Sr. No: 9418(S)　　　　　　　　　　　　　　　　Roll No_____

B. SC. (NON MEDICAL) – 2ND SEMESTER EXAMINATIONS. OCTOBER - 2017

[SUB: - SOLID GEOMETRY; PAPER CODE: 09010203]

Time: 3 Hrs.　　　　　　　　　　　　　　　　**Max. Marks: 40**

Instructions:-
1. Write your Roll No. on the Question paper.
2. Candidates should ensure that they have been provided correct question paper. Complaints in this regard, if any, should be made within 15 minutes of the commencement of the exam. No complaint(s) will be entertained thereafter.
3. Attempt 5 Questions in all, Question No. 1 is compulsory. Attempt other 4 questions selecting at least one question from each unit.
4. All question carry equal marks.
5. Draw diagram wherever required.

Q1. Answer all the following question.　　　　　　　　　　　　　　(2X4=8)
   (a) Write the asymptotes of a conic $\frac{l}{r} = 1 + e \cos \theta$
   (b) Define section of a sphere by a plane.
   (c) Define enveloping cone.
   (d) Write the equation of the reciprocal cone.

UNIT-I

Q2. (a) Two coins have a common focus. Then prove that two of their common chords will pass through the point of intersection of their directrices.　　　　　(4)

   (b) A chord of rectangular hyperbola subtends a right angle at the focus. Find the loucs of the foot of perpendicular from this focus on the chord.　　　　(4)

OR

Q3. Let PSQ be a focal chord of the conic $\frac{l}{r} = 1 + e \cos \theta$. Then show that:
   (a) The tangents at P and Q intersect on the corresponding directirix,　　(4)

   (b) The angle between tangents at P and Q is $\arctan\left(\dfrac{2e \sin\alpha}{1-e^2}\right)$ where α is the angle

   between chord and the axis of the conic.　　　　　　　　　　　　(4)

UNIT-II

Q4. (a) A sphere is inscribed in a tetrahedron whose faces are $x = 0, y = 0, z = 0$ and $2x + 6y + 3z = 14$. Find the equation of the sphere. Also find its centre and radius.　(4)

   (b) Find the equation of the sphere passing through the points $(1,0,-1), (2,1,0), (1,1,-1)$ and $(1,1,1)$.　　　　　　　　　　　　　　　　　　　　(4)

OR

Q5. (a) A sphere of constant radius r passed through the origin O and cuts the axes in A, B and C Find the locus of the foot of the perpendicular from O to the plane ABC.　(4)

   (b) Two Spheres of constant radii r_1 and r_2 intersect orthogonally. Prove that the radius of the common circle is $\dfrac{r_1 r_2}{\sqrt{r_1^2 + r_2^2}}$　　　　　　　　　　　　　　　(4)

P.T.O.

UNIT-III

Q6. (a) Find the equation of the right circular cone with its vertex at the origin, along the z-axis and semi-vertical angle α. (4)

(b) Prove that the tangent plane at any point of a cone touches th cone along the generator through P. (4)

OR

Q7. (a) Find the equation of the right circular cylinder whose axis is $x = 2y = -z$ and radius 4. (4)

(b) Find the equation of the cylinder whose generators are parallel to the line

$\frac{x}{-1} = \frac{y}{2} = \frac{z}{3}$ and whose guiding curve is $x^2 + y^2 = 9,\ z = 1$ (4)

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Sr. No: 9420(S)   Roll No_____

B. SC. (NON MEDICAL) – 2ND SEMESTER EXAMINATION; OCTOBER - 2017

[SUB: - ELECTROMAGNETIC THEORY AND FIBER OPTICS]
[PAPER CODE: 09010205]

Time: 3 Hrs.   **Max. Marks: 40**

Instructions:-
1. Write your Roll No. on the Question paper.
2. Candidates should ensure that they have been provided correct question paper. Complaints in this regard, if any, should be made within 15 minutes of the commencement of the exam. No complaint(s) will be entertained thereafter.
3. Attempt 5 Questions in all, Question No. 1 is compulsory. Attempt other 4 questions selecting at least one question from each unit. All question carry equal marks.
4. Draw diagram wherever required.

Q1. Write short notes on: (4X2=8)
   (a) Fibre Optics
   (b) Optical Fibre.
   (c) Define Poynting vector
   (d) What do you mean by wave Impedance?

UNIT-I

Q2. What is the equation of continuity? Derive Maxwell's equations and give their physical interpretation.   (8)

Q3. Write Maxwell's equation in differential form. Discuss physical significance of each.   (8)

UNIT-II

Q4. Deduce the equation for the propagation of the plane electromagnetic wave in free space.   (8)

Q5. Obtain poynting theorem for the conservation of energy in an electromagnetic field and discuss the physical meaning of each term in the resulting equation.   (8)

UNIT-III

Q6. Give the principle of optical fibre. Explain the terms acceptance angle and numerical aperture.   (8)

Q7. Give the block diagram showing how optical fibre communication may be made?   (8)

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B. SC. (NON MEDICAL) – 2ND SEMESTER EXAMINATIONS; OCTOBER - 2017

[SUB: - INORGANIC CHEMISTRY-II; PAPER CODE: 9010207]

Time: 3 Hrs.   **Max. Marks: 40**

Instructions:-
1. Write your Roll No. on the Question paper.
2. Candidates should ensure that they have been provided correct question paper. Complaints in this regard, if any, should be made within 15 minutes of the commencement of the exam. No complaint(s) will be entertained thereafter.
3. Attempt 5 Questions in all, Question No. 1 is compulsory. Attempt other 4 questions selecting at least one question from each unit. All question carry equal marks.
4. Draw diagram wherever required.

Q1. Answer the following: (2X4=8)

   a) Write two conditions for formation of hydrogen bond.
   b) Draw the structure of Diborane.
   c) What are chalcogens?
   d) What is catenation?

UNIT-I

Q2. (a) Describe the various factors on which Vander Waals forces depend.   (2)

   (b) Explain band theory of metals.   (4)
   (c) Why does p-nitro phenol has higher boiling point than o-nitro phenol?   (2)

Q3. (a) Why do most of the noble gas compounds involve xenon, fluorine and oxygen?   (2)
   (b) Discuss the structures of XeF_4 and XeF_6.   (4)
   (c) What is the cause of diagonal relationship?   (2)

UNIT-II

Q4. (a) What is Borazine? Discuss its structure and chemical properties.   (6)
   (b) Describe the structure of Aluminium chloride.   (2)

Q5. (a) Why is CO_2 a gas but SiO_2 is a solid?   (2)
   (b) Give a brief account of silicates.   (4)
   (c) Write down the main properties of silicones.   (2)

UNIT-III

Q6. (a) Name any three oxides of nitrogen and draw their structures.   (3)
   (b) Discuss the structures of H_3PO_3 and H_3PO_4. Which one is a stronger reducing agent out of these two acids?   (5)

Q7. (a) Hydrogen peroxide is a strong oxidizing agent both in acid and alkaline medium. Explain giving examples.   (5)
   (b) Write a short note on interhalogen compounds.   (3)

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B. SC. (NON MEDICAL) – 2ND SEMESTER EXAMINATION; OCTOBER - 2017

[SUB: - PHYSICAL CHEMISTRY-II; PAPER CODE: 09010208]

Time: 3 Hrs.   Max. Marks: 40

Instructions:-
1. Write your Roll No. on the Question paper.
2. Candidates should ensure that they have been provided correct question paper. Complaints in this regard, if any, should be made within 15 minutes of the commencement of the exam. No complaint(s) will be entertained thereafter.
3. Attempt 5 Questions in all, Question No. 1 is compulsory. Attempt other 4 questions selecting at least one question from each unit. All question carry equal marks
4. Draw diagram wherever required.

Q1. Answer the following :-   (4X2=8)
  (a) Define specific conductance.
  (b) What is Nernst equation?
  (c) What is the unit of second order reaction?
  (d) What is the integrated rate expression for first order reaction?

UNIT-I

Q2. (a) Derive the integrated rate equation for second order reaction.   (5)
  (b) Show that time taken for 99.9% of the first order reaction to complete is ten times that of its half life.   (3)

Q3. Explain transition state theory? Give advantage of this theory over collision theory.   (8)

UNIT-II

Q4. (a) Discuss the elementary treatment of Debye- Huckle-Onsager equation.   (5)
  (b) The resistance of 0.01M solution of an electrolyte was found to be 210 ohm at 25^0C. Calculate the Molar conductance of the solution at 25^0C. The Cell constant is 0.88 cm^{-1}. (3)

Q5. (a) What do you understand by transport number? How it is calculated by Hittorfs method for $AgNO_3$ solution using silver electrodes.   (6)
  (b) Define Equivalent conductivity and mention its units.   (2)

UNIT-III

Q6. (a) Discuss how molar ionic conductance is affected by the viscosity, temperature and pressure.   (5)
  (b) What are buffers define acidic and basic buffers with examples.   (3)

Q7. (a) What will be the pH value of a solution obtained by mixing 5g of acetic acid and 7.5 g of sodium Acetate and making the volume to 500 mL $K_{CH3COOH}$ = 1.8 x 10^{-5} at 25^0C. (5)
  (b) Discuss the conductometric titration curve of CH_3COOH with NH_4OH.   (3)

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