

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI  
(C.G.)**

**Scheme of Teaching & Examination**

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

**III Semester**

S. No.	Board of Study	Subject Code	Subject	Periods per Week			Scheme of Examination			Total Marks	Credit L+(T+P)/2
				L	T	P	Theory / Practical				
							ESE	CT	TA		
1	Mech. Engg.	548311 (37)	Robotics	3	1	-	100	20	20	140	4
2	Mech. Engg	548312 (37)	Fatigue & Creep	3	1	-	100	20	20	140	4
3	Mech. Engg	548321 (37)	Preliminary work on Dissertation	-	-	28	100	-	100	200	14
4	Mech. Engg	548322 (37)	Seminar on Industrial Training and Dissertation	-	-	03	-	-	20	20	2
<b>Total</b>				<b>6</b>	<b>2</b>	<b>31</b>	<b>300</b>	<b>40</b>	<b>160</b>	<b>500</b>	<b>24</b>

L- Lecture

T- Tutorial

P- Practical ,

ESE- End Semester Exam

CT- Class Test

TA- Teacher's Assessment

**Note (1) –**        **1/4<sup>th</sup> 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.**

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

**Semester:** M. E. III Sem.  
**Subject:** Robotics  
**Total Theory Periods:** 40  
**Total Marks in End Semester Exam. :** 100

**Branch:** Mechanical Engg.  
**Code:** 548311 (37)  
**Total Tutorial Periods:** 12

## **Unit-1** **Robotics**

Basic concepts in Robotics: Advances and application and application of robotics in Robots, Resolution, Accuracy and Repeatability, Point Continuous 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**

Robot –An Dynamics: Elementary treatment of Lagrange –Euler, Newton – Euler formulations, Generalized D'Alembert equation of motion.

## **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**

Robotic Sensors: Vision system, Range proximity, touch, force and torque Sensors, Assembly-Aid devices, Robot Programming, Artificial Intelligence.

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

## **Books Recommended:**

### **Text Books**

- ✍✍ M.P.Groover, M.Weiss, P.N.Nagal and N.G.Odrey, Industrial Robotics, Mcgraw Hill International Deduction, 1986
- ✍✍ 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 Verlag, 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.)

Semester: M. E. III Sem.  
Subject: Fatigue & Creep  
Total Theory Periods: 40  
Total Marks in End Semester Exam. : 100

Branch: Mechanical Engg.  
Code: 548312 (37)  
Total Tutorial Periods: 12

### **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)
- ✍✍ Machine Design – Robert L Norton (Pearson Education)