



WILLIAM PIERCE

AIKTC KALSEKAR TECHNICAL CAMPUS

INNOVATIVE TEACHING. EXHIBITING LEARNING.

School of Architecture

School of Engineering & Technology

School of Pharmacy

Knowledge Resource & Relay Centre (KRRC)

AIKTC/KRRC/SoET/ACKN/QUES/2018-19/

Date: _____

School: SoET-CBSGS Branch: EXTC SEM: VII

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following [✓]Semester/[✓]Unit Test-I/[✓]Unit Test-II (Reg./ATKT) question papers from your exam cell:

| Sr. No. | Subject Name | Subject Code | Format | | No. of Copies |
|---------|------------------------------------|--------------|--------|----|---------------|
| | | | SC | HC | |
| 1 | Image and Video Processing | ETC701 | | ✓ | 02 |
| 2 | Mobile Communication | ETC702 | | ✓ | 02 |
| 3 | Optical Communication and Networks | ETC703 | | ✓ | 02 |
| 4 | Microwave and Radar Engineering | ETC704 | | ✓ | 02 |
| 5 | Elective | ETE70X | | | |
| 6 | | | | | |
| | | | | | |
| | | | | | |

Note: SC – Softcopy, HC - Hardecopy

(Shaheen Ansari)
Librarian, AIKTC

16

Time: 3 Hrs

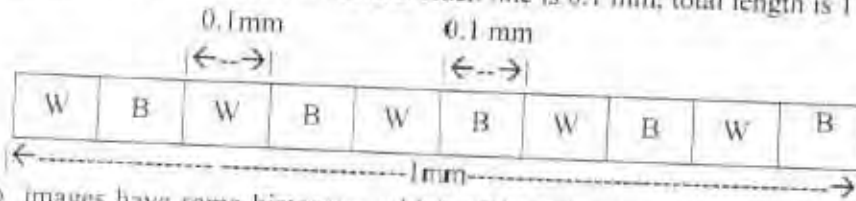
Total marks: 80

Instructions

1. Q1 is compulsory
2. Solve **any three** from remaining
3. Assume suitable data if necessary

Q1 Answer the following

1. Image resulting from poor illumination could be difficult to segment. State true or false, Justify your answer 4M
2. For given figure, Improve and reduce the spatial resolution, consider W= White line, B = Black line, Size of each white and black line is 0.1 mm, total length is 1 mm. 4M



3. Two images have same histogram which of the following properties must they have in common 1) same total power 2) same entropy 3) same inter pixel covariance function Justify your answer 4M
4. Compare 2-D motion and optical flow 4M
5. Draw and explain the model of image degradation/restoration process 4M

Q2

1. For given image find and equalize histogram 8M

| | | | |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 5 | 5 | 6 | 6 |
| 6 | 7 | 6 | 6 |
| 6 | 7 | 2 | 3 |

2. Explain 1) Contrast stretching 2) Log Transformation with neat diagrams 6M
3. Prove Periodicity and symmetry properties of DFT 6M

Q3

1. Apply 1) Averaging filter 2) Median filter on following image, Use pixel replication for padding. No marks if procedure not followed 8M

| | | |
|----|----|----|
| 4 | 8 | 9 |
| 12 | 15 | 18 |
| 30 | 32 | 46 |

2. Explain 1) Sharpening using 2nd order derivative 2) Unsharp masking and high boost filtering. 8M
3. Let $V = \{0,1\}$. Compute 1) Euclidean distance 2) City block distance 3) Chess board distance between pixels p and q . 4M

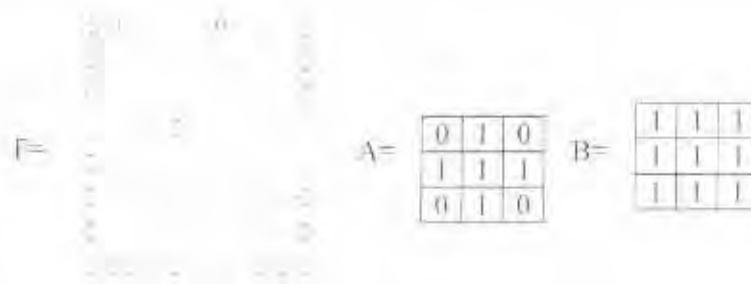
| | | | |
|-------|---|---|-------|
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 (q) |
| 1 | 1 | 1 | 1 |
| 1 (p) | 1 | 1 | 1 |

Q4

1. Draw PDF and write equation for following noise models 6M
 - a. Gaussian Noise
 - b. Rayleigh noise
 - c. Erlang noise
2. Apply bit plane slicing on following image

| | | |
|---|---|---|
| 5 | 7 | 5 |
| 4 | 6 | 3 |
| 1 | 3 | 2 |

3. Find the border for image F given below using two different structural elements A and B respectively. 10M



Q5

1. Classify video frames? What is GOP? 6M
2. Which are the digital quality measures? Explain any 2 6M
3. Find DCT of given image by finding kernel function 8M

| | | | |
|---|---|---|---|
| 4 | 2 | 2 | 1 |
| 2 | 5 | 8 | 9 |
| 2 | 4 | 5 | 2 |
| 2 | 3 | 2 | 2 |

Q6

1. Explain motion estimation criterion based on optical flow equation 10M
2. Write Short Notes on **any two** 10M
 1. Exhaustive block matching algorithms
 2. Binary Feature Matching
 3. Motion Representation

(3 Hours)

[Total Marks: 80]

- N.B.:** (1) Question no 1 is compulsory
 (2) Solve any three from remaining five
 (3) Assume suitable data if required.
 (4) Figures to the right indicate full marks.
 (5) Draw neat diagrams wherever required.

- | | | |
|----|---|----|
| 1 | (a) What is timing advance in GSM? | 05 |
| | (b) Explain Foliage loss in propagation. | 05 |
| | (c) What is cell dragging and dwell time? | 05 |
| | (d) How handoffs are prioritized | 05 |
| 2. | (a) If $bw=1.25\text{MHz}$, $R=9600\text{ bps}$ and minimum acceptable E_b/N_0 is found to be 10 dB determine the maximum no of users that can be supported in a single-cell CDMA system using a) omnidirectional base station antennas and no voice activity detection and b) 3 sectors at base station and activity detection with $\alpha=3/8$ assume the system is interference limited. | 10 |
| | (b) Draw and explain 3GPP architecture | 10 |
| 3 | (a) Draw and explain Signaling architecture of GSM | 10 |
| | (b) What is the concept of software Defined Radio | 10 |
| 4 | (a) Classify small scale fading based on Multipath Time Delay Spread and Doppler spread and explain in brief each type. | 10 |
| | (b) Explain Block Call delayed and Block Call cleared System | 10 |
| 5 | (a) Draw reference architecture of GPRS and explain role of SGSN and GGSN | 10 |
| | (b) Draw and explain IMT 2000 architecture | 10 |
| 6. | Write short note on (any two) | |
| | a) MIMO technique in LTE | |
| | b) Rake Receiver | |
| | c) Power control in CDMA 2000 and WCDMA | |

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17/5/19

(3 Hours)

[Total Marks: 80]

N.B.

- (1) Question No.1 is compulsory
- (2) Attempt any three questions from remaining questions.
- (3) Figures to right indicate full marks

1.
 - a) Explain the advantages and disadvantages of SONET/SDH 05
 - b) Compare Linear and Nonlinear Scattering 05
 - c) What is the Numerical Aperture of Fiber? Give its significance 05
 - d) What is Optical Circulator? Give its applications. 05

2.
 - a) Explain in brief intermodal and intramodal dispersion in fiber 10

 - b) A 6Km optical link consist of multimode step index fiber with a core refractive index of 1.5 and relative refractive index difference of 1%. Estimate 10
 - (i) Delay difference between slowest and fastest modes at the fiber output
 - (ii) RMS pulse spreading due to intermodal dispersion on the link
 - (iii) Maximum bit rate that may be obtained without substantial errors on the link assuming only intermodal dispersion
 - (iv) Bandwidth Length product corresponding to (iii)

3.
 - a) What are the different fiber fabrication methods? Explain double crucible method of fiber fabrication. 10

 - b) What is optical amplifier? Compare different types of optical amplifiers 10

4.
 - a) Explain in detail working principle of PIN photodetector. Explain its merits and demerits 10

 - b) What is OTN? Draw and explain its frame structure 10

5.
 - a) What are the advantages of OTDM? Explain its working principle 10

 - b) Discuss the term power penalty with suitable system model 10

6. Write short notes on any two 20
 - a) Passive optical Network
 - b) Dispersion compensation
 - c) Performance and fault management in optical network
 - d) Optical safety

(3 Hours)

Max Marks: 80

1. Question No. 1 is compulsory.
2. Out of remaining questions, attempt any three questions.
3. Assume suitable additional data if required.
4. Figures in brackets on the right hand side indicate full marks.

- Q.1
- (a) What factors limit transistor use at microwave frequencies? [5]
 - (b) Explain Doppler shift and its role in CW radar. [5]
 - (c) Explain the working of Phase shifter. [5]
 - (d) Explain the principle of working of quarter wave transformer. [5]
- Q.2
- (a) Explain how avalanche devices operate. Name three devices that use the avalanche mode for their operation. [10]
 - (b) Design single-stub (short circuit) shunt tuning networks to match a load impedance $Z_L = 60 - j80 \Omega$, to a 50Ω line. Assuming that the load is matched at 2 GHz [10]
- Q.3
- (a) Explain the working of a negative resistance parametric amplifier. [10]
 - (b) Explain the concept of velocity modulation. Also explain the working of cylindrical magnetron. [10]
- Q.4
- (a) Derive equation for phase velocity, cutoff frequency, cutoff wavelength and field equations for rectangular waveguide. [10]
 - (b) Explain how avalanche devices operate. Name three devices that use the avalanche mode for their operation. [10]
- Q.5
- (a) Derive the Radar range equation as governed by minimum detectable signal to noise ratio. [10]
 - (b) Draw the functional block diagram of an MTI Radar system and explain its operation. Define the terms blind speed and MTI improvement factor. [10]
- Q.6
- (a) Instrument landing system. [5]
 - (b) Ferrite device Isolator [5]
 - (c) Hybrid ring [5]
 - (d) Modes in Gunn diode [5]