

PROGRAM: THREE YEAR DIPLOMA IN ENGINEERING AND TECHNOLOGY *	
Course Code: BS201	Course Title: Applied Mathematics-II
Semester: 2nd	Credit: 4
Periods Per Week: 4 (L: 03, T: 01, P: 0)	

(* Common to Architecture Assistantship, Automobile, Civil, Civil(PHE), QSCM, Computer , Electrical , E&C, Medical Electronics, Food Technology, I&C, Leather Technology, Mechanical, Textile Technology, Wood Technology and IT)

COURSE OBJECTIVE:

This course is designed to develop an understanding of basic mathematical and statistical tools which include matrices, determinants, integral calculus and coordinate geometry and the applications of such tools in the field of engineering and technology

COURSE CONTENT

1. Integral Calculus

- 1.1 Integration as inverse operation of differentiation
- 1.2 Simple integration by substitution, by parts and by partial fractions (for Linear factors only)
- 1.3 Evaluation of definite integrals (simple problems)-

$$\text{Evaluation of } \int_0^{\pi/2} \sin^n x \cdot dx, \int_0^{\pi/2} \cos^n x \cdot dx, \int_0^{\pi/2} \sin^m x \cdot \cos^n x \cdot dx$$

Using formulae without proof (m and n being positive integers only)

2. Coordinate Geometry

- 2.1 Equation of straight line in various standard forms (without proof), intersection of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.
- 2.2 General equation of a circle and its characteristics. To find the equation of a circle, given: Centre and radius, three points lying on it and coordinates of end points of a diameter.
- 2.3 Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Basic problems on conics when their foci, directrices or vertices are given.

3 Matrices and Determinants

- 3.1 Definition of matrix and its types.
- 3.2 Addition, subtraction and multiplication of matrices.
- 3.3 Expansion of Determinants.

4 Statistics

- 4.1 Measures of Central Tendency: Mean, Median, Mode
- 4.2 Measures of Dispersion: Mean deviation, Standard deviation
- 4.3 Basic Concepts of Probability.

COURSE OUTCOME

After the completion of the course the student will be able to:

- evaluate both indefinite and definite integrals by various methods
- identify various points in a 2-D space along with formulation of equations and graphs for different types of lines, circles, ellipses, parabolas etc.
- find the sum, difference and product of two or more matrices,
- evaluate determinants and their relations to matrices
- find the mean, median, mode and other measures of central tendency.
- solve basic problems on probability.

RECOMMENDED BOOKS:

1. R.D Sharma, Applied Mathematics-II.
2. H.K Das, Applied Mathematics.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
4. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
5. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
6. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi
7. Applied Mathematics-II, Eagle Publications.

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	16	35
2	10	20
3	12	25
4	10	20
Total	48	100

PROGRAM THREE YEAR DIPLOMA IN ENGINEERING AND TECHNOLOGY	
Course Code: ES202	Course Title: Introduction to Computers and Information Technology
Semester: 2nd	Credit: 2
Periods Per Week: 4 (L: 0 T: 0 P: 4)	

(* Common to Architecture Assistantship, Automobile, Civil, Civil(PHE), QSCM, Computer , Electrical , E&C, Medical Electronics, Food Technology, Garment Technology, I&C, Leather Technology, Mechanical, Textile Design, Textile Technology, Travel and Tourism, MLT, Wood Technology and IT)

COURSE OBJECTIVE

Information technology has great influence on all aspects of our life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools of MS Office/Open Office using internet etc. form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

COURSE CONTENT

1. Basics of Information Technology

- 1.1. Its concept and scope, applications of IT, ethics and future with information technology.
- 1.2. Impact of computer and IT in society.
- 1.3. Computer application in office, book publishing, data analysis, accounting, investment, inventory control, graphics, air and railway ticket reservation, robotics, military, banks, Insurance financial transactions and many more.

2. Basic Components of Computer System

- 2.1. Block diagram of a computer System and Processing of Data.
- 2.2. Demonstration of computer system viz., Hardware, Software
- 2.3. Concept of Memory and its various types, Primary and secondary memories (RAM, ROM, Storage Devices etc).

3. Internet and its Applications

- 3.1. Introduction to Internet, its basic working.
- 3.2. Concept of Email, Social Media, Cloud Computing.
- 3.3. Basic ideas about IP Address, DNS, URL, Server, Web Browser, LAN etc.

4. Use of Various Basic Data Processing Softwares

4.1. Word Processing (Microsoft Word & Google Docs.)

- 4.1.1. File Management:
 - 4.1.1.1. Opening, creating and saving a document, locating files, copying contents in some different file(s).
- 4.1.2. Editing a document:
 - 4.1.2.1. Entering text, Cut, copy, paste using tool- bars
- 4.1.3. Formatting a document:
 - 4.1.3.1. Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
 - 4.1.3.2. Aligning of text in a document, justification of document, Inserting bullets and numbering
 - 4.1.3.3. Formatting paragraph, inserting page breaks and column breaks, line spacing
 - 4.1.3.4. Use of headers, footers: Inserting footnote, end note, use of comments
 - 4.1.3.5. Inserting date, time, special symbols, importing graphic images, drawing tools
- 4.1.4. Tables and Borders:
 - 4.1.4.1. Creating a table,
 - 4.1.4.2. Formatting cells,
 - 4.1.4.3. Use of different border styles, shading in tables,
 - 4.1.4.4. Merging of cells, partition of cells, inserting and deleting a row in a table
- 4.1.5. Print preview, zoom, page set up, printing options
- 4.1.6. Using Find, Replace options

4.2. Microsoft-Excel and Google Sheets

- 4.2.1. Introduction to Spreadsheet Application-Workbook and Worksheets
- 4.2.2. Working with data and formulas:
 - 4.2.2.1. Addition, subtraction, division, multiplication, percentage and autosum.
 - 4.2.2.2. Format data, create chart, printing chart, save worksheet, creating and formatting of charts and graphs

4.3. Presentation (Microsoft-PowerPoint and Google Slides)

- 4.3.1. Introduction to PowerPoint - How to start PowerPoint - Working environment: concept of toolbars, slide layout, templates etc. - Opening a new/existing presentation - Different views for viewing slides in a presentation: normal, slide sorter etc.
- 4.3.2. Addition, deletion and saving of slides.
- 4.3.3. Insertion of multimedia elements - Adding text boxes, importing pictures, movies and sound, tables and charts etc.
- 4.3.4. Formatting slides - Text formatting, changing slide layout, changing slide color scheme - Changing background, Applying design

template.

4.3.5. Viewing the presentation using slide navigator

COURSE OUTCOME

After the completion of the course the student will be able to:

- Identify the different hardware components and functional units of a Computer system.
- Explain basic concepts and working of internet.
- Create and format word documents by using different word processing software.
- Prepare the spread sheets and the presentation of data in different ways.
- Prepare power point presentations.

RECOMMENDED BOOKS:

1. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd-Jungpura, New Delhi
2. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
3. Fundamentals of Information Technology by Leon and Leon;Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
4. Basics of Information Technology, by Ishan Publications, Ambala
5. Information Technology for Management by Henery Lucas, 7th edition, Tata McGraw Hill Education Pvt Ltd, New Delhi

UNIT WISE TIME AND MARKSDISTRIBUTION

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	10
2	13	20
3	13	20
4	32	50
Total	64	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGG / CIVIL (PHE) / QSCM	
Course Code: ES207*	Course Title: APPLIED MECHANICS*
Semester: 2 ND	Credits: 05
Periods Per Week :5 (L: 4, T: 1, P:0)	

(* Common to Automobile, Civil, Civil (PHE), QSCM, Mechanical and Wood Technology)

COURSE OBJECTIVE:

The objectives of the course are to determine the resultant of various forces and to compute support reactions using equilibrium conditions for various structures and to understand the significance of friction in equilibrium problems, basic machine rules and their application in different engineering problems

COURSE CONTENT

1. Basics of mechanics and force system (17 Hours)

- 1.1. Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics
- 1.2. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units.
- 1.3. Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification.
- 1.4. Resolution of a force - Orthogonal components of a force, moment of a force, Varignon's Theorem
- 1.5. Composition of forces – Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces

2. Equilibrium (15 Hours)

- 2.1. Equilibrium and Equilibrant, Free body and Free body diagram, Analytical and graphical methods of analysing equilibrium
- 2.2. Lami's Theorem – statement and explanation, Application for various engineering problems.
- 2.3. Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple)
- 2.4. Beam reaction for cantilever, simply supported beam with or without overhang subjected to combination of Point load and uniformly distributed load.
- 2.5. Beam reaction graphically for a simply supported beam subjected to vertical point loads only.

3. Friction

(10 Hours)

- 3.1. Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction.
- 3.2. Equilibrium of bodies on level surface subjected to force parallel and inclined to plane.
- 3.3. Equilibrium of bodies on inclined plane subjected to force parallel to the plane only.

4. Centroid and Centre of gravity

(11 Hours)

- 4.1. Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle)
- 4.2. Centroid of composite figures composed of not more than three geometrical figures
- 4.3. Centre of Gravity of simple solids (Cube, cuboid, cone, cylinder, sphere, hemisphere)
- 4.4. Centre of Gravity of composite solids composed of not more than two simple solids

5. Simple lifting machine

(11 Hours)

- 5.1. Simple lifting machine, load, effort, mechanical advantage, applications and advantages.
- 5.2. Velocity ratio, efficiency of machines, law of machines.
- 5.3. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility
- 5.4. Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel, Single purchase and double purchase crab winch, Simple screw jack, Weston's differential pulley block, geared pulley block.

COURSE OUTCOME

After completing this course, the student will be able to:

- Identify the force systems for given conditions by applying the basics of mechanics.
- Determine unknown force(s) of different engineering systems.
- Apply the principles of friction in various conditions for useful purposes.
- Find the centroid and centre of gravity of various components in engineering systems.
- Calculate mechanical advantage, velocity ratio and efficiency of simple lifting machine

RECOMMENDED BOOKS

1. D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi.

2ND SEMESTER CURRICULUM OF THREE-YEAR DIPLOMA COURSES IN
POLYTECHNICS OF UT OF J&K

2. Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.
3. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
4. Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.
5. Dhade, Jamadar &Walawelkar, Fundamental of Applied Mechanics, Pune VidhyarthiGruh.
6. Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cambridge University Press.
7. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi
8. Applied Mechanics by Er. Arun Bangotra, Eagle Prakashan

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	Time (Hours)	Marks(%age)
1	17	25
2	15	22
3	10	17
4	11	18
5	11	18
Total	64	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGG / CIVIL (PHE) / QSCM	
Course Code: ES208*	Course Title: APPLIED MECHANICS LAB*
Semester: 2 ND	Credits: 01
Periods Per Week : 2 (L: 0, T: 0, P:2)	

(* Common to Automobile, Civil, Civil (PHE), QSCM, Mechanical and Wood Technology)

COURSE OBJECTIVES:

The objectives of the course are to determine the resultant of various forces and to compute support reactions using equilibrium conditions for various structures and to understand the significance of friction in equilibrium problems, basic machine rules and their application in different engineering problems

LIST OF PRACTICAL TO BE PERFORMED:

1. To study various equipment related to Engineering Mechanics.
2. To find the M.A., V.R., Efficiency and law of machine for Differential Axle and Wheel.
3. To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
4. Derive Law of machine using Worm and worm wheel.
5. Derive Law of machine using Single purchase crab.
6. Derive Law of machine using double purchase crab.
7. Derive Law of machine using Weston's differential or wormed geared pulley block.
8. Verification of Polygon Law of Forces using gravesand apparatus
9. Determine resultant of concurrent force system graphically.
10. Determine resultant of parallel force system graphically.
11. Verify Lami's theorem.
12. Study forces in various members of Jib crane.
13. Determine support reactions for simply supported beam.
14. To obtain support reactions of beam using graphical method.
15. Determine coefficient of friction for motion on horizontal and inclined plane.
16. Determine centroid of geometrical plane figures.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGG / CIVIL (PHE) / QSCM	
Course Code: CEPC202	Course Title: Construction Materials
Semester: 2nd	Credits: 4
Periods Per Week: 4 (L: 4, T: 0, P: 0)	

COURSE OBJECTIVE:

The concerned students have to supervise construction of various types of civil works involving use of various materials like stones, bricks and tiles, cement and cement based products, lime, timber and wood based products, paints and varnishes, metals and other miscellaneous materials. The students should have requisite knowledge regarding characteristics, uses and availability of various building materials and skills in conducting tests to determine suitability of materials for various construction purposes. In addition, specifications of various materials should also be known (PWD/BIS) for effective quality control.

COURSE CONTENT

1. Building Stones

- 1.1 Requirements of good building stones
- 1.2 Quarrying of stones by various methods
- 1.3 Physical classification: Unstratified, stratified and foliated rocks
- 1.4 Geological classification: Igneous, sedimentary and metamorphic rocks
- 1.5 Chemical classification; Calcareous, argillaceous and siliceous rocks

2. Bricks

- 2.1 Requirements of good bricks for construction.
- 2.2 Raw materials for brick manufacturing
- 2.3 Manufacturing of bricks
 - i. Preparation of clay
 - ii. Moulding, drying of bricks, burning of bricks
- 2.4 Types of kilns - Bull's Trench Kiln and Hoffman's Kiln
- 2.5 Classification and specifications of bricks as per BIS: 1077
- 2.6 Testing of common building bricks as per BIS: 3495
Compressive strength, water absorption test, efflorescence, Dimensional tolerance, soundness.

3. Tiles

- 3.1 Building tiles; Types of tiles-wall, ceiling, roofing and flooring tiles
- 3.2 Ceramic, terrazzo and PVC tiles: their properties and uses.
- 3.3 Vitrified tiles, Paver blocks.

4. Cement

- 4.1 Introduction, raw materials required for manufacturing cement.
- 4.2 Flow diagram of manufacturing of cement.
- 4.3 Various types of Cements and their properties – Short note Ordinary Portland cement, rapid hardening cement, low heat cement, high alumina cement, blast furnace slag cement, white and colored cement, Portland pozzolana cement, super sulphate cement.
- 4.4 Tests of cement – fineness, soundness, initial and final setting time etc. as per B.I.S. Code.

5. Paints and Varnishes:

- 5.1 Types, ingredients, properties and uses of oil paints, water paints, cement paints and varnishes.
- 5.2 Covering capacity of various paints.

6. Metals

- 6.1 Ferrous metals: Composition, properties and uses of cast iron, mild steel, HYSD steel.
- 6.2 Aluminum & Stainless Steel - Composition, properties and uses

7. Miscellaneous Materials

- 7.1 Plastics – Introduction and uses of various plastic products in buildings
- 7.2 Types and uses of insulating materials for sound and thermal insulation
- 7.3 Construction chemicals like water proofing compound, epoxies, polymers
- 7.4 Materials used in interior decoration works like POP, methods of doing POP

NOTE: Field visit may be planned to Cement Manufacturing Plant & Construction Site to explain and show the relevant things

RECOMMENDED BOOKS

- 1) Sharma, SK; and Mathur, GC; "Engineering Materials;" Delhi-Jalandhar, S. Chand and Co.
- 2) Surendra Singh; "Engineering Materials;" New Delhi, Vikas Publishing House Pvt. Ltd.
- 3) Chowdhuri, N; "Engineering Materials;" Calcutta, Technical Publishers of India.
- 4) Bahl, SK; "Engineering Materials;" Delhi, Rainbow Book Co.
- 5) Kulkarni, GJ; "Engineering Materials;" Ahmedabad, Ahmedabad Book Depot.

- 6) Gurcharan Singh; "Engineering materials", Delhi Standard Publishers
- 7) SC Rangawala, "Construction Materials", Charotar Publishers
- 8) Alam Singh, "Construction Materials"

COURSE OUTCOME

After completion of the course the student will be able to:

- understand the use of stones as construction material
- calculate the strength parameters of Bricks
- identify the use and suitability of Tiles
- enumerate the Properties of various types of cement, their strength parameters
- distinguish between the various types of paints
- list the various types of metals and their properties.

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	7	12
2	13	20
3	4	06
4	14	20
5	7	12
6	6	10
7	13	20
Total	64	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGG / CIVIL (PHE) / QSCM	
Course Code: CEPC204	Course Title: Construction Materials Lab
Semester: 2 nd	Credits: 1
Periods Per Week: 2(L: 0, T: 0, P: 2)	

COURSE OBJECTIVE:

The subject Constructions Materials Lab deals the determination of strength parameters of various construction materials

LIST OF PRACTICALS

1. To identify various types of stones used in building works by visual examination.
2. To determine water absorption of various types of stones used in construction
Four types
3. To determine dimensional tolerance test of bricks.
4. To determine the water absorption of bricks, Soundness and efflorescence of bricks.
5. To determine the crushing strength of bricks
6. To determine fineness, consistency, setting time and physical test of cement
7. To determine compressive strength of cement – Any three types

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGG / CIVIL (PHE) / QSCM	
Course Code: CEPC205	Course Title: Computer Aided Drawing (Cad)-I For Civil Engineering
Semester: 2 nd	Credits: 2
Periods Per Week: 4 (L: 0, T: 0, P: 4)	

COURSE OBJECTIVE

Computer applications plays a very vital role in present day life and more so, in the professional life of diploma engineer. In order to enable the students to use the computers effectively in problem solving, this course offers applications of various computer software Auto CADD in civil engineering.

COURSE CONTENT

1. Introduction
 - 1.1 Study of Interface
 - 1.2 Drawing Tools – Understanding and working of commands related to:-
 - i. Draw tools
 - ii. Modify tool
 - iii. Annotative tool
 - iv. Dimension tool
2. Preparation of Plan, Elevation and Section for a Single Storey Two Room Building with Verandah (2D)
3. Preparation of Plan, Elevation and Section of a Dog Legged Staircase. (2D)
4. Preparation of Plan, Elevation and Section of a Septic Tank and Soak Pit. (2D)

RECOMMENDED BOOKS

1. AutoCAD Exercises for Beginners: Designers Workbook for Practice by Shameer S.A
2. Introduction to AutoCAD 2D Design by Shanu Aggarwal
3. Civil Engineering Drawing by RS Malik, Asia Publishing House
4. Civil Engineering Drawing by V.B.Sikka. Katson Publishing, Ludhiana

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	13	20
2	25	40
3	13	20
4	13	20
Total	64	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGG / CIVIL (PHE) / QSCM	
Course Code: CEPC206	Course Title: Civil Engg Workshop Practices
Semester: 2nd	Credits: 3
Periods Per Week: 5(L: 0, T: 1, P: 4)	

COURSE OBJECTIVE:

The course of Civil Engineering Workshop Practices would facilitate the development of basic skills a Diploma holder is expected to possess. He/she should be able to supervise construction activities like brick masonry, woodwork, concreting, welding, finishing etc. including quality control and maintenance of safety to self, coworkers and the constructed components of the building.

The students are advised to practice each of the experiences with an understanding of necessary technical aspects and safety precautions needed to be observed.

COURSE CONTENT

1. Masonry and Concreting

- 1.1. Brick and stone Masonry work, Different type of joints/bonds, Concept of line, plumb, right-angle and water level.
- 1.2. Plastering, Pointing,
- 1.3. Flooring, Skirting and Dado
- 1.4. Concrete Laying: Proper Mixing of concrete, Use of tools like concrete mixtures and vibrators, different types of vibrators.
 - 1.4.1. Formwork
 - 1.4.2. Scaffolding
 - 1.4.3. Centering/ Shuttering

2. Plumbing

- 2.1 Different types of pipes, joints, taps, fixtures and accessories used in plumbing.
- 2.2 Components (pipes, bends, chambers etc.) used in sanitary/sewerage lines
- 2.3 Scheme/plan for water supply and sanitary system for a simple residential building.

3. Carpentry, Welding and Drilling Work

- 3.1 Types of woods/timber, different types of tools, machines and accessories for wood works
- 3.2 Types of welding, ARC welding, Gas welding, Gas Cutting, welding of dissimilar materials, Selection of welding rod material, welding processes.
- 3.3 Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc.
- 3.4 Drilling machine.
- 3.5 Safety precautions in carpentry, welding, fittings safety equipment's and its use.

4. Finishing Works

- 4.1 False ceiling, POP work, aluminum –glass works
- 4.2 Whitewashing and painting: brush, roller and spray painting, types of finishing, preparation of surface, need of primer

RECOMMENDED BOOKS

- 1. B.S .Raghuwanshi, Workshop Technology, Dhanpat Rai and sons ,NewDelhi 2014
- 2. Howard C. Massey, Basic Plumbing With Illustrations Revised Edition, Craftsman Book Co;
- 3. PWD Standard Data Book for Building Work.
- 4. CPWD Works Manual

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	Time Allotted (Hrs)	Marks Allotted (%)
1	20	30
2	14	20
3	15	25
4	15	25
Total	64	100