B.E. (Sem. VII), COMP.

Sub:- Digital Signal & Image Processing.

QP Code : 8472

(3 Hours) **[Total Marks : 100**

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

1. Solve any **five** :– **20**
   (a) Check unit step signal for energy/power signal and find its value.
   (b) Find DFT of x(n) = {3, 1, 2, 4} using DIF-FFT.
   (c) Compare between lossy and lossless compression.
   (d) Explain image fidelity criterion.
   (e) Find Z.T. of x(n) = {2, –1, 0, 3, 4). Find ROC of x(z).
   (f) Prove that 2D DFT matrix is an unitary matrix.

2. (a) Find the circular convolution of the two sequence **5**
   $x_1(n) = \{1, -1, 2, -4\}$
   $x_2(n) = \{1, 2\}$
   (b) Find the DFT of the given image **5**

$$\begin{bmatrix} 0 & 1 & 2 & 1 \\ 1 & 2 & 3 & 2 \\ 2 & 3 & 4 & 3 \\ 1 & 2 & 3 & 2 \end{bmatrix}$$

   (c) Find the inverse z-transform of **10**

$$x(z) = \frac{z^3 - 4z^2 + 5z}{(z-1)(z-2)(z-3)}$$

   For all possible ROCs.

3. (a) What are the different types of the redundancies in image. **5**
   (b) Explain segmentation based on discontinuities. **5**
   (c) Define signals and system and also give the classification of discrele time signals with suitable example. **10**

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RJ-Con. 10027-15.

4. (a) Determine the system function and unit sample response of the given system described by the following difference equation. (Assume zero initial conditions.) 10

$$y(n)=\frac{1}{4}y(n-2)+\frac{1}{2}y(n-1)+x(n)$$

(b) Check wheather following sequence is periodic or not. If yes, find the fundamental time period. 5

$x(n) = 3 \sin(0.01\ \pi n) + 4 \cos(10n)$

(c) Find auto-correlation of 5

$x(n) = \{1, 2, 3, 2\}$

5. (a) Perform histogram equilization on the given image transform. 10

Gray level	0	1	2	3	4	5	6	7
No. of pixel	70	100	40	80	60	40	08	02

(b) Obtain the digital negative and thresholing of following 8 bits per pixel image. T = 150 5

121	205	217	156	151
139	127	157	117	125
252	117	236	138	142
227	182	178	197	242
201	106	119	251	240

(c) Justify why Laplacian is not good edge detector. 5

6. (a) Construct improved gray scale quantization code for the given level data set. 10

{100, 110, 124, 124, 130, 200, 210}

(b) Explaqin image restoration and its application. 10

7. Write short notes on (any two) :– 20

(a) K. L. Transform
(b) Wavelet transform
(c) Trimmed average filter
(d) Edge linking and boundary detection via graph theoritic techniques.

B.E. (Sem VII) – COMP.

Sub:- Robotics & AI

QP Code : 8531

(3 Hours)

[Total Marks : 100]

N.B.: (1) Question No. 1 is compulsory
(2) Write any four questions out of remaining.
(3) Assume suitable data if required.

1	(a)	Discuss Belief network.	5
	(b)	Explain Heuristic function with example.	5
	(c)	Describe robot workspace.	5
	(d)	Explain Screw Transformation.	5
2	(a)	Explain A* search with example.	10
	(b)	What is Uncertainty? Explain Bayesian network with example.	10
3	(a)	Explain various methods of knowledge representation with example.	10
	(b)	Explain steps in problem formulation with example.	10
4	(a)	Obtain Inverse Kinematic solution for 4-axis SCARA Robot.	10
	(b)	Discuss various position sensors used in robots.	10
5	(a)	Discuss partial order planning giving suitable example.	10
	(b)	Explain supervised, unsupervised and reinforcement learning with example.	10
6	(a)	Explain the structure of learning agent. What is role of critic in learning?	10
	(b)	Describe different types of environments applicable to AI agents.	10
7		Write short note on	20
	(a)	Properties of environment	
	(b)	Limitations of Hill-Climbing Algorithm	
	(c)	PROLOG	
	(d)	Crypt Arithmetic	

R.J.Con. 10699-15.

B.E. Sem - VII (Rev.) Comp

S.S. 08/06/2015

Q.P. Code : 8720

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question **No. 1** is **compulsory**.
(2) Solve any **Four** questions from the remaining **Six** questions.
(3) Assume suitable data wherever necessary and mention the same.

1. (a) Distinguish between substitution cipher and transposition cipher. 5
   (b) What are different types of malicious codes. 5
   (c) What are the different types of IP - Spoofing. 5
   (d) Differentiate between - vulnerability, threats and controls. 5

2. (a) A and B decide to use Diffie-Hellman key exchange where p=13, g=2. Each choose his own secret no. and exchange nos. 6 and 11. 10
      (i) What is common secret key?
      (ii) What are their secret nos?
      (iii) Can intruder M, gain any knowledge from protocol run if he sees p, g and the 2 public keys 6 & 11. If yes, show how?
   (b) Explain structure of DES. 10

3. (a) Describe block ciphers? Explain any one with example. 10
   (b) Explain difference between MAC and message digest? What is role of compression function in general structure of message digest? 10

4. (a) What is Reverse Engineering? Explain need of Digital Rights Management. 10
   (b) What is Buffer overflow and incomplete mediation in Software Security? 10

5. (a) How does ESP header guarantee confidentiality & integrity for packet payload? 10
   (b) What makes a network vulnerable? 10

6. (a) What are different types of firewalls? Explain design, configuration and limitations. 10
   (b) IPSec offers security at network layer. What is the need of SSL? Explain the services of SSL protocol? 10

7. Write Short note on **(any TWO)** 20
   (a) MD5.
   (b) Covert Chanel.
   (c) CAPCHA.
   (d) Trojan.

RJ-Con. 12264-15.