### Scheme of Teaching & Examination

**M.E. Mechanical Engg. (Design)**

**III Semester**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Board of Study</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Periods per Week</th>
<th>Theory Marks</th>
<th>Practical Marks</th>
<th>Total Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mech. Engg.</td>
<td>548311 (37)</td>
<td>Robotics</td>
<td>3</td>
<td>100</td>
<td>20</td>
<td>140</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Mech. Engg.</td>
<td>548312 (37)</td>
<td>Fatigue &amp; Creep</td>
<td>3</td>
<td>100</td>
<td>20</td>
<td>140</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Mech. Engg.</td>
<td>548321 (37)</td>
<td>Preliminary work on Dissertation</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>200</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>Mech. Engg.</td>
<td>548322 (37)</td>
<td>Seminar on Industrial Training and Dissertation</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>300</td>
<td>160</td>
<td>500</td>
<td>24</td>
</tr>
</tbody>
</table>

**Note (1)** – 
1/4\(^{th}\) of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a particular academic session.

**Note (2)** – 
Choice of elective course once made for an examination cannot be changed in future examinations.
Unit-1
Robotics
Basic concepts in Robotics: Advances and application and application of robotics in Robots, Resolution, Accuracy and Repeatability, Point Continues part system control loops, types of manipulators, wrist & Grippers.

Unit-2
Kinematic Analysis of Robotics
Geometry based direct kinematics, Co-ordinate and vector transformation using matrix, Denant-Hartenberg Conversion, application of DH notation, Inverse Kinematics.

Unit-3

Unit-4
Drives, Control of Trajectory: Hydraulic system stepper motor, Direct current servomotors, AC servomotors, adaptive control, interpolars, trajectory planning, resolved motion rate control methods.

Unit-5

Applications of Robot: Handling, loading unloading, welding, painting, assembly, Machining, Manufacturing, Work – cell, Installation of Robots.

Books Recommended:

Text Books

☞ K.S.Fu, R.C, Gonzaler C.S.G.Lee, Robothes (Control, Sensing vision & intelligence)
Reference Books

- Shimon Y.Nof (Editor) handbook of industrial robotics, John wiley and sons, 1985
- Fu K.S. , Gonzalez R.C and Lee C.S.G., Robotics : Control sensing vision and intelligence ,Mcgraw Hill ,1987
- D.T.Pham, Expert–System in Engineering, Springer Verlog, 1988
- Anthony C.McDonald, Robot Technology, theory, design and applications Prentice Hall, New Jersey 1986
- Yoren Koren, Robotes for Engineers.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)

Subject: Fatigue & Creep Code: 548312 (37)
Total Theory Periods: 40 Total Tutorial Periods: 12
Total Marks in End Semester Exam. : 100

Unit-1
Design Against Fatigue: Factors affecting fatigue behaviour, Environmental effects, Influence of superimposed static stress, Gerber parabola, Modified Good man diagram, Sadenburg line, Stress Concentration, Notch sensitivity, Cumulative fatigue damage, Linear damage rule, Miners Equation, Practical measure to combat fatigue. Loading in finite /life range

Unit-2
Design Against Fracture: Stress intensity, factor of a crack in finite bodies, fracture criteria, Fracture toughness, Fatigue crack propagation, Plastic deformation, Plastic deformation around crack tip, Crack opening displacement, Design of steam, turbine rotors, Rotor discs, Design of thin walled pressure vessels and pressure piping,

Unit-3
Design Against Creep: Creep of solids, Creep phenomenon, Parameter methods, Larson Miller Parameter, herby Dorn parameter, Manson Hafford parameter, Creep under biaxial stress, Materials for application at elevated temperature

Unit-4
Surface Failure: Surface geometry, Mating surfaces, Different types of wears-Adhesive, Abresive, Corosion, Pitting, spalling: Contact pressure in spherical contact, Stress distribution in spherical contact, Stresses in ball and thrust bearing Cylinder contact stresses, Stresses in cam and follower, Surface fatigue strength.

Unit-5
Design for reliability: Introduction Probabilistic approach to design, Design for reliability, Failure mode and effects analysis, Design for safety
Text Books

- Mechanical Engineering Design – Joseph E Shigley & Charles R Mischke
- Engineering Design – George E Dieter (McGraw Hill)

Reference Books

- Advanced Machine Design – A Mubeen (Khanna Publisher)