

Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING AND EXAMINATION

B.E. III SEMESTER MECHANICAL ENGINEERING

S. No.	Board of Study	Sub. Code	SUBJECT	PERIODS PER WEEK			SCHEME OF EXAM Theory/Practical			TOTAL MARKS	Credit L+(T+P)/2
				L	T	P	ESE	CT	TA		
1.	Appl. Mathematics	300311 (14)	Mathematics - III	4	1	-	80	20	20	120	5
2.	Mech. Engg.	337312 (37)	Numerical Analysis & Computer Programming(C & C++)	4	1	-	80	20	20	120	5
3.	Mech. Engg.	337313 (37)	Material Science	3	1	-	80	20	20	120	4
4.	Mech. Engg.	337314 (37)	Mechanics of Solids - I	4	1	-	80	20	20	120	5
5.	Mech. Engg.	337315 (37)	Fluid Mechanics	4	1	-	80	20	20	120	5
6.	Electronics & Telecom Engg.	320316 (28)	Electronics & Instrumentation	3	1	-	80	20	20	120	4
7.	Mech. Engg.	337321 (37)	Numerical Analysis & Computer Programming(C & C++) Lab	-	-	2	40	-	20	60	1
8.	Mech. Engg.	337322 (37)	Materials Testing Lab	-	-	2	40	-	20	60	1
9.	Mech. Engg.	337323 (37)	Fluid Mechanics Lab	-	-	2	40	-	20	60	1
10.	Mech. Engg.	337324 (37)	Manufacturing Practice Lab	-	-	3	40	-	20	60	2
11.	Humanities	300325 (46)	Value Education	-	-	2	-	-	40	40	1
12.			Library	-	-	1	-	-	-	-	-
Total				22	6	12	640	120	240	1000	34

L – Lecture, T – Tutorial,
P – Practical, ESE- End Semester Exam , CT- Class Test
TA – Teacher’s Assessment

Note : Duration of all theory papers will be of **Three Hours.**

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (CG)**

Semester : **B.E. III Sem.**

Branch: **Mechanical, Mining,
Civil and Chemical Engg.**

Subject : **MATHEMATICS-III**

Code : 300311 (14)

Total Theory Periods: **40**

Total Tutorial Periods: **10**

Total Marks in End Semester Exam. : **80**

Minimum number of class test to be conducted: **02**

UNIT - 1 FOURIER SERIES

(No. of periods 8+2)

Euler's Formula, Functions having points of discontinuity, Change of interval, Even & Odd functions, Half range series, Harmonic analysis.

UNIT - 2 LAPLACE TRANSFORM

(No. of periods 8+2)

Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by t^n , Division by t , Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

UNIT - 3 PARTIAL DIFFERENTIAL EQUATION

(No. of periods 8+2)

Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables.

UNIT - 4 COMPLEX VARIABLES

(No. of periods 8+2)

Derivative, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Flow problems, Complex integration, Cauchy theorem, Cauchy integral formula, Taylor & Laurent series, Singularity, Residue, Evaluation of real definite integrals.

UNIT - 5 STATISTICS

(No. of periods 8+2)

Random variables, Discrete & continuous probability distributions, Expectation, Mean & Standard Deviation, Moments & moment generating function, Distributions- Binomial, Poisson and Normal distributions.

TEXT BOOKS: -

1. Higher Engg. Mathematics by Dr. B.S. Grewal– Khanna Publishers.
2. Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons.

REFERENCE BOOKS: -

1. Advanced Engg. Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.
2. Applied Mathematics by P.N. Wartikar & J.N. Wartikar. Vol- II– Pune Vidyarthi Griha Prakashan, Pune.
3. Applied Mathematics for Engineers & Physicists by Louis A. Pipes- TMH.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (CG)**

Semester	B.E. III Sem.	Branch : Mechanical Engineering
Sub:	Numerical Analysis & Computer Programming (C & C++)	Code : 337312 (37)
Total Theory Periods : 48		Total Tutorial Periods : 12
Total Marks in End Semester Exam : 80		
Minimum number of class tests to be conducted : 02		

UNIT - I Approximation and Errors in Computation

Approximation and round of errors, truncation errors and Taylor Series, Determination of roots of polynomials and transcendental equations by Graphical methods and Bisection, Regula-falsi, Secant and Newton-Raphson methods, Solution of Linear simultaneous, linear algebraic equations by Gauss Elimination Gauss-Jordan and Gauss-Siedel iteration method.

UNIT – II Empirical laws, Curve Fitting & Interpolation

Curve fitting linear and non-linear regression analysis (Method of group average and Least squares) Finite differences, Backward, forward and central difference relation and their use in Numerical differentiation and integration and their application in interpolation.

UNIT – III Numerical Solution of Ordinary Differential Equations

Numerical integration by Trapezoidal rule, Simpson's ($1/3^{\text{rd}}$ & $3/8^{\text{th}}$) rule and its error estimation. Application of difference relations in the solution of partial differential equations. Application of difference relations in the solution of partial differential equations. Numerical solution of ordinary differential equations by Taylor's series, Euler, Modified Euler, Runge-Kutta and Predictor-Corrector method.

UNIT – IV Numerical Solutions of Partial Differential Equations

Introduction, Classification of second order equations, Finite difference approximations to partial derivatives, Elliptic equations, solution of Laplace equation, solution of Poisson's equation, Solution of Poisson's equation, Solution of elliptic equations by relaxation method, Parabolic equations, Solution of one-dimensional heat equation, Solution of two-dimensional heat equation, Solution of two-dimensional heat equation, Hyperbolic equations, solution of wave equation.

UNIT – V Computer Programming

I/O statement, Mathematical, Relational & Conditional Statements & Expressions. Switch Loops and Control Statements. Introduction to one dimensional arrays and two dimensional arrays. Basics of I/O file handling.

TEXT BOOKS

1. Numerical Methods in Engineering & Science – Dr. B.S. Grewal – Khanna Publishers, 6th Edn. 2004
2. Numerical Methods – P. Kandasamy, K. Thilagavathy & K. Gunavathy – S. Chand & Co., 2nd Rev. Edn. – 2003

REFERENCES

1. Let us C – Yashwant Kanitkar –
2. Introductory Methods of Numerical Analysis – S.S. Sastry, 3rd Edn. – PHI – New Delhi, 2003
3. Numerical Mathematical Analysis – James B. Scarborough, 6th Edn. – Oxford & IBH Publishing Co. – New Delhi,
4. Theory & Problems in Numerical Methods – T. Veerarajan, T. Ramchandran – TMH, New Delhi, 2004
5. Numerical Methods for Engineers – Steven C. Chapra, Raymond P. Canale, 4th Edn. – TMH, New Delhi
6. The Spirit of C – Henry Mullish & Herbert L. Cooper - Jaico Pub. House

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (CG)**

Semester : B.E. III Sem. **Branch :** Mechanical Engineering
Sub : MATERIALS SCIENCE **Code :** 337313 (37)
Total Theory Periods : 40 **Total Tutorial Periods :** 10
Total Marks in End Semester Exam : 80
Minimum number of class tests to be conducted : 02

UNIT – I

Structure of Materials:

Crystalline structure of solid: Concept of unit cell and space lattice, Miller Indices, Crystal structure determination by X-ray diffraction, Crystal imperfections.

Solidification of Metals and Alloys

Mechanism of solidification, nucleus formation and crystal growth, Metal ingot structure-dendritic and columnar grains, grain boundaries, grain growth, effect of grain size on properties of metals, polytropic transformation.

UNIT- II

Elastic and Plastic Deformation:

Material properties like strength, hardness, toughness, ductility, brittleness etc. and their importance in manufacturing. Quantitative evaluation of these properties with destructive testing methods.

Mechanism of plastic deformation, role of dislocations, slip and twinning. Strain hardening, Season cracking, Baushinger effect, yield point phenomena and related effects, Cold working and Hot working processes, effect on properties like recovery, recrystallization, grain growth, grain size etc.

Unit - III

Phase Diagrams:

Phase and phase equilibrium : solidification of pure metals and alloys, phase diagrams of monotectic Eutectic, eutectoid, Peritectic and peritectoid & other systems. Allotropy of iron and Fe-C diagram.

Unit - IV

Heat Treatment

Introduction, purpose of heat treatment, T-T-T curve and micro constituents in steel heat treatment processes like hardening, tempering, annealing, normalizing, Effects of heat treatment on properties of materials. Surface treatment processes.

Unit - V

Engineering Materials

Classification, structure, general properties and applications of Cast Iron, Steel, brass, Bronze, bearing metals, light metal alloys, sintered carbide.

TEXT BOOKS

1. Engineering Physical Metallurgy – Lakhtin – CBS Publishers & Distributors
2. Materials Science- Narang – CBS Publishers & Distributors

REFERENCES

1. Elements of Material Science & Engg. - Van Vlack. – Addison – Wesley longman, 6th Edn., New York
2. Physical Metallurgy - Clark & Varney, East West Edn., New Delhi
3. Engineering Materials - Woulf series.
4. Material Science & Engg. – A first course – V. Raghavan – PHI (P) Ltd., Delhi, 2003
5. Physical Metallurgy Principles – Robert E Reed Hill – Affiliated East-West Press Pvt. Ltd., New Delhi, 2004
6. A Text Book of Material Science & Metallurgy – O.P. Khanna – Dhanpat Rai & Sons – New Delhi

**CHHATTISGARH SWAMI VEVEKANAND TECHNICAL UNIVERSITY
BHILAI (C.G.)**

Semester : **B.E. III Sem.**
Sub : **Electronics & Instrumentation**
Total Theory Periods : 40
Total Marks in End Semester Exam : 80
Minimum number of class test to be conducted : 02

Branch : Mech., Civil & Chemical Engg.
Code : 320316 (28)
Total Tutorial Periods : 10

Unit – I : Semiconductor Diodes

Construction & Characteristics of PN Junction diodes, Rectifier : Half wave, Full Wave & Bridge (Circuit and operation), Zener diode: construction, characteristics, specifications, Voltage regulator circuit using Zener diode.

Unit – II : Transistors

(8L + 2T)

Junction Transistor : Construction, Various current components inside a transistor, circuit symbol of PNP and NPN transistors, transistor amplifier, input and output characteristics, relation between α and β of a transistor, CB, CE & CC configuration. Field Effect Transistor: construction, principle of operation and characteristics of JFET. Construction, principle of operation and characteristics of MOSFET enhancement and depletion type MOSFET.

Unit – III : Basics of Transducers

(8L + 2T)

Active & Passive Transducers, Analog & Digital Transducers, Classification of transducers according to Applications. Selection of a transducer. Construction, Principles of operation and applications of : Wire wound Potentiometer, Strain gauge, LVDT, Thermistor, Solar cell Transducer, Piezo-electric crystals.

Unit – IV : Signal Conditioning Circuits

(8L + 2T)

Operational Amplifiers: Terminal characteristics, Ideal characteristics, OPAMP as Inverting amplifier, Non-inverting amplifier, Adder, Difference amplifier, differentiator, Integrator, Comparator, Instrumentation amplifier. *Passive Filters:* High Pass, Low Pass and Band Pass filter using RC- expression for their Gain – BW Product. *Wheatstone bridge. Diode Clipper and clamper* (only qualitative analysis, no mathematical derivation is required).

Unit – V : Basic Instrumentation System & Components

(8L + 2T)

Block diagram of basic measurement systems: Distortion due to Mechanical loading, Distortion due to Impedance loading, Distortion due to change in signal frequency, Distortion due to electrical noise. *Data Acquisition System:* Objective of DAS, Single & Multi channel DAS, Computer based DAS. Data Loggers, (Only introductory idea is expected no detail analysis is required).

Text Books :

1. *Electronic Instrumentation* (2nd Ed.) by H S Kalsi, TMH
2. *Elements of Electronic Instrumentation* by J. Jha, M.Puri, R. Sukesh Kumar & M. Kowar, Narosa Publishing House.
3. *Electronics & Instrumentation* by B.R. Gupta, S. Chand & Co.

Reference Books :

1. *Electrical & Electronics Measurement & Instrumentation* by A.K. Sawheny, Dhanpat Rai Publishing Company.
2. *Electronic Instrumentation & Measurement Techniques* by Copper & Helfrick, PHI.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (CG)**

Semester : **B.E. III Sem.** **Branch** : **Mechanical Engineering**
Sub : **NUMERICAL ANALYSIS & COMPUTER PROGRAMMING (C & C++) LAB** **Practical Code** : **337321 (37)**
Total Practical Periods : **20**
Total Marks in End Semester Exam : **40**

EXPERIMENTS TO BE PERFORMED

1. Write a program to calculate the area & perimeter of the rectangle and the area & circumference of the circle. The length and breadth of a rectangle and radius of a circle are input through keyboard.
2. Write a program to determine whether the character entered through a keyboard is a capital letter, a small case letter, a digit or a special symbol.
3. Write a program to add first seven terms of the following series using looping statements series is
$$S = \frac{1}{1!} + \frac{2}{2!} + \frac{3}{3!} + \frac{4}{4!} + \dots$$
4. Write a program which has the following options:
 - a. Factorial of a number
 - b. Prime or not
 - c. Odd or even
5. Write a program to implement Bubble sort on a set of 10 numbers.
6. Write a program to store every character typed at the keyboard into a file. The procedure should come to an end as soon as the 'Esc' key is pressed.
7. Write a program to find the roots of an equation using Newton Raphson Method.
8. Write a program to practice one of the Numerical Integration Method.
9. Write a program to find the solution of Differential Equation by Modified Euler's Equation.
10. Write a program to find the solution of Differential Equation by Runge Kutta Equation.

LIST OF EQUIPMENTS/MACHINES REQUIRED

1. P-IV, 2.6 G. Hz., 128/256 MB SDRAM, 40 GB HDD, 1.44 MB FDD, 14" Colour Monitor, 52 X CD RW, Laser Scroll Mouse
2. Software Required – C & C++

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (CG)**

Semester : **B.E. III Sem.** **Branch** : **Mechanical Engineering**
Sub : **MATERIALS TESTING LAB** **Practical** : **337322 (37)**
Code

Total Practical Periods : **20**

Total Marks in End Semester Exam : **40**

EXPERIMENTS TO BE PERFORMED (MINIMUM TEN NUMBERS)

1. To study the Universal Testing Machine.
2. To perform the Tensile Test of Mild Steel on U.T.M and To Draw Stress–Strain Curve.
3. To determine strength of wood on U.T.M (i) Along the Grain (ii) Across the Grain.
4. To determine shear strength of Mild Steel on U.T.M.
5. To observe Flexural Behavior of Timber specimen and to determine it's strength under transverse loading on U.T.M.
6. To study the Impact Testing Machine and test specimen of Izod and Charpy.
7. To determine Izod and Charpy Value of the given mild steel specimen.
8. To study the Fatigue Testing Machine and to discuss the procedure to find out endurance limit of given material.
9. To study the Spring Testing Machine.
10. To determine modulus of rigidity for the material of open and closed Coiled Helical Spring Subjected to Axial Load by spring testing machine.
11. To study the Torsion Testing Machine
12. To determine ultimate shear stress and modulus of rigidity under Torsion.
13. To study the Cupping Test Machine and to determine Erichsen value of Mild Steel sheet.
14. To study the Rockwell Hardness Testing Machine and to determine the Rockwell Hardness of the given material.
15. To study the Brinell Hardness Machine and to determine the Brinell hardness of the given material.
16. To study the Vickers Hardness Machine and to conduct a test on the machine.
17. Buckling of column

LIST OF EQUIPMENTS/MACHINES REQUIRED

1. Universal Testing Machine
2. Impact Testing Machine
3. Fatigue Testing Machine
4. Spring Testing Machine
5. Torsion Testing Machine
6. Cupping Testing Machine
7. Rockwell Hardness Testing Machine
8. Brinell Hardness Machine
9. Vickers Hardness Machine
10. Column Testing Machine

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (CG)**

Semester : B.E. III Sem. Branch : Mechanical Engineering
Sub : Fluid Mechanics Lab Practical : 337323 (37)
Code

Total Practical Periods : 20

Total Marks in End Semester Exam : 40

EXPERIMENTS TO BE PERFORMED (MINIMUM TEN NUMBERS)

1. To determine the meta-centric height of a ship model.
2. To verify Bernoulli's Theorem.
3. To verify Impulse Momentum Principle.
4. To calibrate a Venturimeter and study the variation of coefficient of discharge.
5. To calibrate an orifice-meter.
6. Experimental determination of critical velocity in pipe.
7. To determine of head loss in various pipe fittings.
8. Flow measurement using Pitot tube.
9. To study the transition from laminar to turbulent flow and to determine the lower critical Reynold's number.
10. To determine the hydraulic coefficients (C_c , C_d and C_v) of an orifice.
11. To determine the coefficient of discharge of a mouth piece.
12. To obtain the surface profile and the total head distribution of a forced vortex.
13. To study the velocity distribution in pipe and to compute the discharge by integrating velocity profile.
14. To study the variation of friction factor for pipe flow.
15. To determine the roughness coefficient of an open channel.

LIST OF EQUIPMENTS/MACHINES REQUIRED

1. Apparatus for determination of metacentric height
2. Bernoulli's apparatus
3. Impact of jet apparatus
4. Venturimeter
5. Orificemeter
6. Pipe friction apparatus
7. Orifice apparatus
8. Mouth Piece apparatus with the provision for determination of hydraulic coefficient C_c , C_d & C_v
9. Vortex flow apparatus
10. Apparatus of head loss in various pipe fittings.
11. Reynold's apparatus
12. Complete setup for flow measurement using Pitot tube
13. Complete set for open channel apparatus

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (CG)**

Semester : B.E. III Sem. Branch : Mechanical Engineering
Sub : Manufacturing Practice Lab Practical Code: 337324 (37)

Total Practical Periods : 30

Total Marks in End Semester Exam : 40

EXPERIMENTS TO BE PERFORMED (MINIMUM TEN NUMBERS)

Shaper Machine

1. Study of Quick Return Mechanism and Table feed mechanism.
2. V groove in C.I. Block.

Milling Machine

3. Study of indexing mechanism (simple and differential)
4. Study of different milling cutters and operations.(End cutter, Face cutter & T-Slot cutter)
5. Gear Cutting

Lathe

6. Study of Work holding devices.
7. Facing, straight turning, step turning & taper turning.
8. Thread cutting and knurling.
9. Boring
10. Preparation of Solid of revolution using wood working lathe.

Welding

11. Joining of metals by Arc welding
12. Joining of metals by Spot welding (Metallic sheets)
13. Joining of metals by Soldering & Brazing (Metallic wires)
14. Joining of metals using MIG welding (Metallic plates)

Molding

15. Preparation of solid & split pattern.
16. Preparation of non-ferrous casting using solid and split pattern.

Advanced Fitting

17. Drilling, Filing tapping and assembly of casting produced on a base plate.

LIST OF EQUIPMENTS/MACHINES REQUIRED

1. Center Lathe
2. Wood Working Lathe
3. Capstan & Turret Lathe
4. Shaper Machines
5. Milling Machines
6. MIG Welding Machines
7. Spot Welding Machine
8. Drilling Machine
9. Open Hearth Forging Furnace.
10. Carpentry Tools
11. Fitting Tools
12. Molding Tools
13. Measurement Tools
14. Equipments for costing of nonferrous material.
15. Slotter and Planner Machines

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (CG)

Semester : **B.E. III Sem.**
Subject : **Value Education**

No. of Periods : 2 pds/week
Total Marks in End Semester Exam. : NIL

Minimum number of class test to be conducted : Two

Branch : **Common to all Branches**

Code : **300325(46)**

Tutorial Periods : NIL

Teacher's Assessment : 40 Mks

Unit – I

- **STUDY OF BASIC HUMAN OBJECTIVES** : Everlasting solution $\frac{1}{4}lek/kku\frac{1}{2}$ prosperity $\frac{1}{4}le`f)\frac{1}{2}$ trust in self and others $\frac{1}{4}vHk;\frac{1}{2}$ and coexistence $\frac{1}{4}lgvfLrRo\frac{1}{2}$ for balance in nature. Need and importance of aforesaid basic human objectives and how to achieve these.

Unit – II

- **CONCEPT AND UNDERSTANDING OF HUMAN HAPPINESS**

Meaning and concept of "happiness", incessant happiness, its relationship with guarantee of physical needs, comforts, physical and sensory pleasures with its transient nature, misery; The only method to minimize incessant happiness : gaining right understanding about oneself, one's body, one's relationship with other human beings, Nature and total existence.

Unit – III

- **PROPER UNDERSTANDING** about the order in Nature $\frac{1}{4}O;oLFkk\frac{1}{2}$ and co-existence $\frac{1}{4}lgvfLrRo\frac{1}{2}$ at various levels, such as, I and my body, family, society, Nature and existence.
- **UNDERSTANDING THE SELF** : Understanding human reality – I and my body, present understanding of the self, physical needs, relation with others and with Nature, gaining proper understanding of the self, discrimination between 'I' and my 'body', characteristics and the needs of 'I', of my 'body' and 'body' & 'I'.

Unit – IV

- **SYNERGATIC ORDER $\frac{1}{4}O;oLFkk\frac{1}{2}$ and COEXISTENCE $\frac{1}{4}lgvfLrRo\frac{1}{2}$ among HUMANS, IN NATURE & IN EXISTENCE :**
 - Conceptual understanding of natural relations and consequent values, of family and relation therein, of society and role of engineers therein, 'overall excellence' : concept, its universal parameters and total human behaviour
 - Inanimate $\frac{1}{4}tM+\frac{1}{2}$ and consciousness $\frac{1}{4}pSrU;\frac{1}{2}$ aspects of Nature, Four distinct synergetic orders in Nature - Padaarth Awastha $\frac{1}{4}inkFkZ\ voLFkk\frac{1}{2}$ Pran Awastha $\frac{1}{4}izk.k\ voLFkk\frac{1}{2}$ Jiv Awastha $\frac{1}{4}tho\ voLFkk\frac{1}{2}$ and Gyan Awastha $\frac{1}{4}Kku\ voLFkk\frac{1}{2}$ complementary supplementary evolutionary connection amongst above orders, identifying and implementing "Appropriate Technology".
 - Synergetic order among interacting entities of Nature operating in all pervading changeless Shunya or Satta, Indivisible interconnectedness of Satta and Prakriti and its implications.

Unit – V

- **IMPLICATIONS OF PROPER UNDERSTANDING**

- Awakening $\frac{1}{4}tkx`fr\frac{1}{2}$ the common goal of all human beings,
- promotion and perseverance of synergetic order and co-existence at all levels leading to incessant happiness.
- Natural manifestation of universal human values and thereby incessant happiness
- Undivided Society $\frac{1}{4}vfoHkkT;\ lekt\frac{1}{2}$ and Universal Organised System $\frac{1}{4}lkoZHkkSe\ O;oLFkk\frac{1}{2}$
- Transition from synergetic disorder $\frac{1}{4}vO;oLFkk\frac{1}{2}$ to synergetic order $\frac{1}{4}O;oLFkk\frac{1}{2}$
- Evaluation of Understanding, work and behaviour.

REFERENCES

1. Jeevan Vidya Camp $\frac{1}{4}f'kfoj\frac{1}{2}$ notes
2. An Introduction to Jeevan Vidya by Shri A. Nagaraj
