

|         |  |
|---------|--|
| PRN No. |  |
|---------|--|

|            |  |
|------------|--|
| Paper code |  |
|------------|--|

**MAY 2022 - ENDSEM EXAM****B. TECH. (E & TC) (SEMESTER - II)****COURSE NAME: Image and Video Processing****COURSE CODE: ETUA40181A****(PATTERN 2018)**

Time: [1Hr]


[Max. Marks: 30]

**(\*) Instructions to candidates:**

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6.
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

| Question No. | Question Description  | Marks | CO mapped | Blooms Taxonomy Level |
|--------------|---|-------|-----------|-----------------------|
| Q.1 a        | What are SIFT features? Describe Scale space with reference to SIFT features.   | 4     | CO4       | Understand            |
| Q.1 b        | In Harris corner detection, if the equation for change in intensity is given by the equation of $E(u,v)$ where $M$ is covariance matrix, apply cornerness measure $R$ to the given $M$ matrix and decide whether the given point is a corner or edge? Justify the answer. Given $K=0.15$<br><br>$E(u,v) = \begin{pmatrix} u & v \end{pmatrix} M \begin{pmatrix} u \\ v \end{pmatrix} \quad M = \begin{bmatrix} 1.27 & 0 \\ 0 & 0.045 \end{bmatrix}$ | 6     | CO4       | Analyze               |
| OR           |   |       |           |                       |
| Q2 a         | With suitable example describe how minimum distance classifier is used in classification task?  | 4     | CO4       | Understand            |
| Q2 b         | Describe the SURF algorithm. Differentiate between SIFT and SURF features. Justify how the speed of operation is improved in SURF features?   | 6     | CO4       | Analyze               |
| Q.3 a        | Identify and Comment on type of the noise from their histogram in the following image. Give the mathematical model for any one of the identified noise.   | 4     | CO5       | Understand            |



|       |   |   |     |                      |   |   |     |         |
|-------|---|---|-----|----------------------|---|---|-----|---------|
|       |   |   |     |                      |   |   |     |         |
| Q.3 b | With reference to JPEG scheme for Image compression, which block decides the compression ratio and the quality of the image after compression? Discuss how it does so?  | 6 | CO5 | Analyze              |   |   |     |         |
| OR    |   |   |     |                      |   |   |     |         |
| Q.4 a | Justify that Wiener filter reduces to Inverse filter if the noise in the image is zero.   | 4 | CO5 | Apply/<br>Understand |   |   |     |         |
| Q.4 b | Refer the following image. Obtain the image after application of DCT transform. Analyze the energy of the image before and after transformation and comment on the result.<br><table border="1"><tr><td>2</td><td>2</td></tr><tr><td>2</td><td>2</td></tr></table>  | 2 | 2   | 2                    | 2 | 6 | CO5 | Analyze |
| 2     | 2   |   |     |                      |   |   |     |         |
| 2     | 2   |   |     |                      |   |   |     |         |
| OR    |   |   |     |                      |   |   |     |         |
| Q.5 a | Describe the video CODEC for H.264 and MPEG-4 Video Compression   | 4 | CO6 | Understand           |   |   |     |         |
| Q.5 b | Refer following conversion formulae for RGB to YCbCr and YCbCr to RGB conversion.<br>$Y = 0.299R + 0.587G + 0.114B$ $Cb = 0.564(B - Y)$ $Cr = 0.713(R - Y)$ $R = Y + 1.402Cr$ $G = Y - 0.344Cb - 0.714Cr$ $B = Y + 1.772Cb$<br>Compute the Y,Cb and Cr values for normalized White color with RGB color triplet [ 1 1 1] and justify that reverse transformation also gives the same white color. | 6 | CO6 | Apply                |   |   |     |         |
| OR    |   |   |     |                      |   |   |     |         |
| Q.6 a | Justify that the interlaced scanning help reducing the flicker in video   | 4 | CO6 | understand           |   |   |     |         |
| Q.6 b | block based matching –SSD measure   | 6 | CO6 | Apply                |   |   |     |         |