Con. 6529-11. MP-5605
(REVISITED COURSE) [Total Marks: 100]
(3 Hours)

N.B.: (1) Question No. 1 is compulsory.
(2) Attempt any four questions out of remaining six questions.
(3) Make suitable assumptions wherever necessary and clearly justify them.

Q1. Solve any Four:

A. What is near far problem in CDMA system?
B. Explain frequency reuse concept in cellular system.
C. Write short note on wireless local loop.
D. Explain personal access communication system.
E. Explain signalling system No. 7.

Q2.

A. Explain WATM reference model with several access scenarios.
B. Explain Qos in mobile reference. How to improve the Qos in mobile adhoc networks.

Q3.

A. Draw and Explain architecture of GPRS system.
B. Explain main features of 3rd Generation mobile phone system. How do they achieve higher capacities and higher data rates?

Q4.

A. Compare IEEE 802.11, HIPER LAN 2 and Bluetooth with regards to their adhoc capabilities, where is the focus of these technologies.
B. i. Name basic applications of satellite communication and describe the trends.
ii. What are the general problems of satellite signals travelling from a satellite to a receiver?

Q5.

A. Why is routing in multishop adhoc networks complicated, what are the special challenges?
B. Explain Hierarchical adhoc routing.
Q6.

A. **What are major differences between WAP 2.0, WAP 1.X and i-mode?**
   What influenced the WAP 2.0 development?  

B. i) **What is mobile agent? What are the application domain in which Mobile Agent have potential development?**  

   ii) **Explain Synchronize multimedia mark up language.**

Q7. **Write short note on any four:**  

A) M-commerce  
B) Symbion OS  
C) WML  
D) Sync 4J  
E) Wireless sensor Networks  
F) Threats and security issued in Mobile computing.
N.B. : (1) Question No. 1 is compulsory.
(2) Solve any four questions.

Q: 1 a) Define Reach & stroke, Degree of Freedom and Accuracy. [20]
b) Given that coordinate transformation matrix is a rotation matrix and represents fundamental rotation, what is the axis of rotation (1, 2, or 3) and what is the angle of rotation? i.e. and θ

\[
R_k(\theta) = \begin{bmatrix}
0.5 & 0 & -0.866 \\
0 & 1 & 0 \\
0.866 & 0 & 0.5 \\
\end{bmatrix}
\]

c) What is proximity sensor? Explain SONAR sensor.
d) Explain Heuristic function with example.

Q: 2 a) Yaw 90°, Pitch -90°, roll 90°. Rotations are performed about the fixed axes of F frame. Find coordinates of q w.r.t. fixed axis. i.e. \([p]^T,[P]M=[0,0,0.8]^T\). [4]
b) Explain Goal based agent and Utility based Agent with diagram. State difference between them. [8]
c) Explain steps in problem formulation with example. [8]

Q: 3 a) Explain steps to convert Logical statements into Causal Normal Form. [4]
b) Explain Learning Agent with diagram. Also explain inductive learning. [8]
c) What is Uncertainty? Explain Bayesian network with example. [8]

Q: 4 a) Explain Direct Kinematics of 4-axis SCARA Robot. [10]
b) What is Configuration Space? Draw the Configuration space induced by the translation of the concave mobile part A on the fixed obstacle B. [10]

Q: 5 a) Explain Screw Transformation [4]
b) Define rational agent. Explain task set properties of environment. [8]
c) Explain steps in designing reactive behavioral system. [8]

Q: 6 a) Draw and explain WUMPS WORLD Environment with their Performance measure, Environment, Actuator, and sensor. [10]
b) Explain A* search with example. [10]

Q: 7 a) Derive the General lion-Co-ordinate transformation matrix \(T^k\ k-1\). [10]
b) Consider following facts
1. If maid stole the jewelry then butler was not guilty.
2. Either maid stole jewelry or she milk the cow
3. If maid milked the cow then butler got the cream.
4. Therefore if butler was guilty then he got the cream.
Prove that the conclusion (step 4) is valid using resolution.
N.B.:
1. Question No.1 is compulsory.
2. Attempt any four questions out of remaining six questions.
3. Figures to the right indicate full marks.
4. Answer to the questions should be grouped and written together.
5. Assume any suitable data wherever required but justify the same.

Q.1 Justify/contradict following statements:
   a) If the energy of the signal is finite its power is zero  
   b) Laplacian is better than gradient for detection of edges  
   c) Walsh transform is nothing but sequency ordered Hadamard transform matrix  
   d) All Image compression techniques are invertible

Q.2 a) Find the following sequences are periodic or not. If yes find the fundamental time period.
   i) \( x_1(n) = e^{j(\frac{\pi}{4})n} \)
   ii) \( x_2(n) = 3 \sin \left(\frac{\pi}{6}\right) n \)
   b) Obtain linear convolution of two discrete time signals as below
      \( x(n) = u(n) \)
      \( h(n) = a^n u(n), a < 1 \)
      Show that \( y(n) = \frac{1-a^{n+1}}{1-a} \)

Q.3 a) Find cross-correlation between given signals
      \( x(n) = \{1,2,0,1\} \)
      \( y(n) = \{4,3,2,1\} \)
   b) Find z-transform of \( x(n) \) and draw its ROC
      \( x(n) = \left[0.5^n \sin \left(\frac{\pi n}{4}\right)\right] u(n) \)
   c) Determine auto-correlation of the following signal
      \( x(n) = \{1,3,1,1\} \)

Q.4 a) Using 4 point FFT algorithm, calculate 2-D DFT of
      \[
      f(x,y) = \begin{bmatrix}
      0 & 0 & 3 & 1 \\
      1 & 1 & 2 & 2 \\
      2 & 2 & 1 & 3 \\
      1 & 1 & 2 & 4
      \end{bmatrix}
      \]
Q.4  b) Write 8x8 Hadamard transform matrix and its signal flow graph. Using the Butterfly diagram, compute Hadamard transform for
x(n) = { 1, 2, 3, 4, 1, 2, 1, 2}

Q.5  a) Perform histogram equalization and draw new equalized histogram of the following image data

<table>
<thead>
<tr>
<th>Gray Level</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of pixels</td>
<td>790</td>
<td>1023</td>
<td>850</td>
<td>656</td>
<td>329</td>
<td>245</td>
<td>122</td>
<td>81</td>
</tr>
</tbody>
</table>

b) What is image segmentation? Explain the following methods of image segmentation.
i) Region growing
ii) Region splitting
iii) Thresholding

Q.6  a) What are the different types of redundancies in digital image? Explain in detail.

b) For the 3 bit 4x4 size image perform following operations.
i) Thresholding T = 4
ii) Intensity level slicing with background, r_1 = 2 and r_2 = 5
iii) Bit plane slicing for MSB and LSB planes
iv) Negation

```
4 2 3 0
1 3 5 7
5 3 2 1
2 4 6 7
```

Q.7  Write notes on (any four):
i) Discrete Cosine transform
ii) Wiener filter
iii) Difference between Low-pass filter and Median filter
iv) Hough transform
v) Homomorphic filter
vi) 4, 8, m connectivity of image pixels
Q.4 b) Write 8x8 Hadamard transform matrix and its signal flow graph. Using the Butterfly diagram, compute Hadamard transform for x(n) = { 1, 2, 3, 4, 1, 2, 1, 2}

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</tr>
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<td>7</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
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N.B. : (1) Question No. 1 is compulsory.

(2) Attempt any **four** questions out of remaining **six** questions.

(3) All questions carry **equal** marks.

(4) Assume suitable data, if necessary.

1. (a) Explain any two types of Business Models used in E-Business. 10
    (b) Explain various session tracking techniques with suitable examples. 10

2. (a) Explain SET protocol in detail. 10
    (b) Define market segmentation. Explain any three marketing strategies in detail. 10

3. (a) Explain the concept of Web Mashup in detail. 10
    (b) What are the success factors for implementation of E-business strategies. 10

4. (a) Discuss various strategies for Web Auction. 10
    (b) Explain the important factors to be considered in server side programming. 10

5. (a) Explain the concept of Enterprise Application Integration (EAI). 10
    (b) Write detailed note on 'Ecases'. 10

6. (a) Explain various E-commerce strategies for Virtual Communities. 10
    (b) Explain in detail the concept of Mobile Agent. 10

7. Write short note (any **two**) :- 20
    (a) SOA
    (b) XML
    (c) Cloud Computing
    (d) Web 2.0.
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************
N. B. : (1) Question No. 1 is compulsory.
(2) Choose any four out of remaining six questions.

1. Differentiate the following: \( (5 \times 4=20) \)
   (a) Exogenous events and Endogenous events
   (b) Conditional and Unconditional wait
   (c) Simulation Language and Simulation package
   (d) Terminating and non-Terminating simulation.

2. Explain the goal, cost and output statistics of: \( (10 \times 2=20) \)
   (a) Queuing system
   (b) Inventory system.

3. Solve the following problems for the given data: \( (10 \times 2=20) \)
   (a) Write the FEL and execute manually. simulation end time 30 min
   
   Inter Arrival Time: 8, 6, 1, 8, 3, 8
   Service Time: 4, 1, 4, 3, 2, 4.

   (b) A firm sells bulk rolls of newsprint. The daily demand is given in the table shown. The lead time is number of days from placing an order until the firm receives the order from the supplier. In this instance, lead time is a random variable and its probability is given below. Calculate the lead time demand for above problem.

<table>
<thead>
<tr>
<th>Lead time (days)</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td>0.36</td>
<td>0.42</td>
<td>0.22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Daily Demand (Rolls)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.20</td>
</tr>
<tr>
<td>4</td>
<td>0.35</td>
</tr>
<tr>
<td>5</td>
<td>0.30</td>
</tr>
<tr>
<td>6</td>
<td>0.15</td>
</tr>
</tbody>
</table>
4. Derive the following: (10 x 2 = 20)
   (a) Steady state parameters for M/M/1 queue
   (b) Random variates for exponential and Erlang distribution.

5. Explain the following: (10 x 2 = 20)
   (a) Properties of random numbers and generation of random numbers for reliability system
   (b) Model validation.

6. Solve the following: (10 x 2 = 20)
   (a) Covariance and correlation with respect to multivariate models. Lead times and demand for 10 years are given below:
   Lead time: 5.8, 6.2, 4.3, 6.0, 7.2, 6.5, 5.9, 4.7, 6.8, 6.1
   Demand: 81, 86, 72, 90, 95, 87, 79, 72, 90, 88
   (b) Explain time series model. The numbers of patrons staying at a small hotel on 20 successive nights were observed to be 20, 14, 21, 19, 14, 18, 21, 25, 27, 26, 22, 18, 13, 18, 18, 18, 25, 23, 20, and 21. Fit both an AR(1) and an EAR(1) model to this data. Decide which model provides a better fit by looking at a histogram of this data.

7. Write short notes on any two: (10 x 2 = 20)
   (a) Output Analysis Performance measures
   (b) Simulation of computer system
   (c) Evaluate simulation software.
N. B.:
1. (a) Question No. 1 is compulsory.
   (2) Solve any four questions out of remaining six questions.
   (3) All questions carry equal marks.
   (4) Assume suitable data wherever required.
   (a) Define a project. Explain project management and various characteristics of project management.
   (b) Define scope. How to control Scope? Develop a work breakdown structure (WBS).
2. (a) Explain project goals and roles of a Project Manager.
   (b) Define organizational structure. Explain different organizational structure.
3. (a) Develop a project plan, get in to work and evaluate the outputs of project plan development. Describe the phase of project life cycle.
   (b) Explain various project cost estimation methods and compare them with each other.
4. (a) Define the methods in developing the schedule. Differentiate PERT and CPM.
   (b) What is quality assurance? Explain the tools and techniques in quality control.
5. (a) Explain project organizational chart and describe the assignment work responsibilities.
   (b) Explain project communication management processes.
6. (a) Explain the Trends affecting in IT Project Management.
   (b) Write briefly about risk response and procurement of a plan.
7. Write short notes on:
   (a) Probability and Impact Matrix.
   (b) Project charter.
   (c) Gantt Chart.
   (d) Triple Constraint of Project Management.
Con. 6646-11.  (REVISED COURSE)  MP-5614
(3 Hours)  [Total Marks : 100]

N.B.: (1) Question No. 1 is compulsory.
(2) Attempt any four from remaining six questions.
(3) Assume suitable data if required.

1. (a) How does RC4 stream cipher work?  5
(b) Explain Knapsack algorithm with example.  5
(c) What are the key principles of security?  5
(d) What is software reverse engineering?  5

2. (a) Explain MD5 in detail.  10
(b) Compare packet sniffing and packet spoofing. Explain the session hijacking attack.  10

3. (a) Explain one-time initialization process and processes in each round of Advanced Encryption Standard.  10
(b) Explain IPSec protocols in detail. Also write applications and advantages of IPSec.  10

4. (a) What is Buffer overflow and incomplete mediation in Software Security.  10
(b) Explain how threat precursors are used for Reconnaissance of network.  10

5. (a) How flaws in TCP/IP can cause operating systems to become vulnerable? Also explain how Kerberos are used for user authentication in Windows.  10
(b) Based on packet filters and proxy servers what are different firewall configurations. What are the limitations of firewall?  10

6. (a) What are different types of password? Explain how they work with neat diagrams. What are the problems with passwords?  10
(b) What is Malware? Explain Salami and Linearization attacks.  10

7. Write short notes on (any four):—  20
   (a) Honey pots
   (b) CAPTCHA
   (c) SHA-1
   (d) Digital Rights Management
   (e) Multiple—level security model.