UNIT IV: Thermal And Electronic Applications:

Case studies on control, Thermal cycle fatigue of a ceramic plate, pH control system, Dc-Icing Temperature Control system, Skip control of a CD Player, Autofocus Camera, exposure control, Case studies of design of mechatronic products, Motion control using D.C.Motor & Solenoids, Car engine management systems.

UNIT V: Advaced Applicatons:

Advanced applications in Mechatronics, Sensors for condition Monitoring, Mechatronic Control in Automated Manufacturing, Artificial intelligence in Mechatronics, Fuzzy Logic Applications in Mechatronics, Micro-sensors in Mechatronis.

TEXT BOOKS:

1. Devdas shetty, Richard A. Kolk, "Mechatronics System Design", Thomson Learning Publishing Company, Vikas publishing house, 2001. Groover M P, "Industrial Robotics", Pearson Publications.

REFERENCES:

1. Bolton, "Mechatronics - Electronic Control systems in Mechanical and Electrical Engineering", 2nd ed., Addison Wesley Longman Ltd., 1999.

2. Brian Morriss, "Automated Manufacturing Systems - Actuators, Controls,Sensors and Robotics", Mc Graw Hill International, 1995.

3. Bradley, D.Dawson, N.C. Burd and A.J. Loader, "Mechatronics: Electronics in Products and Processes", Chapman and Hall, London, 1991. Fu K S, "Robotics", McGraw Hill Publications

IV Year II Semester	L	T	P	To	C
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MT 428   DIGITAL IMAGE PROCESSING (ELECTIVE - V)

Course Description & Objectives:

This course exposes students to digital image fundamentals, image processing techniques, image compression and segmentation techniques.

Course Outcomes:

Upon successful completion of this course, students would be able to:

1. *discuss digital image fundamentals.*

2. *apply image enhancement and restoration techniques.*

3. *use image compression and segmentation techniques.*

4. *represent features of images.*

UNIT I: **Digital Image Fundamentals:**

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models.

UNIT II: Image Enhancement:

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering –
Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

UNIT III: Image Restoration and Segmentation:

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering
Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation-Morphological processing- erosion and dilation.

UNIT IV: **Wavelets and Image Compression:**

Wavelets – Subband coding - Multiresolution expansions - **Compression:** Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT V: Image Representation and Recognition:

Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TEXT BOOK:

1. Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2010.

REFERENCES:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital ImageProcessing Using MATLAB", Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.

2. Anil Jain K. "Fundamentals of Digital Image Processing", PHI LearningPvt. Ltd., 2011.

3. Willliam K Pratt, "Digital Image Processing", John Willey, 2002.

4. Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", First Edition, PHI Learning Pvt. Ltd., 2011.

5. http://eeweb.poly.edu/~onur/lectures/lectures.html.