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**MEHRANUNIVERSITY OF ENGINEERING & TECHNOLOGY**

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Sept. 20, 2003

INFO.ONLY

IMMEDIATE

URGENT

ROUTINE

**DEPARTMENT OF BASIC SCIENCES AND RELATED STUDIES**

**Annexure-A**

**BS-Mathematics**

**(Scheme & Courses)**

**Total Credit hours for four years 129**

**Table.A1: Curriculum Structure**

|  |  |
| --- | --- |
| Duration | 4 Years |
| Semesters | 8 |
| Courses | 43 |
| **Total Credit Hours** | **129** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **First year** | | | | |
| **First Semester** | | | | |
| **S.#** | **Course Title** | **Course Code** | **Cr. Hr** | **Marks** |
| 1 | Calculus-I | MATH 105 | 3 | 100 |
| 2 | Set Theory | MATH 110 | 3 | 100 |
| 3 | Functional English | ENG 101 | 3 | 100 |
| 4 | Islamic Studies/Ethics | IS 111/ SS 104 | 2 | 50 |
| 5 | Physics-I | MEBP 101 | 3 | 100 |
| 6 | Pakistan Studies | PS 106 | 2 | 50 |
| **Total** | | | **16** | **500** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **First year** | | | | |
| **Second Semester** | | | | |
| **S.#** | **Course Title** | **Course Code** | **C.H.** | **Marks** |
| 1 | Calculus II | MATH 150 | 3 | 100 |
| 2 | Discrete Mathematics & Graph Theory | MATH 155 | 3 | 100 |
| 3 | Statistics & Probability | MATH 160 | 3 | 100 |
| 4 | Communication Skills | ENG 102 | 3 | 100 |
| 5 | Introduction to Computers | CS 130 | 3 | 100 |
| 6 | Physics-II | EL 127 | 3 | 100 |
| **Total** | | | **18** | **600** |

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

**Title of Subject: Calculus-I**

**Discipline:** Mathematics

**Code:** MATH 105

**Pre-requisites:** Intermediate

**Assessment:** 20% Sessional work, 20% Mid Examination, and 60% Final Examination

**Credit Hours:** 03+00 **Marks:** 100

**Minimum Contact Hours:** 45+00

**Course Learning Outcomes (CLOs):**

Upon successful completion of the course, the student will be able to:

|  |  |  |  |
| --- | --- | --- | --- |
| CLO | Description | Maximum Taxonomy  Level | PLOs |
| 1 | Explain the concept of functions, limit, and continuity including graphical implementation | C3 | 1 |
| 2 | Find the derivatives and use them for real-life problems | C3 | 2 |
| 3 | Explain concept of integration and apply substitution rule | C3 | 1 |

**PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the following PLOs:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Mathematics Knowledge | **◼** | 7 | Environment and Sustainability | ☐ |
| 2 | Problem Analysis | **◼** | 8 | Ethics | ☐ |
| 3 | Design/Development of Solutions | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Investigation | ☐ | 10 | Communication | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Task Management | ☐ |
| 6 | The Mathematician and Society | ☐ | 12 | Lifelong Learning | ☐ |

**Course Contents**

**Functions and graphs:** Introduction to mathematical functions**.** Domain and range of a function with examples. Polynomial, rational, irrational, and absolute functions, and evaluation of such functions. Operations with functions: sum, product, quotient, and composition. Graphs of functions: linear, quadratic and piece-wise functions.

**Limits and continuity:** Functions, limit of a function. Graphical approach. Properties of limits. Theorems of limits. Limits of polynomials, rational and transcendental functions. Limits at infinity, infinite limits, and one-sided limits. Continuity and discontinuity of function.

**Derivatives:** Definition, techniques of differentiation. Derivatives of polynomials rational, exponential, logarithmic, trigonometric, and hyperbolic functions. The chain rule. Implicit differentiation. Rates of Related rates. Linear approximations and differentials. Higher derivatives, Leibnitz's theorem.

**Applications of derivatives:** Increasing and decreasing functions. Relative extrema and optimization. First derivative test for relative extrema. Convexity and point of inflection. The second derivative test for extrema. Asymptotes and radius of curvature. Rolle’s and Mean value theorems. Maclaurin and Taylor series. Indeterminate forms and L'Hôpital's rule. Inverse functions and their derivatives.

**Integration**: Anti derivatives and integrals. Riemann sums and the definite integral. Properties of Integral. The fundamental theorem of calculus. The substitution rule.

**Recommended Books (latest edition):**

1. Stewart, J., Clegg, D. K., & Watson, S. (2020). *Calculus: early transcendentals*. Cengage Learning.
2. Zill, D., & Wright, W. S. (2009). *Calculus: early transcendentals*. Jones & Bartlett Learning.
3. Thomas, G. B., Weir, M. D., & Hass, J. (2013). *Thomas' Calculus: Single Variable*. Pearson.
4. Zill, D. G., & Dewar, J. M. (2015). *Precalculus with calculus previews*. Jones & Bartlett Publishers.
5. Anton, H., Bivens, I. C., & Davis, S. (2016). *Calculus: Early Transcendental Single Variable*. John Wiley & Sons.
6. Penney, D. E., & Edwards, C. H. (1994). *Calculus and Analytic Geometry*. Prentice-Hall International.
7. Larson, R., & Edwards, B. H. (2010). *Calculus: Early transcendental functions*. Cengage Learning.
8. Zill, D. G. (2020). *Advanced engineering mathematics*. Jones & Bartlett Publishers.
9. Greenwell, R. N., Lial, M. L., & Ritchey, N. P. (2017). *Calculus with applications*. Pearson Education.
10. Stewart, J., Clegg, D. K., & Watson, S. (2020). *Multivariable calculus*. Cengage Learning.
11. Zill, D. G., & Wright, W. S. (2009). *Multivariable Calculus*. Jones & Bartlett Publishers.

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

**Title of Subject: Set Theory Marks: 100**

**Discipline: Mathematics**

**Code: MATH 110**

**Pre-requisites: Intermediate**

**Assessment: 20% sessional work, 20% midterm, 60% final examination**

**Credit Hours: 03 Minimum Contact Hours: 45**

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**Objectives:** To give advanced idea of sets

**Course Learning Outcomes**

After completion of this course the student should be able to:

|  |  |  |  |
| --- | --- | --- | --- |
| CLO | Description | Maximum Taxonomy  Level | PLOs |
| 1 | Understand basic concepts of sets and their properties | C2 | 1 |
| 2 | Describe relations and functions with types | C2 | 1 |
| 3 | Extend the concept of sets to ordered sets, cardinality, and ordinal numbers | C2 | 1 |

**PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the following PLOs:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 1 | Mathematics Knowledge | **◼** | 7 | Environment and Sustainability | ☐ | | 2 | Problem Analysis | ☐ | 8 | Ethics | ☐ | | 3 | Design/Development of Solutions | ☐ | 9 | Individual and Teamwork | ☐ | | 4 | Investigation | ☐ | 10 | Communication | ☐ | | 5 | Modern Tool Usage | ☐ | 11 | Task Management | ☐ | | 6 | The Mathematician and Society | ☐ | 12 | Lifelong Learning | ☐ | |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Contents:**

**SETS:** Set, set notations: tabular, descriptive and set builder. Equal and equivalent sets, operations on sets: subset, empty set, power set of a set, union, intersection, differences of sets, de Morgan's laws, ordered pairs, Cartesian product of sets, infinite Cartesian products, representation of sets as bit strings, principle of inclusion/exclusion, ordered pair.

**RELATIONS AND FUNCTIONS:** Pictorial representation of relations, composition of relations, types of relations, partial ordering relations, *n*-Ary Relations, composition of functions, types of function.

**CARDINALITY NUMBERS:** Cardinality of sets, equipotent sets, denumerable and countable sets, cardinal numbers and Algebra of (Addition, multiplication and Cartesian products), continuum cardinality and Cantor's theorem.

**ORDERED SETS:** Ordered sets, set construction and order, partially ordered set, minimal and maximal elements, isomorphic ordered sets.

**ORDINALS NUMBERS:** Well-ordered sets, limit elements, similarity between well-ordered and its subsets, ordinals numbers and its arithmetical operations.

**BOOKS RECOMMENDED:**

1. Lipstchiz, S: Set theory and Related topics; Schaum's outline series, McGraw Hill Book Company.
2. Discrete Mathematics for Computer Scientists, Gray Haggard, John Schlipf, Sue Whitesides, (Latest Edition)
3. Set Theory: A first course, Daniel W. Cunnunngham, Cambridge University Press, (Latest Edition)
4. Hand Book of Set Theory; Matthew Foreman, Akihiro Kanamori: Springer Netherlands, 2010
5. Herbert Enderton: Elements of Set Theory, Gulf Professional Publishing, (Latest Edition)

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

**Title of Subject: Functional English Marks: 100**

**Discipline: Mathematics**

**Code: ENG 101**

**Pre-requisites: Intermediate**

**Assessment: 20% Sessional work, 20% midterm, 60% final examination**

**Credit Hours: 03 Minimum Contact Hours: 45**

**Aims:** Enable students to use four skills of language with confidence and use different components of grammar

**Objectives**: To comprehend authentic text

Composing different types of sentences

Listen and comprehend lectures and collect information

Identify and improve pronunciation with the help of sounds, Individual and combination of diphthongs, stress patterns and intonation

After completion of this course the student should be able to:

|  |  |  |  |
| --- | --- | --- | --- |
| CLO | Description | Maximum Taxonomy  Level | PLOs |
| 1 | **Write** varied contents including official letters, e-mails, and applications and summarize the texts using appropriate grammatical mechanisms and cohesive devices. | C2 | 12 |
| 2 | **Apply** skimming, scanning and detailed reading and listening strategies to understand gist of the text/conversation. | C3 | 2 |
| 3 | **Utiliz**e their skills using English language to express their point of view, show arguments and deliver a presentation in a real-life situation. | C3 | 7 |

The course is designed so that students will achieve the following PLOs:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Applied and Basic Mathematics Knowledge | ☐ | 7 | Communication | **◼** |
| 2 | Problem Analysis | **◼** | 8 | The Mathematician and Society | ☐ |
| 3 | Investigation | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Design/Development of Solutions | ☐ | 10 | Project Management | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Environment and Sustainability | ☐ |
| 6 | Ethics | ☐ | 12 | Lifelong Learning | **◼** |

**Content**:

Reading: Interactive Reading, apply the skills of surveying skimming, scanning and detailed reading and identify topic sentence

Writing: Audience Related Writing, composition of sentences, Paragraph, short descriptive writing, précis and letter and application, identify contextual clues with the help of cohesive devices.

Listening: Collect gist and important points from a listening text or any other oral source viz. Lecture, speech or conversation

Speaking: Taking part in different real-life situations, answer question, argue and explain one’s point of view, ask for in format-

ion turn taking techniques and presentation skills.

Grammar: Mechanics of English Language, Punctuation, vocabulary, conversion of words, tenses and sentence structure

**Recommended Materials:** Dawn newspaper, Reader Digest, New Scientist and other interesting materials selected by teachers

Books: A. J, Thomson and A. v. Martinet and Practical English Grammar

Sarwar Zakia, (Edt) 1991 English Study Skills A Spelt Publication Karachi.

R.R. Jordon, 1980 Collins Study skills in English. William Collins Sons & Co. Glasgow Great Britain.

Jones Rhodri, 1986, A New English Course (An Approach to GCSE English Language for Individual Study or Class Use)

K. James at al, 1986, Listening Comprehension and Note-Taking Course (Collins Study Skills In English)

Selected Text from Dawn, Readers Digest, New Scientist and other relevant material of teacher’s Choice.

**Book:** 1. Oxford Advanced Learning’s Dictionary

2. Oxford Practice grammar By John Eastwood

3. English for Undergraduates by D.H. Howe, T.A. Kirkpatrick and D. L.

4. Essential Grammar in use By Raymond Murphy

5. The concise Guide to writing by Rise B. Axelrod Charles R. Cooper

6. Academic Writing Course by R. R. Jordan

7. Study Skills in English by Michael J.

8. A practical English Grammar by Thomas and Martinet

9. The Ultimate Job search Letter by Martin Yat

10. English for Business by J. Chiver

11. How to Write Better English by Robert allen.

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

Title of Subject : ISLAMIC STUDIES Code: SS 111

Discipline : AR/CRP/TE/MN/MT/IN/ME/CH/PG/EE/TL

: CE/EL/CS/SW/ES/BM

Semester : 1st semester and 2nd semester

Effective : 17 Batch onwards

Pre-requisites : Social Science

Assessment : 20% Sessional, 20% Mid Semester and 60% End Semester

Marks : TH: 50 PR: 00

Credit Hours : TH: 02 PR: 00

Min. Contact Hours : TH: 30 PR: 00

**Course Learning Outcomes:**

On completion of this course the students should be able to:

|  |  |  |  |
| --- | --- | --- | --- |
| CLO | Description | Maximum Taxonomy  Level | PLOs |
| 1 | Explain scope and significance of basic **beliefs & pillars** of Islam, their effects on different aspects of individual life and society | C2 | 6 |
| 2 | Enhance understanding of **Quran, Hadith and life of Holy Prophet Muhammad (ﷺ)** as the source of inspiration and guidance. | C2 | 8 |

**PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the following PLOs:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Mathematics Knowledge | ☐ | 7 | Environment and Sustainability | ☐ |
| 2 | Problem Analysis | ☐ | 8 | Ethics | **◼** |
| 3 | Design/Development of Solutions | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Investigation | ☐ | 10 | Communication | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Task Management | ☐ |
| 6 | The Mathematician and Society | **◼** | 12 | Lifelong Learning | ☐ |

**Course Contents:**

**Quran and Uloomul Quran:** Surah Al-Hujurat., Surah Al-Furqan (These both surahs cover all topics related to

ethical values of Islamic society including Taqwa, Taqwa, Simplicity, Lawful earning, Social Justice, Rights

of Parents, elders, neighbors, Fear of Allah and Truthfulness), Excellence of Holy Quran (Aijazul Quran),History

of collection and compilation of Holy Quran.

**Basic Beliefs of Islam:** Tauheed, its importance, effects on the life of believer, shirk and its types, Existence of Angles, Holy Scriptures, Prophethood, its need and necessities, characteristics and Finality of Prophethood, Concept on life hereafter.

**Life history of Holy Prophet Muhammad (ﷺ):** Life history at Makkah (Before Prophethood), Life history at Makkah (after Prophethood), Life history at Madina {including Brotherhood, Charter of Madina, Victory of Makkah and Last Sermon of Holy Prophet Muhammad **(ﷺ**), Importance of Hadith and Sunnah, Ten selected Ahadiths (Covering topics related to Proper usage of time, Hospitality, quality of shyness, love and affection to humanity, facilitate to others and tolerance etc).

**Fundamentals of Islam:** Testifying KalimaShahadah, Prayer, its importance, pre-conditions, obligations and effects, Zakat, its aims & objectives, Requirements, Legal recipients, Nisab and benefits, Fasting, its philosophy, requirements and benefits, Pilgrimage, requirements, types, obligations, procedure and benefits, Jihad and its types.

**Islam and Science:** Quran and Science, Importance of science and technology in Islam, Historical contribution of Islam and Muslims in the development of science, Verses of Holy Quran those cover different fields of science e.g. social, management and natural science.

**Text books :**

A.A. Umrani, **Islam: The universal Religion**, Naseem book depo, latest edition.

A.Q. Natiq, **Sirat-e-Mustaqeem**, Urdu bazzar Karachi, latest edition.

**Reference books:**

S.M. Saeed, **Islam aurHamariZindagi**, Naseem book depo, latest edition.

M. Shabudden, **Quran Science and Muslims**, Al Maktabah Al Ashrafiya, Lahore, latest edition.

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

Title of Subject : Ethics (optional for only non-Muslim students) Code: SS 104

Discipline : AR/CRP/TE/MN/MT/IN/ME/CH/PG/EE/TL CE/EL/CS/SW/ES/BM/MTE

Semester : 1st semester and 2nd semester

Effective : 17 Batch onwards

Pre-requisites : Social Science

Assessment : 20% sessional work Mid-sem. Exam: 20% End-Sem Exam: 60%

Marks : TH: 50 PR: 00

Credit Hours : TH: 02 PR: 00

Min. Contact Hours : TH: 30 PR: 00

**Course Learning Outcomes:**

After completing this course student should be able to:

|  |  |  |  |
| --- | --- | --- | --- |
| **CLO No.** | **Description** | Taxonomy  Level | PLOs |
| 1 | Create stable and healthy civilized society. | C2 | 6 |
| 2 | Develop uniformity of moral beliefs and behavior. | C2 | 8 |

**PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the following PLOs:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Mathematics Knowledge | ☐ | 7 | Environment and Sustainability | ☐ |
| 2 | Problem Analysis | ☐ | 8 | Ethics | **◼** |
| 3 | Design/Development of Solutions | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Investigation | ☐ | 10 | Communication | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Task Management | ☐ |
| 6 | The Mathematician and Society | **◼** | 12 | Lifelong Learning | ☐ |

**Course Contents:**

**Ethics:** Definition of Ethics, Position of ethics in different religions.

**Islam:** Introduction, Role of Beliefs and Arakans in character building, Rights of Non-Muslim, Ill effects of corruption and respect of law.

**Hinduism:** Introduction, Role of doctrines in character building, Religious books, Concept of Re-Birth and its influence in social life, Celebration days and their social effects, Comparative study of cast systems in the contemporary atmosphere.

**Buddhism:** Introduction, Doctrines, Eight Nobel Paths of Buddha and its benefits, Critical study on concept of Renunciation of material & worldly life.

**Christianity:** Introduction, Doctrines, Religious books, Celebration days.

**Judaism:** Introduction, Doctrines, Religious books, Ten Commandments of Moses and its importance in social life.

**Moral values of different religions:** Patience, Modesty, Moderation, Tawakal, Taqwa, Lawful earning, Sincerity, Positivity, Forgiveness and Softening.

**Bad morals:** lying, pride, selfishness, Fame, Greed, Extravagantness, Bribe, Social injustice, Religious biasness and Discrimination on the basis of race, color and faith

**Text Books:**

1. Dr. A Rasheed, Comparative Study of Religions Tahir sons Karachi, latest edition.
2. AadilFaraz, IkhlaqiyatMazahib-e-Aalamkinazar main, ApnaIdara Lahore latest edition.

**Reference Books:**

1. Jeoge D. Chryssides, the study of religions – an introduction to key ideas and methods, London, latest edition.
2. GhulamRasool Cheema MazahibAalamkaMutalia, Ilm o Irfan publishers Lahore latest edition.

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

**Title of Subject: Physics-I Marks: 100**

**Discipline: Mathematics**

**Code: MEBP 101**

**Pre-requisites: Intermediate**

**Assessment: 20% Sessional work, 20% midterm, 60% final examination**

**Credit Hours: 03 Minimum Contact Hours: 45**

**Objective:** Introduce the idea of motion and energy

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Applied and Basic Mathematics Knowledge | ☐ | 7 | Communication | ☐ |
| 2 | Problem Analysis | ☐ | 8 | The Mathematician and Society | ☐ |
| 3 | Investigation | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Design/Development of Solutions | ☐ | 10 | Project Management | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Environment and Sustainability | ☐ |
| 6 | Ethics | ☐ | 12 | Lifelong Learning | ☐ |

**Contents:**

**Introduction:** standards of length, mass and time, the building block of matter, dimensional analysis, uncertainty in measurement and significant figures, conversion of units, estimates and order of magnitude calculations, coordinate system, trigonometry, problem solving strategy,

**Vector:** introduction to vectors, geometrical representation of vector, laws of vectors, triple scalar and vector product, vector algebra and calculus.

**Vectors and Two-three-dimensional Motion:** Vectors and their Properties, Components of vectors, displacement, Velocity, and Acceleration in two dimensions, Motion in two dimensions, Relative velocity, projectile motion, freely fall objects projectile motion analyzed, Momentum: Linear momentum, the linear momentum of a system of particles, conversation of linear momentum, angular momentum.

**Laws of Motion:** Forces, Newton’s Laws, Application of Newton’s laws, forces of friction

**Work and Energy:** work, work done by gravitational force, work done by spring force, work done by a general variable force, power. Kinetic energy and work-energy theorem, gravitational, spring potential energy, systems and energy conversation, power, work done by varying force.

**Motion in Space:** Gravity, Circular motion, Centripetal force, Centrifugal Force, Newton gravitational Law, Kepler’s Law.

**Recommended Books**

1. [University Physics with Modern Physics](http://www.amazon.com/gp/product/0321696867/ref=as_li_qf_sp_asin_il_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=0321696867&linkCode=as2&tag=physidatab-20&linkId=W7YL5BG4M25YML57" \t "_blank)**[by Young, Freedman & Lewis Ford](http://www.amazon.com/gp/product/0321696867/ref=as_li_qf_sp_asin_il_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=0321696867&linkCode=as2&tag=physidatab-20&linkId=W7YL5BG4M25YML57" \t "_blank)**
2. [Physics for Scientists and Engineers with Modern Physics](http://www.amazon.com/gp/product/0131495089/ref=as_li_qf_sp_asin_il_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=0131495089&linkCode=as2&tag=physidatab-20&linkId=WQBXZ72RYPMG4VAX" \t "_blank)**[by Douglas C. Giancoli](http://www.amazon.com/gp/product/0131495089/ref=as_li_qf_sp_asin_il_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=0131495089&linkCode=as2&tag=physidatab-20&linkId=WQBXZ72RYPMG4VAX" \t "_blank)**
3. **[Fundamentals of Physics by David Halliday, Robert Resnick and Jearl Walker](http://www.amazon.com/gp/product/0470469080/ref=as_li_qf_sp_asin_il_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=0470469080&linkCode=as2&tag=physidatab-20&linkId=XDV7X2LRQRHHADKI" \t "_blank)**
4. [Physics for Scientists and Engineers: A Strategic Approach](http://www.amazon.com/gp/product/0321740904/ref=as_li_qf_sp_asin_il_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=0321740904&linkCode=as2&tag=physidatab-20&linkId=CBHA4MWWLIG7MIZG" \t "_blank)**[by Randall D. Knight](http://www.amazon.com/gp/product/0321740904/ref=as_li_qf_sp_asin_il_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=0321740904&linkCode=as2&tag=physidatab-20&linkId=CBHA4MWWLIG7MIZG" \t "_blank)**

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCES AND RELATED STUDIES**

**Title of Subject: Introduction to Computer Marks: (100+50)**

**Discipline: Mathematics**

**Code: CS 130**

**Pre-requisites:**

**Assessment: 20% sessional work, 20% midterm, 60% final examination**

**Credit Hours: 03 Minimum Contact Hours: 45+30**

**Objectives:** To give idea of computers, Microsoft windows and office.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Applied and Basic Mathematics Knowledge | ☐ | 7 | Communication | ☐ |
| 2 | Problem Analysis | ☐ | 8 | The Mathematician and Society | ☐ |
| 3 | Investigation | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Design/Development of Solutions | ☐ | 10 | Project Management | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Environment and Sustainability | ☐ |
| 6 | Ethics | ☐ | 12 | Lifelong Learning | ☐ |

**Contents:**

**Introduction to Computer:** Importance of computer, Computers for individual users: desktop computers, workstations, notebook computers, tablet PCs, handhold PCs, smart phones, Computers for organizations: Network services, mainframe computers, minicomputers, super computers, Parts of computer: hardware, software, data, Memory devices: Random access memory (RAM), Read-only memory (ROM), Input and output devices, both input-output devices.

**Microsoft windows:** Operating system**:** History and development of Microsoft and windows, Windows versions through the year: 1985 windows 1.0, 1987 windows 2.0 & 2.11, 1990 windows 3.0, 1993 windows NT, 1995 windows 95, 1998 windows 98, 2000 windows ME, 2001 windows XP, 2006 windows vista, 2009 windows 7, 2012 windows 8, 2015 windows 2010, Other operating system: UNIX, Mac OS X, Novell NetWare, Linux/FreeBSD differences in windows operating system,

**Microsoft office:** Getting familiar**: (Word, Excel, Power Point, Outlook)**, documents navigation tips, manipulating texts, formatting characters, formatting paragraph, themes and templates, quick parts, preparing documents for printing, organizing contents, tabs, column, charts, links, headers, footers, references, mail merge, visual contents, reviewing documents, protecting, and sharing documents,

Spread Sheets (Microsoft Excel) and other related software Packages (at least two).

### Internet access and different data bases available on the internet

**BOOKS RECOMMENDED:**

1. Introduction to Computer; Revised addition Peter Norton; Tata McGraw-Hill
2. Brief introduction to Computers; Thomas J. Cashman, Gray B. Shelly; Course Technology, 1997
3. Introduction to Computers; Gray B. Shelly, Steven M. Freund, Misty E.Vermaat; Cengage Learning, 2010.
4. Computing fundamentals Introduction to computers; FaitheWempon, RoiseHatterley; Jhon Wiley& Sons, Inc.10475.
5. Introduction to Computer and Communications; D Ravichandran; Tata McGraw-Hill Publishing Company Limited, New Delhi.

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

**Title of Subject: Calculus-II Marks: 100**

**Discipline: Mathematics**

**Code: MATH 150**

**Pre-requisites: Calculus I**

**Assessment: 20% sessional work, 20% midterm, 60% final examination**

**Credit Hours: 03 Minimum Contact Hours: 45**

**Objective:** To introducing the students to infinite series, parametric curves and polar coordinates, it focuses on techniques of integration and applications of integrals.

**Specific Objectives of course:** This is second course of Calculus. In continuation of Calculus I, the course also aims at:

**Course Learning Outcomes**

After completion of this course the student should be able to:

|  |  |  |  |
| --- | --- | --- | --- |
| CLO | Description | Maximum Taxonomy  Level | PLOs |
| 1 | Apply the partial derivatives with applications in optimization. | C3 | 2 |
| 2 | Use techniques of integration in physical and real-life situations. | C3 | 2 |
| 3 | Examine the curves with parametrization and polar coordinates and apply these concepts for areas and arc length. | C3 | 2 |

**PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the following PLOs:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Mathematics Knowledge | ☐ | 7 | Environment and Sustainability | ☐ |
| 2 | Problem Analysis | **◼** | 8 | Ethics | ☐ |
| 3 | Design/Development of Solutions | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Investigation | ☐ | 10 | Communication | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Task Management | ☐ |
| 6 | The Mathematician and Society | ☐ | 12 | Lifelong Learning | ☐ |

**Course Outline:**

**Partial derivatives:** Eulers Theorem **,**Maxima and Minima of function of two variables and their applications

**Techniques of integration**: Integrals of elementary, hyperbolic, Trigonometric, logarithmic and exponential functions. Integration by Parts, substitution and partial fractions. Reduction formula Approximate integration.

Improper integrals. Beeta and Gamma functions.

**Applications of integrals:** Area between curves, average value. Volumes. Arc length. Area of a surface of revolution. Applications to Economics, Physics, Engineering and Biology.

**Analytic geometry of 3-dimensions.**Introduction; Coordinates in R3.

**Line:** Coordination of a point dividing a line segment in a given ratio. Straight line, in R3. Vector form of a straight line, parametric equations of a straight line, equation of a straight line in symmetric form, direction ratios and direction cosines, angle between two straight lines; distance of a point from a line.

**Plane:** Equation of a plane, angle between two planes, intersection of two planes, a plane and a straight line; skew lines. Cylindrical and spherical coordinates.

**Sphere:** General equation of sphere. Latitude and longitude directions; direction of Qibla.

**Recommended Books (latest edition):**

1. Stewart, J., Clegg, D. K., & Watson, S. (2020). *Multivariable calculus*. Cengage Learning.
2. Zill, D., & Wright, W. S. (2009). *Calculus: early transcendentals*. Jones & Bartlett Learning.
3. Thomas, G. B., Weir, M. D., & Hass, J. (2013). *Thomas' Calculus: Single Variable*. Pearson.
4. Zill, D. G., & Dewar, J. M. (2015). *Precalculus with calculus previews*. Jones & Bartlett Publishers.
5. Anton, H., Bivens, I. C., & Davis, S. (2016). *Calculus: Early Transcendental Single Variable*. John Wiley & Sons.
6. Penney, D. E., & Edwards, C. H. (1994). *Calculus and Analytic Geometry*. Prentice-Hall International.
7. Larson, R., & Edwards, B. H. (2010). *Calculus: Early transcendental functions*. Cengage Learning.
8. Zill, D. G. (2020). *Advanced engineering mathematics*. Jones & Bartlett Publishers.
9. Greenwell, R. N., Lial, M. L., & Ritchey, N. P. (2017). *Calculus with applications*. Pearson Education.
10. Stewart, J., Clegg, D. K., & Watson, S. (2020). *Multivariable calculus*. Cengage Learning.
11. Zill, D. G., & Wright, W. S. (2009). *Multivariable Calculus*. Jones & Bartlett Publishers.

**Approved:** Board of Studies, BSRS: Res. No. 02, Dated: 07-11-2023

Board of Faculty (FOST&H) Dated:

Academic Council Dated

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCES AND RELATED STUDIES**

**Title of Subject: Discrete Mathematics and Graph Theory Marks: 100**

**Discipline: Mathematics (2nd Semester)**

**Code: MATH 155**

**Pre-requisites: Intermediate**

**Assessment: 20% Sessional work, 20% midterm, 60% final examination**

**Credit Hours: 03 Minimum Contact Hours: 45**

**Objectives:** To equip students with skills necessary for decision making in non-continuous situations.

**Course Learning Outcomes**

After completion of this course the student should be able to:

|  |  |  |  |
| --- | --- | --- | --- |
| CLO | Description | Maximum Taxonomy  Level | PLOs |
| 1 | Extend basic concepts of sets and induction to solve problems on formal logic and Boolean algebra | C3 | 1 |
| 2 | Understand basic counting methods and solve recurrence relations with principles and applications | C3 | 2 |
| 3 | Understand and apply concepts of graphs and trees with relevant algorithms | C3 | 4 |

**PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the following PLOs:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Mathematics Knowledge | **◼** | 7 | Environment and Sustainability | ☐ |
| 2 | Problem Analysis | **◼** | 8 | Ethics | ☐ |
| 3 | Design/Development of Solutions | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Investigation | **◼** | 10 | Communication | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Task Management | ☐ |
| 6 | The Mathematician and Society | ☐ | 12 | Lifelong Learning | ☐ |

**Contents:**

**Sets and Induction:** Basic Definitions, Sets, Operations on Sets, Principle of Inclusion-Exclusion, Mathematical Induction, Program Correctness

**Formal Logic and Boolean Algebra:** Propositional logic, Truth and logical truth, Predicates and quantification, Boolean algebra, Boolean variable, Boolean expression, DeMorgan’s Theorem,

**Counting methods:** Basic methods: product, inclusion-exclusion formulae. Permutations and combinations. Recurrence relations and their solutions. Generating functions. Double counting. Applications. Pigeonhole principle, applications.

**Recurrence Relations:** solving first order recurrence relations, solution of homogeneous and non-homogeneous difference equations.

**Graphs:** Graph terminology. Representation of graphs. Graphs isomorphism. Algebraic methods: the incidence matrix. Connectivity, Eulerian and Hamiltonian paths. Shortest path problem. Trees and spanning trees. Complete graphs and bipartite graphs.

**Recommended Books:**

1. K.H. Rosen, *Discrete Mathematics and its Application*, McGraw-Hill,

(Latest Edition)

1. K.R. Parthasarathy, *Basic Graph Theory*, McGraw-Hill, (Latest Edition)
2. D.P Acharjya, Sreekumar, *Fundamental Approach to Discrete Mathematics*, (Latest Edition)
3. Gary Haggard, John Schlipf, Sue Whitesides, Discrete *Mathematics for Computer Science*, (Latest Edition)
4. Joe L. Mott, Abraham Kandel, Theodore P Baker , *Discrete Mathematics for Computer Scientists and Mathematicians*, (Latest Edition)

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

**Title of Subject : Statistics and Probability Marks: 100**

**Discipline : Mathematics**

**Code : MATH 160**

**Pre-requisites : Intermediate**

**Assessment : 20% sessional work, 20% midterm, 60% final examination**

**Credit Hours : 03 Minimum Contact Hours: 45**

**Objective:** Introduce the concept of descriptive statistics and basics of Probability

**Course Learning Outcomes:** After completion of this course the students should be able to

|  |  |  |  |
| --- | --- | --- | --- |
| CLO | Description | Maximum Taxonomy  Level | PLOs |
| 1 | Understand basic concepts with statistical techniques for the measure of central values of a data and their interpretation | C2 | 2 |
| 2 | Discuss basic concepts of probability theory with several types of probabilities and their applications | C2 | 4 |
| 3 | Describe the least squares method for fitting of different curves, simple regression, and correlation | C2 | 3 |

**PROGRAM LEARNING OUTCOMES (PLOs):**

The course is designed so that students will achieve the following PLOs:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Mathematics Knowledge | ☐ | 7 | Environment and Sustainability | ☐ |
| 2 | Problem Analysis | **◼** | 8 | Ethics | ☐ |
| 3 | Design/Development of Solutions | **◼** | 9 | Individual and Teamwork | ☐ |
| 4 | Investigation | **◼** | 10 | Communication | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Task Management | ☐ |
| 6 | The Mathematician and Society | ☐ | 12 | Lifelong Learning | ☐ |

**Contents:**

### Introduction to statistics: Nature and importance of statistics, descriptive and inferential statistics; population and samples.

**Data organization:** Frequency distribution and its graphical representation.

**Descriptive measures:** Measures of central tendency and dispersions.

**Probability:** Counting techniques. Random Experiment. Sample Space. Events and types of Events. Operations on Events. Introduction to Probability. Addition and Multiplication Law of Probability. Conditional Probability. Bayes’ theorem.

**Probability Distribution:** Concept of random variable. Discrete and Continuous Random Variable. discrete probability distribution. Case study. Continuous probability distribution, Probability density function, joint probability distribution. Mean and variance of a random variable. Binomial probability distribution. Mean and variance of binomial distribution. Poisson distribution, Mean and variance of Poison distribution. Normal distribution. Standard normal distribution, inverse use of table for area under the normal curve; applications.

**Curve fitting by least squares method:** Goodness of fit, fitting a straight, parabola and higher degree curves.

**Simple regression and correlation:** Regression analysis by least squares method, testing the significance of the slope, simple correlation analysis, coefficient of correlation and coefficient of determination, testing the significance of r; Rank correlation.

**Books Recommended:**

* M. Anwar Solangi; Statistical Methods and Estimations
* Ronald Walpole, Introductory Statistics
* Sher Muhammad Choudhry, Introduction to Statistics vol. I & II
* Iqbal Bhatti, Elements of Statistics
* Douglas C. Montgomery, Applied Statistics and Probability for Engineering.

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

**Title of Subject : Communication Skills Marks: 100**

**Discipline : Mathematics**

**Code : ENG 102**

**Pre-requisites : Intermediate**

**Assessment : 20% Sessional work, 20% midterm, 60% final examination**

**Credit Hours: 03 Minimum Contact Hours:45**

**Objective:**

* To provide detailed knowledge of writing technicalities
* To provide understanding and acquiring the sense of effective writing, create and write different forms
* To enable students to use the mechanical tools of writing.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Applied and Basic Mathematics Knowledge | ☐ | 7 | Communication | ☐ |
| 2 | Problem Analysis | ☐ | 8 | The Mathematician and Society | ☐ |
| 3 | Investigation | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Design/Development of Solutions | ☐ | 10 | Project Management | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Environment and Sustainability | ☐ |
| 6 | Ethics | ☐ | 12 | Lifelong Learning | ☐ |

**Contents:**

Introduction to Writing: approaches, practices, purposes and characteristics. Kinds of Writing. Informal Writing: Diaries and Journals, Strategies. Formal Writing: Grammar in context, Fiction, Autobiography, The Language of Reporting, Polemical Writing, Travel Writing, Instruction Texts, Focus on Emotive language, Focus on Persuasive Language. Writing Modes. The Process of Writing. Paragraph Writing: Structure and Characteristics. Forms of Writing: Story writing, Life stories, Letter writing, Advertisements and Persuasive texts, Descriptive Writing, Academic Writing, Essay Writing, Article Writing.

**Recommended Books:**

* Webster’s New World Student Writing Handbook, (2009) by Sharon Sorenson.
* Teaching Writing, (2008) by Gail E. Tompkins.
* Heath Grammar and Composition, (1988) by Carol Ann Bergman and J. A. Senn.
* Focus on Composition, (1978) by Ann Raimes.
* Writing as Learning, (2006) by Evelyn Rothstein and Gerald Lauber.

**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

Title of Subject : Pakistan Studies (Compulsory) Code: PS 106

Discipline : ME/CH/PG//MT/MN/IN/CRP/TE/TL

: EE/BM/SW/ES/CE/CS/EL/MTE

Semester : 1st semester and 2nd semester

Effective : 17 Batch onwards

Pre-requisites : Social Science

Assessment : 20% sessional work Mid-sem. Exam: 20% End-Sem Exam: 60%

Marks : TH: 50 PR: 00

Credit Hours : TH: 02 PR: 00

Min. Contact Hours : TH: 30 PR: 00

**Course Learning Outcomes :**After completion of this course the student should be able to

|  |  |  |  |
| --- | --- | --- | --- |
| CLO | Description | Taxonomy  Level | PLOs |
| 1 | Trace the Muslim Nationalism in South Asia and the creation of Pakistan | C2 | 8 |
| 2 | Discuss the Constitutional and Political history of Pakistan and to analyze contemporary challenges to Pakistan | C2 | 11 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Applied and Basic Mathematics Knowledge | ☐ | 7 | Communication | ☐ |
| 2 | Problem Analysis | ☐ | 8 | The Mathematician and Society | **◼** |
| 3 | Investigation | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Design/Development of Solutions | ☐ | 10 | Project Management | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Environment and Sustainability | **◼** |
| 6 | Ethics | ☐ | 12 | Lifelong Learning | ☐ |

**Contents**

***The Historical Background of Pakistan***

Evolution and growth of Muslim society in Subcontinent

Muslim Revivalist and Reformist Movements

The Factors that shaped the Muslim Nationalism in the Subcontinent

The Factors that led birth to Pakistan

Ideology of Pakistan with special reference to Allama Muhammad Iqbal and Quaid-e-Azam Muhammad Ali Jinnah

Role of Sindh in Making of Pakistan

***History of Internal and External Affairs of Pakistan:***

The Constitutional and Political Developments in Pakistan (1947-1973)

The Constitution of 1973; Salient Features and Amendments

Political Development in Pakistan (1973 to date)

Determinants of Foreign Policy of Pakistan

Pakistan’s Relations with Big Powers

***Contemporary Pakistan (Issues and Challenges):***

Geo-Strategic Significance of Pakistan

Economic Potential and its Utilization

Challenges to National Security of Pakistan

Internal Political, Economic and Legal Problems

Futuristic Outlook of Pakistan

**Books Recommended:**

* Abdul Sattar, (2017), *Pakistan’s Foreign Policy 1947–2016 A Concise History* (4th ed.), Karachi: Oxford University Press.
* Cohen Stephen, (2011), *The Future of Pakistan*. Washington: Brookings Institute Press.
* Hussian, Zahid, (2007), *Front line Pakistan: The Struggle with Militant Islam*, New York: I.B.Tauris.
* Jalal, Ayesha, (2014), *The Struggle for Pakistan: A Muslim Homeland and Global Politics*, The Belknap Press of Harvard University Press.
* Kazimi, M. R., (2008), *A Concise History of Pakistan*, Karachi: Oxford University Press.
* Khan, Hamid, (2017), *Constitutional and Political History of Pakistan* (3rd ed.), Karachi: Oxford University Press.
* Long, Roger D., (2015), *A History of Pakistan*, Karachi: Oxford University Press.
* Rais, RasulBakhsh, (2017),  *Islam, Ethnicity, and Power Politics: Constructing Pakistan’s National Identity*, Karachi: Oxford University Press.
* Riedel, Bruce, (2011), *Deadly Embrace: Pakistan, America, and the Future of Global Jihad*, Washington: Brookings Institute Press.
* Sayeed, K. B., (1960), *Pakistan: The Formative Phase*, Karachi: Oxford University Press.
* Talbot, Ian, (2014), *Pakistan: A New History*, Karachi: Oxford University Press.
* Wolpert, Stanley, (1997), *Jinnah of Pakistan*, Karachi: Oxford University Press.**MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO**

**DEPARTMENT OF BASIC SCIENCE AND RELATED STUDIES**

**Title of Subject : Physics-II Marks: 100**

**Discipline : Mathematics**

**Code :EL 127**

**Pre-requisites : Intermediate**

**Assessment : 20% Sessional work, 20% midterm, 60% final examination**

**Credit Hours : 03 Minimum Contact Hours:45**

**Objective:** Introduce the idea of Modern and Nuclear Physics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 | Applied and Basic Mathematics Knowledge | ☐ | 7 | Communication | ☐ |
| 2 | Problem Analysis | ☐ | 8 | The Mathematician and Society | ☐ |
| 3 | Investigation | ☐ | 9 | Individual and Teamwork | ☐ |
| 4 | Design/Development of Solutions | ☐ | 10 | Project Management | ☐ |
| 5 | Modern Tool Usage | ☐ | 11 | Environment and Sustainability | ☐ |
| 6 | Ethics | ☐ | 12 | Lifelong Learning | ☐ |

**Contents:**

**PHYSICS OF ATOMIC STRUCTURE AND ELECTRICITY**

Atomic structure. Atomic bonding. Electromotive force and potential difference. Current. Effects of electric current. Conductor. Insulator. Semiconductor. Electrical quantities. Resistance. Alternating Current.

**ELECTROSTATICS AND CAPACITANCE**

Coulomb’s law. Electric charge. Electric field. Electric field strength and Electric Flux. Gauss's law. Electric potential. Dielectric. Capacitance. Charging and Discharging of Capacitor. Capacitors in series and in parallel. Energy in capacitor.

**ELECTROMAGNETISM**

Magnetic fields. Characteristic of lines of magnetic flux. Magnetic fields due to currents. Electromagnet. Force on current carrying conductor in magnetic field. Electromagnetic induction. Magnetomotive force., Permeability. Reluctance.

Self-inductance. Inductance of a coil, Air core and Iron cored inductor. L/R Time constant. Energy stored in inductance. Mutual inductance. Electromagnetic oscillations. Alternating current. Principle of transformer. Principles of dc generator and motor.

**SEMICONDUCTOR PHYSICS**

Energy levels in a semiconductor. Hole concept. Intrinsic and Extrinsic regions. PN junction. Doppler effect.

**NUCLEAR PHYSICS**

Nuclear properties. Alpha decay. Beta decay. Gamma decay. Medical uses of nuclear radiation. Fission and Fusion. Nuclear radiation and hazards.

**Recommended Books:**

* Modern quantum mechanics, by sakurai
* Introductory nuclear physics. by Krane
* Fundamentals of Applied Electromagnetics 7th Edition , Fawwaz T. UlabyUmebertoRavaioli , 2014
* Engineering Electromagnetics, Umran S. InanAzizInan , 1998.(Latest Edition)
* Engineering Electromagnetics, Nathan Ida , 2015