.

9. Derive Schrodinger equation for hydrogen like atoms and give its importance.

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B.Sc (Non-Medical) (Sem.–6)

MODERN ALGEBRA

Subject Code : BSNM605-18

M.Code : 79497

Date of Examination : 25-05-2023

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 group? Give one example.

b) What is meaning of cosets of subgroup?

c) Explain conjugate element in a group with example.

d) What is alternating group? Is A_7 a simple group or not?

e) Explain Homomorphism in a group with example.

f) What is Ring? Give two examples.

g) Explain Integral Domains with example.

h) What is prime ideal? Write all prime ideals of a field F.

i) State second isomorphism theorem for rings.

j) Write a note on Quotient rings.

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SECTION-B

2. Prove that the set of positive integers which are less than n and co-prime to n forms an abelian group under the operation of multiplication modulo n.

3. Prove that there is one-one correspondence between the set of left cosets of H is G and the set of right cosets of H in G. Where H is subgroup of group G?

4. Prove that a group G is abelian if and only if the mapping $f: G \to G$ defined by $f(x) = x^{-1}$ is an automorphism.

5. Prove that IJ is an ideal of Ring R. Moreover $IJ \subseteq I \cap J$. Where I and J be any two ideals of a ring R.

6. Prove that the relation of isomorphism in the set of all rings is an equivalence relation.

SECTION-C

7. Prove that $G = a_1^{-1}H \cup a_2^{-1}H \cup a_i^{-1}H$ be a decomposition of G into left cosets of H. where H is subgroup of group G and $G = Ha_1 \cup Ha_2 \cup ... \cup Ha_i$ be a decomposition of G into disjoint right cosets of H.

8. State and prove First Theorem of Isomorphism for Group G.

9. a) State and prove Fundamental theorem of Ring Homomorphism.

   b) Prove that a commutative ring R with identity is simple if and only if R is field.

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Total No. of Questions : 09

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B.Sc (Non-Medical) (Sem.–6)

STATICS AND DYNAMICS

Subject Code : BSNM-606-18

M.Code : 79498

Date of Examination : 27-05-2023

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 concurrent forces.

b) State parallelogram law of forces.

c) What are components Of a force in a given direction?

d) State Newton's laws of motion.

e) Define acceleration of a particle.

f) What is kinetic energy?

g) Define power.

h) What are conservative forces? Give example.

i) What is constrained motion?

j) What happens to the motion of a particle under constant acceleration?

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SECTION-B

2. Derive $\lambda - \mu$ theorem.

3. Derive an expression for acceleration of falling bodies.

4. Derive an expression for work done against gravity.

5. Explain the equilibrium of three forces acting at a point.

6. Discuss the composition and resolution of concurrent forces using parallelogram law of forces.

SECTION-C

7. Derive an expression for resultant of any number of coplanar concurrent forces using triangular law of forces.

8. Derive an equation of motion of two particles executing Simple Harmonic motion.

9. Discuss projectile motion in detail.

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B.Sc. (Non-Medical) (Sem–6)

PUNJAB HISTORY & CULTURE-VI

Subject Code : BSNM-608B-18

M.Code : 79501

Date of Examination : 01-06-2023

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) Who was Evan Jenkins?

   b) Formation of Himachal Pradesh.

   c) Founder of Green Revolution.

   d) Discuss the main reasons for the Agrarian crisis in Punjab.

   e) Examine the politics of Akali Dal after partition.

   f) Throw light on the changes in the demography of Punjab.

   g) How militancy ended in Punjab.

   h) Which country has the most Punjabis?

   i) Which is the major factor for economic growth in Punjab?

   j) Discuss cultural changes in Punjab.

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SECTION-B

2. Examine the main causes of the partition of Punjab.

3. What are the major problems faced by the agriculture sector in Punjab after Green Revolution?

4. In the light of Constitution law, discuss center-state relations.

5. Throw light on the changing cultural values of Punjab in light of Globalization.

6. Discuss in brief the major problems of Punjabi society in recent times.

SECTION-C

7. Discuss in detail the territorial reorganization of Punjab after Partition.

8. Throw light on the emergence of militancy in Punjab. What were its main consequences?

9. Examine various stages of migration of Punjabis to foreign countries.

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Total No. of Questions : 09

B.Sc. (Non-Medical) (Sem.–6)

NUCLEAR AND PARTICLE PHYSICS

Subject Code : BSNM604-18

M.Code : 79496

Date of Examination : 03-06-23

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 binding energy?

b) What are nuclear magic numbers?

c) Define nuclear magnetic moment.

d) Write decay mode for positron emission in β— decay.

e) What is nuclear Q-value?

f) Briefly discuss about compound reactions.

g) What is Compton scattering?

h) What is Baryon number?

i) Briefly explain Thompson scattering.

j) What are cosmic rays?

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SECTION-B

2. Discuss in detail the basic properties of a nucleus.

3. Explain the liquid drop model of nucleus.

4. Describe the theory of β— decay.

5. Give a detailed description of working of GM counter.

6. Determine how the mass and life time is measured for pions and muons.

SECTION-C

7. a) Explain the shell model of nucleus.

b) Explain the importance of Geiger Nuttal law.

8 a) Write a detailed note on gamma decay.

b) Describe the working of scintillation detector.

9. a) Explain how gamma ray interact with matter

b) Discuss the features of quark model.

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B.Sc. (Non-Medical) (Sem.–6)

ORGANIC CHEMISTRY-IV

Subject Code :BSNM601-18

M.Code : 79493

Date of Examination : 06-06-2023

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 chromophore.

b) What do you mean by coupling constant?

c) What is the principle of IR spectroscopy?

d) What do you mean by molar absorptivity?

e) What is polymerization?

f) What is the Ziegler-Natta catalyst?

g) How many PMR peaks are in ethanol?

h) What is the monomer of polyester?

i) Explain the Lambert Beer's Law.

j) What do you mean by monochromatic light?

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SECTION-B

2. Explain the transitions in UV-visible spectroscopy.

3. Explain the Hook's Law in IR spectroscopy.

4. Explain the applications of IR spectroscopy.

5. Explain the polyurethane synthesis.

6. Explain the natural rubber.

SECTION-C

7. Explain the shielding and deshielding in PMR.

8. Explain the method of formation of thioethers.

9. Explain the applications of UV-Visible spectroscopy.

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