

Course Code: MPH 2201

O P JINDAL UNIVERSITY

Mid Semester Examination, April-2023

M.Sc. (Physics) 4th Semester

DEPARTMENT OF PHYSICS

NUCLEAR AND PARTICLE PHYSICS [03PG011]

Time: 2 Hrs.

Max. Marks: 50



Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [04 x 05 marks = 20 marks]

| | | | | | |
|---|----|---|---|-----|----|
| 1 | a. | Describe Yukawa theory of nuclear forces. Discuss how the interaction energy between p-p or p-n is calculated. | 4 | CO1 | K2 |
| | b. | What is threshold energy? Write down the formula of threshold energy. At what angle will threshold energy be maximum? | 4 | CO2 | K1 |
| | c. | Discuss why nuclear binding energy is higher than atomic binding energy. | 4 | CO1 | K2 |
| | d. | What does the X in ${}^{14}_7N(X, p){}^{17}_8O$ represent? Derive an expression of nuclear reaction cross section. | 4 | CO2 | K2 |
| | e. | Discuss that nuclear forces are saturated and non-central. What do you mean by isospin and parity of nucleus. | 4 | CO1 | K2 |

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

| | | | | | |
|---|----|--|----|-----|----|
| 2 | a. | Explain the terms: mass defect and binding energy of the nucleus. Give the methods of calculation of binding energy for a nucleus. Also, give main features of binding energy per nucleon versus mass number graph. | 10 | CO1 | K3 |
| | b. | Consider the bound state deuterium nucleus. Determine its ground state energy using quantum mechanical model. | 10 | CO1 | K3 |
| | c. | Prove that the threshold energy of a nuclear reaction $(E_1)_{th} = (M_1+M_2)/M_2$ where, M_1 is mass of incident particle and M_2 is mass of the target nucleus. | 10 | CO2 | K3 |
| | d. | If 3H is bombarded with 2.5 MeV protons, what are the energies of the neutrons produced at 60° . Given mass of ${}^1H = 1.00782503$ amu, mass of $n = 1.008664915$ amu, mass of ${}^3H = 3.01602932$ amu. | 10 | CO2 | K3 |
| | e. | Obtain the threshold energy for reaction ${}^{27}_{13}Al(\alpha, p){}^{31}_{15}P$ Given: Mass of ${}^{27}_{13}Al = 25.986892$ amu, Mass of $\alpha = 4.002603$ amu, mass of $p = 1.007825$ amu, mass of ${}^{31}_{15}P = 30.973765$ amu | 10 | CO2 | K3 |

UNIT 1: THE HISTORY OF THE UNITED STATES

1. The first part of the unit covers the early years of the nation.

2. The second part of the unit covers the period of westward expansion.

3. The third part of the unit covers the Civil War and Reconstruction.

4. The fourth part of the unit covers the Gilded Age and Progressive Era.

5. The fifth part of the unit covers the early 20th century and the New Deal.

1. The first part of the unit covers the early years of the nation.

UNIT 2: THE AMERICAN WEST

1. The first part of the unit covers the early years of the westward expansion.

2. The second part of the unit covers the period of the gold rush.

3. The third part of the unit covers the period of the cattle drive.

4. The fourth part of the unit covers the period of the frontier.

5. The fifth part of the unit covers the period of the settlement.

1. The first part of the unit covers the early years of the westward expansion.

2. The second part of the unit covers the period of the gold rush.

3. The third part of the unit covers the period of the cattle drive.

4. The fourth part of the unit covers the period of the frontier.

5. The fifth part of the unit covers the period of the settlement.

UNIT 3: THE CIVIL WAR AND RECONSTRUCTION

1. The first part of the unit covers the causes of the Civil War.

2. The second part of the unit covers the military strategy of the war.

3. The third part of the unit covers the Reconstruction period.

4. The fourth part of the unit covers the Reconstruction period.

5. The fifth part of the unit covers the Reconstruction period.

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4. The fourth part of the unit covers the Reconstruction period.

5. The fifth part of the unit covers the Reconstruction period.

UNIT 4: THE GILDED AGE AND PROGRESSIVE ERA

1. The first part of the unit covers the Gilded Age.

2. The second part of the unit covers the Progressive Era.

3. The third part of the unit covers the Progressive Era.

4. The fourth part of the unit covers the Progressive Era.

5. The fifth part of the unit covers the Progressive Era.

1. The first part of the unit covers the Gilded Age.

2. The second part of the unit covers the Progressive Era.

3. The third part of the unit covers the Progressive Era.

4. The fourth part of the unit covers the Progressive Era.

5. The fifth part of the unit covers the Progressive Era.

UNIT 5: THE EARLY 20TH CENTURY AND THE NEW DEAL

1. The first part of the unit covers the early 20th century.

2. The second part of the unit covers the New Deal.

3. The third part of the unit covers the New Deal.

4. The fourth part of the unit covers the New Deal.

5. The fifth part of the unit covers the New Deal.

1. The first part of the unit covers the early 20th century.

2. The second part of the unit covers the New Deal.

3. The third part of the unit covers the New Deal.

4. The fourth part of the unit covers the New Deal.

5. The fifth part of the unit covers the New Deal.

Course Code: 03PG011

O P JINDAL UNIVERSITY**Mid Semester Examination, April-2023****M.Sc. 4th Semester****PHYSICS****COMMUNICATION ELECTRONICS-II [MPH2204]****Time: 2 Hrs.****Max. Marks: 50**UNIVERSITY OF SRI LANKA
50th ANNIVERSARY

Note:

M CO KL**Unit-I (20 marks)**

Answer any 4 questions [05 x 04 marks=20 marks]

| | | | | | |
|---|----|---|---|---|---|
| 1 | a. | What do you mean by pulse modulation? Also write its four advantages. | 4 | 1 | 1 |
| | b. | Explain pulse position modulation. Focus on its advantage and disadvantage over other modulation system. | 4 | 1 | 2 |
| | c. | What is the method, to calculate sampling frequency of a band pass signal? Explain with giving appropriate example. | 4 | 1 | 2 |
| | d. | What do you understand by Delta modulation. | 4 | 2 | 1 |
| | e. | Explain Deferential pulse code modulation (DPCM). | 4 | 2 | 1 |

Unit-II (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

| | | | | | |
|---|----|---|----|---|---|
| 2 | a. | How a continues time signal convert to a discrete signal by using sampling technique. | 10 | 1 | 3 |
| | b. | What do you understand by pulse code modulation? Give its advantage and disadvantage. | 10 | 1 | 3 |
| | c. | What is natural sampling explain. | 10 | 1 | 3 |
| | d. | What do you mean by Phase shift keying (PSK). | 10 | 2 | 3 |
| | e. | What do you mean by Phase shift keying (FSK). | 10 | 2 | 3 |

Course Code: B20CSOS02

O P JINDAL UNIVERSITY
Mid-Semester Examination, April-2023
M.Sc. 4th Semester



LASER PHYSICS AND APPLICATIONS

[SOS-M-PH2205]

Time: 2 Hrs.

Max. Marks: 50

Note:

| M | CO | K | L |
|---|----|---|---|
|---|----|---|---|

Section A (10 marks)

All Questions are compulsory [05 x 02 marks=10 marks]

| | | | | | |
|---|----|--|----|------|----|
| 1 | a. | Name some properties, which make laser light different from ordinary light. | 02 | CO-1 | K1 |
| | b. | What is population inversion? How is it achieved? | 02 | CO-1 | K1 |
| | c. | Name three methods of pumping a Laser. | 02 | CO-1 | K1 |
| | d. | Explain the term Spatial and Temporal coherence. | 02 | CO-1 | K1 |
| | e. | The output power of a given laser is 1mW and the emitted wavelength is 630nm. Calculate the number of photons emitted per second. If the area of the laser beam is 10^{-6}m^2 , then find intensity of laser beam. | 02 | CO-1 | K2 |

Section B (16 marks)

Answer any 4 questions [04 x 04 marks=16 marks]

| | | | | | |
|---|----|---|----|------|----|
| 2 | a. | Derive the relationship between various Einstein's coefficients. What are the necessary conditions for the laser action to take place? | 04 | CO-1 | K2 |
| | b. | Define the Laser. Also, explain the Principles and conditions of laser action. | 04 | CO-1 | K1 |
| | c. | A laser beam can be focused on an area equal to the square of its wavelength λ^2 . For a He-Ne laser $\lambda = 6328 \text{\AA}$. If the laser radiates energy at the rate of 1mW, find out the intensity of the focused beam. | 04 | CO-1 | K1 |
| | d. | What is resonator? Explain the role of feedback in a laser cavity. | 04 | CO-2 | K1 |
| | e. | Explain the working, construction, and energy level diagram for Semiconductor Laser. | 04 | CO-3 | K1 |

Section C (24 marks)

Answer any 3 questions [03 x 08 marks=24 marks]

| | | | | | |
|---|----|--|----|------|----|
| 3 | a. | Explain the Construction and Operation of Solid State Laser. | 08 | CO-3 | K1 |
| | b. | What is the Pumping process? Also define three- level, and four- level laser pumping. | 08 | CO-1 | K1 |
| | c. | Briefly discuss the construction and work in helium-neon laser with the energy level diagram. | 08 | CO-3 | K1 |
| | d. | What do you mean by the terms stimulated absorption, spontaneous emission, and stimulated emission. | 08 | CO-1 | K1 |
| | e. | (i) Find the momentum and energy of a photon of 6328\AA wavelength of laser beam. (ii) If the wavelength of sodium line 5890\AA and coherent length 2.5cm. Calculate coherent time , half width of spectral line and quality of spectral line | 08 | CO-1 | K2 |

03/04/23
03

Course Code: MCH 2201

O P JINDAL UNIVERSITY
Mid Semester Examination, April-2023
M.Sc. 4th Semester



CHEMISTRY
ENVIRONMENTAL CHEMISTRY [03PG012]

Time: 2 Hrs.

Max. Marks: 50

Note: Attempt both sections

| M | CO | KL |
|---|----|----|
|---|----|----|

Section A (20 marks)

Answer any 4 questions [05 x 04 marks=20 marks]

| | | | | | |
|---|----|---|---|---|---|
| 1 | a. | Define Atmosphere. Discuss important roles and services provided by it. | 5 | 1 | 2 |
| | b. | Write a note on Earth's Energy Balance. | 5 | 1 | 2 |
| | c. | Define Hydrosphere. Compare the composition & properties of ground and surface water. | 5 | 3 | 2 |
| | d. | Classify water pollutants and briefly discuss their ill effects. | 5 | 2 | 2 |
| | e. | Differentiate between BOD and COD, as used for accessing the quality of water. | 5 | 2 | 3 |

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

| | | | | | |
|---|----|---|----|---|---|
| 2 | a. | Draw the Temperature profile of the Atmosphere. Discuss the composition and salient feature of its segments. | 10 | 1 | 2 |
| | b. | What is temperature Inversion? Discuss the chemical and photochemical reactions that results in the formation of Photochemical Products. Mention some of their harmful effects. | 10 | 3 | 3 |
| | c. | Discuss the various physico-chemical processes involved during the cycling of the following elements between various parts of the Earth. a. Nitrogen b. Sulphur | 10 | 3 | 3 |
| | d. | Discuss how Dissolved oxygen is used as an important parameter for analyzing the quality of water. Explain Winkler method for its determination. | 10 | 2 | 3 |
| | e. | Briefly outline the various stages of waste water treatment. Discuss the steps involved during the treatment of wastewater by Activated Sludge process and write its merits and demerits. | 10 | 4 | 3 |

Course Code: MCH2203

O P JINDAL UNIVERSITY

Mid Semester Examination, April-2023

M.Sc. 4th Semester

M.Sc. Chemistry

Heterocyclic Chemistry [03PG012]

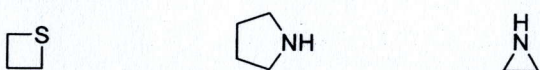
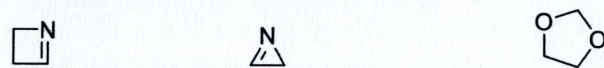
Time: 2 Hrs.

Max. Marks: 50

M CO KL

Section A (10 marks)

All Questions are compulsory [05 x 02 marks=10 marks]

| | | | | | |
|---|----|--|---|---|---|
| 1 | a. | Write the name of given heterocyclic compounds on the basis of replacement nomenclature:  | 2 | 1 | 1 |
| | b. | Draw the structure of following heterocyclic compounds: 1. Oxetane 2. Theipane | 2 | 1 | 1 |
| | c. | Write the name of given heterocyclic compounds on the basis of <i>Hantzsch-Widman</i> nomenclature:  | 2 | 1 | 1 |
| | d. | Write the criteria of aromaticity for a heterocyclic compound. | 2 | 1 | 1 |
| | e. | Explain delocalization energy. | 2 | 2 | 1 |
| Section B (16 marks) | | | | | |
| Answer any 4 questions [04 x 04 marks=16 marks] | | | | | |
| 2 | a. | What do you understand by ring inversion? | 4 | 2 | 2 |
| | b. | Classify the heterocyclic compounds on the basis of their structure with examples. | 4 | 1 | 2 |
| | c. | Explain the 1,3-Di-axial interaction in six membered heterocyclic compounds. | 4 | 2 | 2 |
| | d. | What do you understand by torsional strain. | 4 | 2 | 2 |
| | e. | Write the general chemical behaviour of heterocyclic compounds. | 4 | 1 | 1 |
| Section C (24 marks) | | | | | |
| Answer any 3 questions [03 x 08 marks=24 marks] | | | | | |
| 3 | a. | Write note on: 1. Empirical Resonance Energy 2. Dewar Resonance Energy | 8 | 2 | 2 |
| | b. | Explain the heteroaromatic reactivity and tautomerism in aromatic heterocycles. | 8 | 2 | 3 |
| | c. | Explain the principles of heterocyclic synthesis involving cyclization reactions and cycloaddition reactions. | 8 | 2 | 3 |
| | d. | Explain the systematic nomenclature (Hantzsch-Widman system) for monocyclic heterocycles. | 8 | 1 | 2 |
| | e. | Draw and explain the conformation of six-membered heterocycles with reference to molecular geometry and pyramidal inversion. | 8 | 2 | 3 |

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY

Washington, D. C.
February 1, 1914

Section 1 (1914)

For the purpose of this Act, the term "plant industry" shall mean the raising, propagating, or producing of any plant, tree, or shrub, or any part thereof, for the purpose of sale or distribution.

Section 2 (1914)

Whoever shall knowingly and unlawfully import into the United States any plant, tree, or shrub, or any part thereof, from any foreign country, shall be fined not more than \$1000, or imprisoned not more than one year, or both, at the discretion of the court.

Section 3 (1914)


Whoever shall knowingly and unlawfully export from the United States any plant, tree, or shrub, or any part thereof, to any foreign country, shall be fined not more than \$1000, or imprisoned not more than one year, or both, at the discretion of the court.

Section 4 (1914)

Whoever shall knowingly and unlawfully sell, offer for sale, or dispose of any plant, tree, or shrub, or any part thereof, which has been imported into the United States in violation of the provisions of this Act, shall be fined not more than \$1000, or imprisoned not more than one year, or both, at the discretion of the court.

Section 5 (1914)

Whoever shall knowingly and unlawfully transport, move, or convey any plant, tree, or shrub, or any part thereof, which has been imported into the United States in violation of the provisions of this Act, shall be fined not more than \$1000, or imprisoned not more than one year, or both, at the discretion of the court.

| | | Course Code: MCH2222 | | | |
|---|----|---|----|----|---|
| O P JINDAL UNIVERSITY | | | | | |
| Mid Semester Examination, April-2023 | |  | | | |
| MSc 4 th Semester | | | | | |
| MSc .Chemistry | | | | | |
| Chemistry of Natural Products [03PG012] | | | | | |
| Time: 2 Hrs. | | Max. Marks: 50 | | | |
| Note: | | | | | |
| | | M | CO | KL | |
| Section A (20 marks) | | | | | |
| Answer any 4 questions [05 x 04 marks=20 marks] | | | | | |
| 1 | a. | What do you mean by isoprene rule for terpenes? Explain. | 4 | 1 | 1 |
| | b. | Elucidate structure of menthol | 4 | 4 | 2 |
| | c. | How will you convert: 3 di-bromo -3-methyl butane into citral? | 4 | 2 | 2 |
| | d. | How will you convert. (i) Limonene to corvoxime. (ii) L-terpineol to limonene. | 4 | 2 | 2 |
| | e. | Define carotenes? Write its method of structure determination | 4 | 4 | 2 |
| Section B (30 marks) | | | | | |
| Answer any 3 questions [03 x 10 marks=30 marks] | | | | | |
| 2 | a. | What are terpenoids? How are they classified? How are these extracted? Write a short note on their chemical nature. | 10 | 1 | 1 |
| | b. | Discuss the constitution, properties and uses of menthol as limonene | 10 | 3 | 3 |
| | c. | Give general method of structure elucidation of terpenoids? | 10 | 4 | 1 |
| | d. | What class of carotenes are termed as Xanthophylls? Explain any two xanthophylls. | 10 | 1 | 1 |

O P JINDAL UNIVERSITY

Mid Semester Examination, April-2023

MSc 4th Semester

MSc (Math)

Artificial Intelligence and Neural Network [MMA2201]

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (10 marks)

All Questions are compulsory [05 x 02 marks=10 marks]

| | | | | | |
|---|----|--|---|---|---|
| 1 | a. | Define artificial intelligence | 2 | 1 | 1 |
| | b. | Explain the concept of State Space search. | 2 | 1 | 1 |
| | c. | Define a Production system in artificial intelligence. | 2 | 1 | 1 |
| | d. | Explain the significance of knowledge representation in artificial intelligence. | 2 | 2 | 1 |
| | e. | Outline the levels of representation in knowledge representation. | 2 | 2 | 1 |

Section B (16 marks)

Answer any 4 questions [04 x 04 marks=16 marks]

| | | | | | |
|---|----|---|---|---|---|
| 2 | a. | Define a Game Tree and its significance in artificial intelligence. | 4 | 1 | 2 |
| | b. | Identify different types of problem spaces in artificial intelligence. | 4 | 1 | 2 |
| | c. | Define Hill climbing algorithm in artificial intelligence | 4 | 1 | 2 |
| | d. | What is knowledge representation in artificial intelligence, and what are its different levels of representation? | 4 | 2 | 2 |
| | e. | Can you explain Formal logic, and how is it used in knowledge representation in artificial intelligence? | 4 | 2 | 2 |

Section C (24 marks)

Answer any 3 questions [03 x 08 marks=24 marks]

| | | | | | |
|---|----|--|---|---|---|
| 3 | a. | Discuss the Breadth first Search technique in artificial intelligence and provide examples of its potential applications. | 8 | 1 | 3 |
| | b. | Explain how Best first functions as a heuristic search technique in artificial intelligence problem-solving and discuss its strengths and limitations. | 8 | 1 | 3 |
| | c. | Describe the functioning of the Min Max algorithm in artificial intelligence, along with its pros and cons. | 8 | 1 | 3 |
| | d. | How does an Inference Engine work in artificial intelligence, and what are some of its key features and capabilities? | 8 | 2 | 3 |
| | e. | How do knowledge representation schemes, such as Semantic nets, Frames, and Scripts, function in artificial intelligence, and what are some examples of their use? | 8 | 2 | 3 |

Mathematics

Operations Research [03PG013]

Time: 2 Hrs.

Max. Marks: 50

| | | |
|---|----|----|
| M | CO | KL |
|---|----|----|

Unit-I (20 marks)

Answer any 4 questions [04 x 05 marks=20 marks]

| 1 | a. | <p>A paper mill produces two grades of paper namely A and B. Because of raw material restrictions, it cannot produce more than 400 tons of grade A and 300 tons of grade B in a week. There are 160 production hours in a week. It requires 0.2 and 0.4 hours to produce a ton of products A and B respectively with corresponding profits of Rs.200 and Rs.500 per ton. Formulate the above as a LPP to maximize the profit and solve it using graphical method.</p> | 5 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|----------------|---|----------------|----------------|----------------|----------------|----------------|--------|----------------|----|----|----|----|----|----------------|----|----|----|----|----|----------------|----|----|----|----|----|--------|---|----|----|----|--|---|---|---|
| | b. | <p>Solve using graphical method: <i>Maximize</i> $z = 3x_1 + 4x_2$ <i>subject to</i> $5x_1 + 4x_2 \leq 200$ $3x_1 + 5x_2 \leq 150$ $5x_1 + 4x_2 \geq 100$ $8x_1 + 4x_2 \geq 80.$ $x_1, x_2 \geq 0$</p> | 5 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | c. | <p>Solve using simplex method: <i>Minimize</i> $z = 5x_1 + 3x_2$ <i>subject to</i> $x_1 + x_2 \leq 2$ $5x_1 + 2x_2 \leq 10$ $3x_1 + 8x_2 \leq 12$ $x_1, x_2 \geq 0.$</p> | 5 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | d. | <p>Find the 1st Basic Feasible Solution of the following Transportation problem using Matrix Minima method:</p> <table border="1" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>D₁</th> <th>D₂</th> <th>D₃</th> <th>D₄</th> <th>Supply</th> </tr> </thead> <tbody> <tr> <td>O₁</td> <td>21</td> <td>16</td> <td>25</td> <td>13</td> <td>11</td> </tr> <tr> <td>O₂</td> <td>17</td> <td>18</td> <td>14</td> <td>23</td> <td>13</td> </tr> <tr> <td>O₃</td> <td>32</td> <td>17</td> <td>18</td> <td>41</td> <td>19</td> </tr> <tr> <td>Demand</td> <td>6</td> <td>10</td> <td>12</td> <td>15</td> <td></td> </tr> </tbody> </table> | | D ₁ | D ₂ | D ₃ | D ₄ | Supply | O ₁ | 21 | 16 | 25 | 13 | 11 | O ₂ | 17 | 18 | 14 | 23 | 13 | O ₃ | 32 | 17 | 18 | 41 | 19 | Demand | 6 | 10 | 12 | 15 | | 5 | 1 | 2 |
| | D ₁ | D ₂ | D ₃ | D ₄ | Supply | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₁ | 21 | 16 | 25 | 13 | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₂ | 17 | 18 | 14 | 23 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₃ | 32 | 17 | 18 | 41 | 19 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Demand | 6 | 10 | 12 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | e. | Write notes on inventory cost. | 5 | 6 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Unit-II (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

| 2 | a. | Solve the LPP using Big M method: $\text{Minimize } z = 4x_1 + x_2$ $\text{subject to } 3x_1 + x_2 = 3$ $4x_1 + 3x_2 \geq 6$ $x_1 + 2x_2 \leq 3$ $x_1, x_2 \geq 0.$ | 10 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|--|---|----------------|----------------|----------------|----------------|--------|----------------|---|---|---|----|----------------|---|---|---|----|----------------|---|---|---|----|----------------|---|---|---|----|--------|----|----|----|--|----|---|---|
| | b. | Using dual simplex method to solve: $\text{Minimize } z = 5x_1 + 6x_2$ $\text{subject to } x_1 + x_2 \geq 2$ $4x_1 + x_2 \geq 4.$ $x_1, x_2 \geq 0$ | 10 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | c. | Apply the principle of duality to solve: $\text{Maximize } z = 6x_1 + 8x_2$ $\text{subject to } 5x_1 + 2x_2 \leq 20$ $x_1 + 2x_2 \geq 10.$ $x_1, x_2 \geq 0$ | 10 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | d. | Solve the Transportation problem: <table border="1" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>D₁</th> <th>D₂</th> <th>D₃</th> <th>Supply</th> </tr> </thead> <tbody> <tr> <td>O₁</td> <td>2</td> <td>4</td> <td>7</td> <td>15</td> </tr> <tr> <td>O₂</td> <td>3</td> <td>3</td> <td>1</td> <td>18</td> </tr> <tr> <td>O₃</td> <td>5</td> <td>4</td> <td>7</td> <td>17</td> </tr> <tr> <td>O₄</td> <td>1</td> <td>6</td> <td>2</td> <td>14</td> </tr> <tr> <td>Demand</td> <td>17</td> <td>19</td> <td>28</td> <td></td> </tr> </tbody> </table> | | D ₁ | D ₂ | D ₃ | Supply | O ₁ | 2 | 4 | 7 | 15 | O ₂ | 3 | 3 | 1 | 18 | O ₃ | 5 | 4 | 7 | 17 | O ₄ | 1 | 6 | 2 | 14 | Demand | 17 | 19 | 28 | | 10 | 3 | 2 |
| | | D ₁ | D ₂ | D ₃ | Supply | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₁ | 2 | 4 | 7 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₂ | 3 | 3 | 1 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₃ | 5 | 4 | 7 | 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₄ | 1 | 6 | 2 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Demand | 17 | 19 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| e. | Write notes on purchasing model with no shortages. | 10 | 6 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Unit-II (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

| 2 | a. | Solve the LPP using Big M method: $\text{Minimize } z = 4x_1 + x_2$ $\text{subject to } 3x_1 + x_2 = 3$ $4x_1 + 3x_2 \geq 6$ $x_1 + 2x_2 \leq 3$ $x_1, x_2 \geq 0.$ | 10 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|--|---|----------------|----------------|----------------|----------------|--------|----------------|---|---|---|----|----------------|---|---|---|----|----------------|---|---|---|----|----------------|---|---|---|----|--------|----|----|----|--|----|---|---|
| | b. | Using dual simplex method to solve: $\text{Minimize } z = 5x_1 + 6x_2$ $\text{subject to } x_1 + x_2 \geq 2$ $4x_1 + x_2 \geq 4.$ $x_1, x_2 \geq 0$ | 10 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | c. | Apply the principle of duality to solve: $\text{Maximize } z = 6x_1 + 8x_2$ $\text{subject to } 5x_1 + 2x_2 \leq 20$ $x_1 + 2x_2 \geq 10.$ $x_1, x_2 \geq 0$ | 10 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | d. | Solve the Transportation problem: <table border="1" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>D₁</th> <th>D₂</th> <th>D₃</th> <th>Supply</th> </tr> </thead> <tbody> <tr> <td>O₁</td> <td>2</td> <td>4</td> <td>7</td> <td>15</td> </tr> <tr> <td>O₂</td> <td>3</td> <td>3</td> <td>1</td> <td>18</td> </tr> <tr> <td>O₃</td> <td>5</td> <td>4</td> <td>7</td> <td>17</td> </tr> <tr> <td>O₄</td> <td>1</td> <td>6</td> <td>2</td> <td>14</td> </tr> <tr> <td>Demand</td> <td>17</td> <td>19</td> <td>28</td> <td></td> </tr> </tbody> </table> | | D ₁ | D ₂ | D ₃ | Supply | O ₁ | 2 | 4 | 7 | 15 | O ₂ | 3 | 3 | 1 | 18 | O ₃ | 5 | 4 | 7 | 17 | O ₄ | 1 | 6 | 2 | 14 | Demand | 17 | 19 | 28 | | 10 | 3 | 2 |
| | | D ₁ | D ₂ | D ₃ | Supply | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₁ | 2 | 4 | 7 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₂ | 3 | 3 | 1 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₃ | 5 | 4 | 7 | 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O ₄ | 1 | 6 | 2 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Demand | 17 | 19 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| e. | Write notes on purchasing model with no shortages. | 10 | 6 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Section A (20 marks)

Answer any 4 questions [05 x 04 marks=20 marks]

| | | | | | |
|---|----|--|---|-----|----|
| 1 | a. | Encrypt the message "RETURN HOME" using the Caesar Cipher. | 5 | CO2 | K2 |
| | b. | Explain Diffie-Hellman Key Exchange Cryptosystem. | 5 | CO5 | K3 |
| | c. | Encrypt The Message "CRYPTO" using key pair (5, 3) in Affine Cipher. | 5 | CO2 | K2 |
| | d. | Explain types of attack in public key cryptography. | 5 | CO3 | K2 |
| | e. | Explain RSA Algorithm. | 5 | CO4 | K3 |

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

| | | | | | |
|---|----|---|----|-----|----|
| 2 | a. | Explain ElGamal Signature Scheme with Model. | 10 | CO5 | K3 |
| | b. | Perform encryption and decryption using the RSA Algorithm, if $p=3$, $q=13$, $e=5$ and $M=10$. | 10 | CO4 | K2 |
| | c. | Explain Asymmetric key cryptography and Symmetric key cryptography. | 10 | CO3 | K2 |
| | d. | Define Digital Signature scheme and also explain RSA Signature Scheme. | 10 | CO5 | K3 |



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Section A (50 marks)

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Section B (50 marks)

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Course Code: MMA2202

O. P. JINDAL UNIVERSITY

Mid Semester Examination, April-2023

M.Sc. 4th Semester

SCHOOL OF SCIENCE



DATABASE MANAGEMENT SYSTEM [03PG013]

Time: 2 Hrs.

Max. Marks: 50

Note:

M CO KL

Section A (20 marks)

Answer any 4 questions [05 x 04 marks=20 marks]

| | | | M | CO | KL |
|---|----|---|---|----|----|
| 1 | a. | What is Database Management System? How it is different from file System? | 5 | 1 | 1 |
| | b. | Classify the Components of Relational Data Model. | 5 | 2 | 1 |
| | c. | What is Generalization, Specialization & Aggregation? | 5 | 1 | 1 |
| | d. | What is Schema & Instances? | 5 | 1 | 1 |
| | e. | Differentiate between weak & strong entity? | 5 | 1 | 1 |

Section B (30 marks)

Answer any 3 questions [03 x 10 marks=30 marks]

| 2 | a. | Explain ER Models with Entity & Attributes. | 10 | 1 | 2 |
|---|----|---|----|---|---|
| | b. | Explain Integrity Constraint. | 10 | 2 | 2 |
| | c. | Construct relational table by ER-Diagram. | 10 | 1 | 2 |
| | d. | Discuss DDL & DML with Example Query. | 10 | 2 | 2 |

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