BANGLADESH TECHNICAL EDUCATION BOARD
Agargoan, Dhaka-1207.

4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM
SYLLABUS (PROBIDHAN-2016)

COMPUTER SCIENCE & TECHNOLOGY
TECHNOLOGY CODE: **685**

2nd SEMESTER

COMPUTER SCIENCE & TECHNOLOGY (685)

2nd SEMESTER

Sl. No	Subject Code	Name of the subject	T	P	C	Theory		Practical		Total
						Cont. assess	Final exam	Cont. assess	Final exam	
1	65711	Bangla	3	3	4	60	90	50	0	200
2	65712	English	2	0	2	40	60	0	0	100
3	65912	Physics-1	3	3	4	60	90	25	25	200
4	65921	Mathematics -2	3	3	4	60	90	50	0	200
5	66623	Graphic Design -1	0	6	2	0	0	50	50	100
6	66823	Analog Electronics	3	3	4	60	90	25	25	200
7	66621	Database Application	0	6	2	0	0	50	50	100
		Total	14	24	22	280	420	250	150	1100

উদ্দেশ্য :
১. মাতৃভাষা হিসেবে বাংলা ভাষার প্রকৃতি ও বৈশিষ্ট্য সম্পর্কে ধারণা লাভ। ভাষার ব্যবহারে প্রায়োগিক যোগ্যতা অর্জন।
২.বাংলা সাহিত্য পঠন-পাঠনের মাধ্যমে জাতীয় চেতনা, দেশপ্রেম, মুক্তিযুদ্ধের চেতনা, শুদ্ধাচার, নীতি ও মূল্যবোধের উন্মেষ ঘটানো।

সংক্ষিপ্ত বিবরণী :
মাতৃভাষা ও সৃজনশীলতা : বাংলা ভাষা রীতির বিচিত্রতা, বানান রীতি, পত্র রচনা এবং কবিতা, প্রবন্ধ, নাটক, উপন্যাস ও ছোট গল্প ।
বিশদ বিবরণী:

১.বাংলা ভাষার প্রয়োগ:
ক)বাংলা ভাষা :
ভাষার সংজ্ঞা, বাংলা ভাষা রীতি – সাধু, চলিত, আঞ্চলিক বা উপভাষা (সংজ্ঞা, বৈশিষ্ট্য, পার্থক্য ও উদাহরণ)
খ) বাংলা বানান রীতি ও শব্দ প্রয়োগ:
১.বাংলা একাডেমির প্রমিত বানান রীতি, ণ-ত্ব ও ষ-ত্ব বিধি

২. শব্দ ও শব্দের শ্রেণি বিভাগ (সংজ্ঞা, শব্দের গঠন, উৎস বা উৎপত্তি ও অর্থগত)
৩.বাক্য প্রকরণ ও গঠন রীতি (সংজ্ঞা, বাক্য গঠন এবং প্রকার)
গ) পত্র রচনা :
আবেদন পত্র (চাকুরি, ছুটি), চাকুরিতে যোগদান পত্র, মানপত্র, স্মারকলিপি, সংবাদপত্রে প্রকাশের জন্য পত্র

২. বাংলা সাহিত্য:

ক. কবিতা :
১.বঙ্গভাষা –মাইকেল মধুসূদন দত্ত
২. সোনার তরী – রবীন্দ্র নাথ ঠাকুর
৩. উমর ফারুক –কাজী নজরুল ইসলাম
৪. বাংলার মুখ আমি– জীবনানন্দ দাশ
৫. আসাদের শার্ট – শামসুর রাহমান
৬. স্বাধীনতা শব্দটি কি করে আমাদের হলো? – নির্মলেন্দু গুণ

খ. প্রবন্ধ :
১. অর্ধাঙ্গী –রোকেয়া সাখাওয়াত হোসেন
২.বইকেনা – সৈয়দ মুজতবা আলী

গ. একাঙ্কিকা (নাটিকা):   মানুষ –মুনীর চৌধুরী

ঘ. উপন্যাস: লালসালু – সৈয়দ ওয়ালী উল্লাহ

ঙ.ছোট গল্প:
১. হৈমন্তী – রবীন্দ্র নাথ ঠাকুর
      ২. একুশের গল্প – জহির রায়হান
          ৩. পাতালেহাসপাতালে – হাসান আজিজুল হক

ব্যবহারিক

১.নির্ধারিত বক্তৃতা :
বাংলাদেশ ও বাঙালি সংস্কৃতি, বিভিন্ন জাতীয় দিবস (একুশে ফেব্রুয়ারি ও আন্তর্জাতিক
মাতৃভাষা দিবস, স্বাধীনতা দিবস, বিজয় দিবস,জাতীয় শোক দিবস, মুজিব নগর দিবস,
মহান মে দিবস)
প্রাতিষ্ঠানিক বক্তৃতা- নবাগত শিক্ষক/ছাত্রছাত্রীদের বরণ, গুরুত্বপূর্ণ ব্যক্তিবর্গের আগমন
উপলক্ষে বক্তৃতা।

২. উপস্থিত বক্তৃতা :
      বিষয়বস্তু উন্মুক্ত

৩.আবৃত্তি :

১. মানুষ - কাজী নজরুল ইসলাম
২. আকাশ নীলা - জীবনানন্দ দাশ
৩. পল্লী জননী -জসীম উদ্দীন
৪. ছাড়পত্র - সুকান্ত ভট্টাচার্য
৫. তোমাকে পাওয়ার জন্য হে স্বাধীনতা - শামসুর রাহমান
৬. নিষিদ্ধ সম্পাদকীয় – হেলাল হাফিজ

৪. বিতর্ক (নমুনা)

সংস্কৃতিই আধুনিক মানুষের ধর্ম

তথ্য প্রযুক্তির অবাধ ব্যবহারই যুব সমাজেরঅবক্ষয়ের মূল কারণ

গতানুগতিক শিক্ষা নয় কর্মমুখি শিক্ষাই অর্থনৈতিক মুক্তির চাবিকাঠি

চালকের অসাবধনতাই সড়ক দুর্ঘটনার প্রধান কারণ

মুক্তিযুদ্ধের চেতনাই অসাম্প্রদায়িক বাংলাদেশ প্রতিষ্ঠার মূলমন্ত্র

প্রযুক্তির বিকাশই প্রকৃতি বিনাশের একমাত্র কারণ

৫. প্রতিবেদন প্রণয়ন ও উপস্থাপন:

স্থানীয় বিভিন্ন সমস্যা ও অনুসন্ধানী যে কোন বিষয়।

65712   **ENGLISH**   **T   P   C**
                                                         2   0   2

Objectives:

After The Completion of the Course, Learners Will Be Able To Develop-
- Reading, Listening With Understanding
- The Fluency Of Speech
- Grammatical Accuracy With Emphasis On Spelling & Punctuation
- Creative Writing

Seen Comprehension: (Marks-20)

Unit	Lesson	Title
People Or Institutions Making History (Unit One)	1	Nelson Mandela ,From Apartheid Fighter To President
	2	The Unforgettable History
Food Adulteration(Unit Three)	1	Food Adulteration Reaches Height
	2	Eating Habit And Hazards
Human Relationship(Unit Four)	2	Love And Friendship
Environment And Nature (Unit Eight)	1	Water ,Water Everywhere
	5	Kuakata: Daughter Of The Sea
Greatest Scientific Achievement (Unit Thirteen)	1	Some Of The Greatest Scientific Achievements Of The Last 50 Years
	2	Science And Technology Against An Age- Old Disease
Art And Music (Unit Fourteen)	1	What Is Beauty?
	3	Crafts In Our Time
Tours And Travels (Unit Fifteen)	1	Travelling To A Village In Bangladesh
	4	The Wonders of Vilayet

N.B: The Unit Mentioned Refers To The Text Book (1st Paper) English For Today For Class 11- 12
By National Curriculum & Text Book Board, Dhaka.

Grammar (Marks-20)

1. (A) Uses of Articles.
   (B) Uses of Tense *(Right Forms Of Verbs with Indicators)
   (C) Classify Verbs: (Regular and Irregular Verbs, Auxiliary, Principal, Finite, Non-Finite Verbs,)

2. Sentence:
   (A) Changing Sentences: (Assertive, Interrogative, Optative, Imperative, Exclamatory Simple, Complex and Compound), Comparison of Adjectives/Adverbs

   (B) Question Making: WH, Yes/No, Tag Question

3. Enrich Vocabulary: Synonyms, Antonyms; Suffix And Prefix.

4. Voice, Narration

5. Sentence Analysis:

Study of Part of Speech, (Type Of Verbs-Regular and Irregular Verbs, Auxiliary and Principal Verb)
Study of Phrases and Clauses (Noun/ Adjective/ Verb/ Participle /Adverbial/ Prepositional Phrases and
Principal /Sub Ordinate /Co Ordinate Clauses)

Free Writing (Marks -20)

1. Write Dialogues: (With Teacher, Principal, Shopkeeper, Hotel Manager, Station Master, Newcomer, Buyers, Doctor, Friend, Colleagues Etc).
2. Report Writing On Different Events/ Occasions/ Accidents.
3. Writing Situational Personal and Official Letters.
4. Writing Job Application with CV /Appointment Letter / Joining Letter
5. Write A Guided Paragraph With Questions.

65912	**PHYSICS-1**	**T**	**P**	**C**
		3	**3**	**4**

OBJECTIVES

* To develop the students a background of basic science i.e. Physics required for understanding technological subjects.
* To develop a working knowledge of common engineering and industrial materials and to enable to determine through experiments the properties of such materials.
* To develop through experiments an understanding of fundamental scientific concept.
* To develop a basic knowledge and concept of physical properties of common engineering and industrial materials.

SHORT DESCRIPTION

Measurement, Units; Vector and Scalar quantities; Motion and Equations of motion; Force and Newton's Laws of motion; Gravity and Gravitation; Simple Harmonic motion; Hydrostatics; Surface tension and viscosity; Pressure, Sound; wave and sound Concepts and nature of sound, Velocity of sound, Ultrasonic.

DETAIL DESCRIPTION

THEORY :
1. PHYSICAL WORLD AND MEASUREMENT
<blockquote>

1.1. Nature of Physical World.
1.2. Scope and Excitement of Physics.
1.3. Few Terms about Physics.
1.4. Physics and other world of Technological Knowledge.
1.5. Principle of Measurement.
1.6. Fundamental and Derived Quantities and Units.
1.7. Dimensions of Units.
1.8. Errors in Measurement.
</blockquote>

2. SCALAR AND VECTOR QUANTITIES
<blockquote>

2.1 Define vector and scalar quantities with examples.
2.2 Show the various representations of the vector quantities; and representation of a vector by unit vector.
2.3 Find and explain the resultant of two vectors in different directions.
2.4 Resolve a vector into horizontal & vertical component.
2.5 Explain the dot and cross product of two vectors.
2.6 Define laws of triangle of vector.
</blockquote>

3. MOTION AND EQUATIONS OF MOTION
<blockquote>

3.1 Define rest and motion
3.2 Classify and explain of motion.
3.3 Define and explain displacement, speed, velocity, acceleration and retardation.
3.4 Deduce the relationship between displacement, velocity, acceleration and retardation from these definitions.
3.5 Motion of a Projectile.
3.6 Equation of motion of a freely moving body thrown obliquely vertically upward or motion of a projectile.
3.7 Define angular velocity and linear velocity with their units.
3.8 Deduce the relation between angular velocity and linear velocity.
3.9 Define centripetal and centrifugal force with examples.
3.10 Prove that centrifugal force $= \dfrac{mv^2}{r}$
3.11 State and explain the laws of falling bodies and mention the equation of motion of a body when it is projected vertically upwards or downwards.
</blockquote>

4. NEWTON'S LAWS OF MOTION FORCE AND FRICTION

4.1   Define force.
4.2   State Newton's laws of motion.
4.3   Define different units of force and their correlation and also mention the dimension of force.
4.4   Prove P=mf, from Newton's 2nd law of motion.
4.5   Find out the resultant of parallel forces.

4.6   Define inertia and momentum

4.7   State and prove the principles of conservation of momentum.
4.8   Define friction and describe the different kinds of friction.
4.9   Define the co-efficient of static friction.
4.10   Show that the co-efficient of static friction is equal to the tangent of angle of repose
4.11   State the merits and demerits of friction.

5. GRAVITY AND GRAVITATION

5.1   Define and explain the Kepler's Law.
5.2   Define gravity and gravitation.
5.3   Define and determine the gravitational constant (G) and also mention its units and dimension.
5.4   Define acceleration due to gravity 'g' and also mention its units and dimension.
5.5   Discuss the variation of 'g' at different places.
5.6   Define mass and weight with their units and dimension.
5.7   Distinguish between mass and weight.
5.8   Define and explain gravitational potential and escape velocity

6. SIMPLE HARMONIC MOTION (SHM)

6.1   Define Periodic and simple harmonic motion (SHM).
6.2   State the characteristics of SHM.
6.3   Describe a simple pendulum and a second pendulum.
6.4   Define effective length, amplitude, phase, complete oscillation, period of oscillation, frequency.
6.5   State and explain the laws of simple pendulum.
6.6   Motion of simple pendulum and it's time period.

7. WORK, POWER AND ENERGY

7.1   Define work, power and energy.
7.2   State the units and dimensions of work, power and energy.
7.3   State and prove the principle of the conservation of energy.
7.4   Define potential energy (PE) and kinetic energy (KE).
7.5   Derive the equation of potential and kinetic energy.
7.6   Recognize that the useful work can be found from:

$$\text{Efficiency} = \frac{\text{output work}}{\text{input work}} \times 100.$$

8. ELASTICITY

8.1   Name some of the general and special properties of matter.
8.2   Define Elasticity and Elastic limit.
8.3   Define perfectly elastic body and perfectly rigid body.
8.4   Define stress and strain with their units and dimensions.
8.5   State and explain the Hook's law.
8.6   Describe various kinds of modulus of elasticity.
8.7   Mention the units and dimensions of modulus of elasticity.
8.8   Define and explain Poisson's ratio.

9. HYDROSTATICS

9.1   Define pressure as force per unit area and state that it is measured in N/m^2 or Pascal.

9.2   State characteristics of liquid pressure.

9.3   Establish the pressure at a point in a fluid depend upon the density of the fluid, the depth in the fluid and acceleration due to gravity.

9.4   Surface tension and surface energy, Angle of contact.

9.5   Capillarity and theory of capillarity.

9.6   Viscosity and co-efficient of viscosity.

9.8   Necessity of viscosity.

10. WAVE AND SOUND

10.1   Wave and wave motion.

10.2   Transverse wave and longitudinal wave.

10.3   Some definitions relating waves.

10.4   Progressive wave and stationary waves.

10.5   Equation of progressive wave.

10.6   Sound and production of sound.

10.7   Sound is a longitudinal traveling wave.

10.8   Interference of sound: Constructive and Destructive interference.

10.9   Define beats and Mechanism of formation of beats.

11. SOUND AND VELOCITY OF SOUND

11.1   Identify that sound is produced by vibration and travels through a medium as a longitudinal wave.

11.2   Recognize that sound can be produced of different pitches (frequencies) & that the human ear has an audible frequency range covering approximately 20 Hz to 20 KHz.

11.3   State the approximate frequency range for
a. infrasonic sound,   b. Ultrasonic (supersonic) sound.

11.4   Explain how sound is absorbed, reflected & refracted by different types of surface.

11.5   Describe the practical uses of echo sounding devices.

11.6   Define velocity of sound.

11.7   State the velocity of sound at NTP in still air.

11.8   Compare the effects of pressure, temperature & humidity on the velocity of sound in air.

PRACTICAL

1.   Determine accurate diameter/side of an object using vernier calipers.
2.   Measure the area of cross section of a wire by micrometer screw gage.
3.   Measure the thickness of a glass plate by speedometer.
4.   Verify the law of parallelogram of forces by a force board.
5.   Draw L-T^2 graph and determine the value of "g" by using a simple pendulum.
6.   Determine the coefficient of static friction.
7.   Determine Young's modulus of a steel wire by Searle's apparatus.
8.   Determine gravity of a solid heavier than and insoluble in water by hydrostatic balance.
9.   Determine specific gravity of a liquid by specific gravity bottle.
10.   Determine velocity of sound by resonance air column method.

REFERENCE BOOKS:
1. Higher Secondary Physics - First Part   - by Dr. Shahjahan Tapan
2. A Text Book of Properties of of matter   -By N Subrahmanyam and Brij Lal
3. A Text Book of Sound   -By N Subrahmanyam and Brij Lal
4. Higher Secondary Physics- First Part   -by Prof. Golam Hossain Pramanik
5. Higher Secondary Physics- First Part   -by Ishak Nurfungnabi

65921 **MATHEMATICS -2** **T P C**
                                  3 3 4

OBJECTIVES

- To enable in solving the simultaneous equations with the help of determinant and matrix.
- To make understand the exponential series.
- To provide ability to apply the knowledge of differential calculus in solving problem like slope, gradient of a curve, velocity, acceleration, rate of flow of liquid etc.
- To enable to apply the process of integration in solving practical problems like calculation of area of a regular figure in two dimensions and volume of regular solids of different shapes.

SHORT DESCRIPTION

Algebra : Determinants, Matrix, Exponential Series.

Trigonometry : Inverse circular functions, Properties of triangle and solution of triangles.

Differential Calculus   : Function and limit of a function, differentiation with the help of limit, differentiation of functions, geometrical interpretation of $\dfrac{dy}{dx}$, successive differentiation and Leibnitz theorem, partial differentiation.

Integral Calculus   : Fundamental integrals, integration by substitutions, integration by parts, integration by partial fraction, definite integrals.

DETAIL DESCRIPTION

ALGEBRA :

1   **Apply determinants to solve simultaneous equations.**
  1.1   Expand a third order determinant.
  1.2   Define minor and co-factors.
  1.3   State the properties of determinants.
  1.4   Solve the problems of determinants.
  1.5   Apply Cramer's rule to solve the linear equation.
2   **Apply the concept of matrix.**
  2.1   Define matrix, null matrix, unit matrix, square matrix. column matrix, row matrix, inverse matrix, transpose matrix, adjoin matrix, rank of a matrix, singular matrix.
  2.2   Explain equality, addition and multiplication of matrix.
  2.3   Find the rank of a matrix.
  2.4   solve the problems of the following types:
    i)   Solve the given set of linear equations with the help of matrix.
    ii)   Find the transpose and adjoin matrix of a given matrix.
3   **Understand exponential series.**
  3.1   Define e.
  3.2   Prove that e is finite and lies between 2 and 3.
  3.3   Prove that $e^{x} = 1 + \dfrac{x}{\lfloor 1} + \dfrac{x^{2}}{\lfloor 2} + \dfrac{x^{3}}{\lfloor 3} + \dfrac{x^{4}}{\lfloor 4}$ .... to ∞
  3.4   Solve problems of the followings types :

  i) $1 + \dfrac{1}{\lfloor 2} + \dfrac{1}{\lfloor 4} + \dfrac{1}{\lfloor 6} + ...$ to ∞

  ii) $\dfrac{1}{\lfloor 2} + \dfrac{1+2}{\lfloor 3} + \dfrac{1+2+3}{\lfloor 4} + \dfrac{1+2+3+4}{\lfloor 5} + ...$ to ∞

TRIGONOMETRY

4   Apply the concept of inverse circular function.
  4.1   Explain the term inverse circular function and principal value of a trigonometrical ratio.
  4.2   Deduce mathematically the fundamental relations of different circular functions.
  4.3   Convert a given inverse circular function in terms of other functions.
  4.4   Prove mathematically

  i) $\tan^{-1} x + \tan^{-1} y = \tan^{-1} \dfrac{x+y}{1-xy}$.

  ii) $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \tan^{-1} \dfrac{x+y+z-xyz}{1-xy-yz-zx}$

  iii) $\sin^{-1} x + \sin^{-1} y = \sin^{-1}\left(x\sqrt{1-y^2} + y\sqrt{1-x^2}\right)$

  iv) $2\tan^{-1} x = \sin^{-1}\dfrac{2x}{1+x^2} = \cos^{-1}\dfrac{1-x^2}{1+x^2} = \tan^{-1}\dfrac{2x}{1-x^2}$

  4.5   Solve problems of the following types.

  a) $2\tan^{-1}\dfrac{1}{3} + \tan^{-1}\dfrac{1}{4} = \dfrac{\pi}{4}$

  b) $\cos\tan^{-1}\cot\sin^{-1} x = x$.

  c)   Prove that the area of the segment cut from a circle of radius r by a chord at a distance d from the centre is given by

  $K = r^2 \cos^{-1}\dfrac{d}{r} - d\sqrt{r^2 - d^2}$

5   Apply the principle of properties of triangles.
  5.1   Prove the followings identities :

  i) $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C} = 2R$.

  ii) $a^2 = b^2 + c^2 - 2bc \cos A$

  iii) $a = b \cos C - c \cos B$.

  v) $\Delta = \dfrac{1}{2} bc \sin A$.

  5.2   Establish the   followings.

  a) $\tan\dfrac{A}{2} = \sqrt{\dfrac{(s-b)(s-c)}{s(s-a)}}$

  b) $\tan\dfrac{B-C}{2} = \dfrac{b-c}{b+c}\cot\dfrac{A}{2}$

  c) $\Delta = \dfrac{abc}{4R}$

  5.3   Solve the problems of the following types:

  i)   Prove $\cos(B-C) + \cos A = \dfrac{bc}{2R}$

  ii)   An object experiences two forces F_1 and F_2 of magnitude 9 and 13 Newtons with an angle 100^0 between their directions. Find the magnitude of the resultant R.

  DIFFERENTIAL CALCULUS

6   Understand the concept of functions.
  6.1   Define constant, variable, function, domain, range
  6.2   Solve problems related to functions.
7   Understand the concept of limits.
  7.1   Define limit and continuity of a function.
  7.2   Distinguish between $\underset{x \to a}{\mathrm{Lim}}$ f(x) and f(a).

7.3   Establish (i) $\displaystyle \lim_{x \to 0} \frac{\sin x}{x} = 1$

              (ii) $\displaystyle \lim_{x \to 0} \frac{\tan x}{x} = 1$

8   Understand differential co-efficient and differentiation.

8.1   Define differential co-efficient in the form of

$$\frac{dy}{dx} = \lim_{h \to 0} \frac{f(x + h) - f(x)}{h}$$

8.2   Find the differential co-efficient of algebraic and trigonometrical functions from first principle.

9   Apply the concept of differentiation.

9.1   State the formulae for differentiation:

     (i)   sum or difference

     (ii)   product

     (iii)   quotient

     (iv)   function of function

     (v)   logarithmic function

9.2   Find the differential co-efficient using the sum or difference formula, product formula and quotient formula.

9.3   Find the differential co-efficient function of function and logarithmic function.

10   Apply the concept of geometrical meaning of $\dfrac{dy}{dx}$

10.1   Interpret $\dfrac{dy}{dx}$ geometrically.

10.2   Explain $\dfrac{dy}{dx}$ under different conditions

10.3   Solve the problems of the type:
A circular plate of metal expands by heat so that its radius increases at the rate of 0.01 cm per second. At what rate is the area increasing when the radius is 700 cm ?

11   Use Leibnitz's theorem to solve the problems of successive differentiation.

11.1   Find 2nd, 3rd and 4th derivatives of a function and hence find n-th derivatives.

11.2   Express Leibnitz's theorem

11.3   Solve the problems of successive differentiation and Leibnitz's theorem.

12   Understand partial differentiation.

12.1   Define partial derivatives.

12.2   State formula for total differential.

12.3   State formulae for partial differentiation of implicit function and homogenous function.

12.4   State Euler's theorem on homogeneous function.

12.5   Solve the problems of partial derivatives.

INTEGRAL CALCULUS

13   Apply fundamental indefinite integrals in solving problems.

13.1   Explain the concept of integration and constant of integration.

13.2   State fundamental and standard integrals.

13.3   Write down formulae for:

     (i) Integration of algebraic sum.

     (ii) Integration of the product of a constant and a function.

13.4   Integrate by method of substitution, integrate by parts and by partial fractions.

13.5   Solve problems of indefinite integration.

14   Apply the concept of definite integrals.

14.1   Explain definite integration.

14.2   Interpret geometrically the meaning of $\displaystyle \int_a^b f(x)\, dx$

14.3   Solve problems of the following types:

(i) $\int_0^{\pi/2} \cos^2 x \, dx.$ (ii) $\int_0^1 \frac{(\sin^{-1}x)^2}{\sqrt{-x^2}} dx$

P* =Practical continuous assessment

Reference

SL No	Athour	Title	Publication
01	S. P Deshpande	Mathematics for Polytechnic Students	Pune Vidyarthi Graha Prakashan
02	H. K. Das	Mathematics for Polytechnic Students(Volume I)	S.Chand Prakashan
03	Shri Shantinarayan	Engg.Maths Vol I & II	S.Chand & Comp
04	Dr. B M Ekramul Haque	Higher Mathematics	Akshar Patra Prakashani
05	Md. Abu Yousuf	Differential & Integral Calculus	Mamun Brothers

66623	GRAPHICS DESIGN-1	T	P	C
		0	6	2

Separate and compose Images

1.1. Follow OSH practices

    1.1.1.   Safe work practices are observed according to workplace procedures

    1.1.2.   OSH hazards and incidents are reported to appropriate personnel.

1.2. Identify image source

    1.2.1.   Appropriate Image separation software is identified.

    1.2.2.   Image sources are identified

    1.2.3.   Image separation tools are identified.

    1.2.4.   Images are successfully Imported from appropriate source

1.3. Identify image standards

    1.3.1.   Image properties are identified

    1.3.2.   Image resolution are identified and demonstrated.

    1.3.3.   Image format are identified and selected.

1.4. Separate Images using magic wand tools

    1.4.1.   Magic wand tool is selected

    1.4.2.   Image is selected

    1.4.3.   Image is separated

1.5. Separate Images using lasso tools

    1.5.1.   Lasso tool is selected

    1.5.2.   Image is selected

    1.5.3.   Image is separated

1.6. Separate Images using pen tools

    1.6.1.   pen tool is selected

    1.6.2.   Image is selected

    1.6.3.   Image is separated

1.7. Create layer and compose

    1.7.1.   New document is created

    1.7.2.   Images are pasted for edit

    1.7.3.   Layers are created and selected.

    1.7.4.   Images are edited and arranged.

1.8. Evaluate own work

    1.8.1. Constructive criticism from others is applied to improve own work.

    1.8.2. Own work is evaluated against planned Strategy for own practice.

    1.8.3. Work processes and practice are adjusted as necessary to improve technical, conceptual and commercial outcomes.

Create basic designs using illustration software

    b.   Follow OSH practices
- c. Safe work practices are observed according to workplace procedures
- d. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.

    e.   Create basic designs
- f. Required designs are specified.
- g. Appropriate shape and size are identified
- h. Content area is defined
- i. Contents are inserted and composed
- j. Shapes are modified as per requirements.
- k. Typographical design is applied as per requirements.
- l. Font attributes are applied per requirements.
- m. Design and colour are applied per requirements.
- n. Design is saved in appropriate file format

    o.   Create Outline and transfer.
- p. Design is reviewed and finalized
- q. Outline is created and grouped
- r. Final design is saved in appropriate file format
- s. Final design is transferred to the recipients

    t.   Develop conceptual skills and ideas
- u. Working with others to develop basic design ideas is demonstrated.
- v. Ability to gain experience in a range of genres and interpretation of basic design guidelines is demonstrated.
- w. Ability to gain experience in a range of genres and interpretation of basic design guidelines is demonstrated.
- x. A range of opportunities to develop own practice and keep informed about current design practice are identified and used for basic design guidelines.

    y.   Evaluate own work
- z. Constructive criticism from others is applied to improve own work.
- aa. Own work is evaluated against planned strategy for own practice.
- bb. Work processes and practice are adjusted as necessary to improve technical, conceptual and commercial outcomes.

Manipulate image using image processing Software

    3.1. Follow OSH practices
- 3.1.1. Safe work practices are observed according to workplace procedures
- 3.1.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures

    3.2. Retouch Image
- 3.2.1. Appropriate retouch tools are identified
- 3.2.2. Tools are calibrated as required
- 3.2.3. Layers are created and preserved
- 3.2.4. Different retouch tools are used as per requirement
- 3.2.5. Images are corrected and saved in appropriate file format

    3.3. Colour Correction
- 3.3.1. Different colour correction methods are identified
- 3.3.2. Appropriate image mode is selected
- 3.3.3. Various colour correction methods are used
- 3.3.4. Compare image enhancement with the original one

3.3.5. Save in appropriate file format

3.3.6. Transfer the image to recipient

3.4. Apply Effect

3.4.1. Identify appropriate effect options

3.4.2. Proper image mode is selected

3.4.3. Different Effects are applied to images as per requirements

3.4.4. Compare and adjust effects

3.4.5. Save in appropriate file format

3.4.6. Transfer the image to recipient

3.5. Evaluate own work

3.5.1. Constructive criticism from others is applied to improve own work

3.5.2. Own work is evaluated against planned strategy for own practice

3.5.3. Work processes and practice are adjusted as necessary to improve technical, conceptual and commercial outcomes.

Create professional designs using Illustration software.

cc. Follow OSH practices

dd. Safe work practices are observed according to workplace procedures

ee. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.

ff. Prepare design

gg. Required Professional Design works are selected.

hh. Appropriate Tools, Palette and arrange them as needed are identified.

ii. Ruler/unit/Grids/Guides/Smart Guides as per requirement are set

jj. Key Drawing / Design Layout are prepared

kk. Various Marks.

ll. Layer lock is applied

mm. Create Design

nn. Insert Contents are inserted.

oo. Colour/Design/Pattern is applied.

pp. Pathfinder to create complex Objects are used

qq. Font Attributes as per requirement Applied

rr. Zoom In-Out and Panning are used

ss. Design for further use is Saved

tt. Review and Finalize

uu. Artwork and Preview is used

vv. Layer Hide-Unhide option is used

ww. Outline and Group Created

xx. Appropriate File Format Saved

yy. The image to recipient Transferred

66823   **ANALOG ELECTRONICS**   **T   P   C**
                                                                      3   3   4

OBJECTIVES
- To provide understanding soldering technique and color code.
- To provide understanding and skill on the basic concept of semiconductor and to identify physically a range of semiconductor diodes.
- To develop comprehensive knowledge and skill on special diodes and devices.
- To develop the abilities to construct different rectifier circuits.
- To provide understanding of the basic concept and principle of transistor and to identify physically a range of transistor.
- To provide understanding and skill on the basic concept of ICs.
- To provide the understanding skill on Op-Amp.

SHORT DESCRIPTION
Color code and soldering; Semiconductor; P-N junction diode; Special diodes and devices; Power supply; Transistor; Transistor amplifier; Oscillator, Multivibrator; IC; Op-Amp.

DETAIL DESCRIPTION

Theory:
1   Soldering and Color Code
    1.1   Define soldering.
    1.2   List the materials needed in soldering.
    1.3   Mention the properties of a good soldered joint.
    1.4   Multi layered Printed circuit board.
    1.5   Mention the function of resistor, capacitor and inductor in electronic circuits.
    1.6   Describe the procedure of determining the value of Capacitor, & Resistor using numeric and color code.

2   Semiconductor
    2.1   Define Conductor, Semiconductor and Insulator.
    2.2   Describe Semiconductor with atomic structure.
    2.3   Explain the energy band diagram of Conductor, Semiconductor and Insulator.
    2.4   Classify Semiconductor.
    2.5   Describe the formation of P-type & N-Type Semiconductor material.
    2.6   Explain the majority & minority charge carrier of P-type & N-Type Semiconductor.

3   P-N Junction Diode
    3.1   Define PN junction diode
    3.2   Describe the formation of depletion layer in PN junction.
    3.3   Mention the behavior of PN junction under forward and reverse bias.
    3.4   Explain the forward & reverse current voltage (IV) characteristics of PN junction diode.
    3.5   Describe the operation of Zener diode.
    3.6   Describe the application of Zener diode in voltage stabilization.
    3.7   Describe the construction operation and application of (i) varactor diode (ii) LED (iii) LCD (viii) Photo diode (ix) Solar cell.
    3.8   Describe the construction operation and application of (i) DIAC (ii) TRIAC and (iii) SCR.

4   DC power supplies
    4.1   Define (i) dc power supply (ii) Regulated and Unregulated Power Supply.
    4.2   Describe the block diagram of a typical regulated dc power supply.
    4.3   Explain the operation of Half wave, Full wave and Bridge rectifier.
    4.4   Mention ripple factor of Half wave, Full wave and Bridge rectifier.
    4.5   Explain the operation of different types filter circuits with wave shape.

5   Bipolar Junction Transistor (BJT)
   5.1   Define Transistor.
   5.2   Describe the construction PNP and NPN Transistor.
   5.3   State the biasing rules of BJT.
   5.4   Explain the mechanism of current flow of PNP and NPN Transistor.
   5.5   Draw the three basic transistor configuration circuits (CB, CC, CE).
   5.6   Describe the characteristics of transistor in CB, CE, CC configuration.
   5.7   Describe current amplification factor α, β and γ.
   5.8   Establish the relation among α, β and γ.
   5.9   Solve problem related to I_E, I_C, I_B, α, β and γ.

6   Bipolar Junction Transistor biasing and load line
   6.1   Mention the needs for biasing of transistor
   6.2   State the conditions for proper biasing of transistor.
   6.3   Describe the methods of drawing load line of transistor.
   6.4   Explain the Effect of the location of operating point on the output signal.
   6.5   Describe the various methods of transistor biasing.

7   Bipolar Junction Transistor Amplifier
   7.1   Define (i) Amplifier (ii) Amplification and (III) Gain
   7.2   Mention the classification of Amplifier.
   7.3   Describe the principle of operation of a single stage common emitter (CE) Amplifier.
   7.4   Draw DC & AC equivalent circuits of the CE amplifier circuit.
   7.5   Explain the operation of RC coupled and transformer coupled multistage amplifier.
   7.6   Describe the operation of Push-Pull amplifier.

8   Field-Effect Transistor (FET)
   8.1   Define field effect transistor (FET).
   8.2   Mention the types of FET
   8.3   Describe the construction and operation Junction Field Effect Transistor (JFET).
   8.4   Explain characteristics of JFET.
   8.5   Describe the parameters of JFET.
   8.6   Establish the relationship among FET parameters.
   8.7   Describe the DC biasing of JFET and its load line.
   8.8   Describe the Construction and operation of DE and E-Only MOSFET.

9.   Sinusoidal Oscillators
   9.1   Define feedback
   9.2   Describe different types of feedback with block diagram.
   9.3   Calculate the gain of amplifier with feedback (positive and negative).
   9.4   Mention the advantages and disadvantages of negative feedback.
   9.5   Explain the principle of operation of a oscillatory tank circuit.
   9.6   Describe the essentials of feedback LC oscillators.
   9.7   Explain the principle of operation of Hartly, Colpitt and Wein-bridge oscillators.
   9.8   Explain the principle of operation phase shift & crystal oscillators.

10. Multivibrator circuits
   10.1   State what is meant by multivibrator.
   10.2   Describe the operation of transistor as a switch.
   10.3   Explain the operation of astable, monostable and bistable mutivibrator circuits with wave shapes.
   10.4   Mention the principle of operation of Schmitt trigger circuit.

11. Wave shaping circuits
   11.1   Mention the types of wave shaping circuit.
   11.2   Discuss the principles of RC and RL differentiating and integrating circuits.
   11.3   Analyze the output waves for various input wave shapes of differentiating and integrating circuit.
   11.4   Explain the operation of various clippers by PN junction diode,.

11.5   Describe the operation of of diode clamping circuit for different input wave shape.

12. **Integrated Circuit (IC)**
    12.1   Define IC
    12.2   List the advantages and limitation of IC's.
    12.3   Mention the scale of integration.
    12.4   Identify the types of Integrated circuits.
    12.5   Describe the fabrication of monolithic integrated circuits.

13. **Operational Amplifier (Op- Amp)**
    13.1   Define operational amplifier.
    13.2   Recognize the Op-Amp symbol.
    13.6   State the golden rule and virtual ground of Op-Amp.
    13.7   List the characteristics of an ideal Op-Amp.
    13.8   Explain the operation of Op-Amp in inverter, comparator, adder & subtractor

Practical : (Using Real component and Simulation Software)

1   Show skill in identifying the electronic components.
    1.1   Observe the electronic components board and read the manuals.
    1.2   Identify the different types of resistors with their values, tolerance and wattage.
    1.3   Identify the different types of potentiometers with their values, & wattage.
    1.4   Identify the different types of capacitors with their values, dc working voltages and types.
    1.5   Identify the different types of diodes & rectifiers with the numbers and specifications.
    1.6   Identify the different types of transistors and thyristors with their number and specifications.
    1.7   Identify the different types of LED's, IC's and miniature relays with their number & specification.
    1.8   Identify different types of transformer with their specification.
    1.9   Identify different inductors with their values & current ratings.
    1.10   Study the printed circuit boards.
    1.11   Sketch the symbols of components used in electronic circuits.
    1.12   Describe the basic function of each component.
    1.13   Write a report on above activities.

2   Show skill for determining the values of different resistors and capacitors with the help of color code.
    2.1   Select color code resistors & capacitors of different values.
    2.2   Identify the colors and their numerical numbers.
    2.3   Determine the value of resistors with tolerance.
    2.4   Determine the value of capacitors and dc working voltage.
    2.5   Write a report on above activities.

3   Show skill in performing soldering.
    3.1   Select wires (single strand and multi strand) and cut wires to required length.
    3.2   Select soldering iron, soldering tag and soldering lead.
    3.3   Remove wire insulation to required length.
    3.4   Clean and tin both iron and work piece.
    3.5   Use a tinned iron in order to transfer adequate heat to the joint.
    3.6   Joint two singles& multi stranded wires mechanically and solder.

4   Show skill in soldering & de-soldering of electronic components and wires to the other components and circuit boards.
    4.1   Select electronic components, wires and PCB.
    4.2   Determine the rating of the soldering iron suitable for the work piece.
    4.3   Clean and tin both iron & work piece.
    4.4   Feed new soldering materials to the tinned and heated joint, in order to produce a correctly soldering.

4.5   Check the quality of soldering.
4.6   Clean and tin iron and de-solder the joint and components.
4.7   Use solder suckers and solder braid for de-soldering.
4.8   Write a report on the Job.

5   Show skill in checking the semi-conductor diode.
5.1   Collect a range of semi-conductor diodes and manufactures literature.
5.2   Select the digital multi-meter and set the selector switch to ohm range.
5.3   Determine the specification of semi-conductor diode.
5.4   Compare the determined specification with that of manufactures literature.
5.5   Measure forward & reverse resistances of the diode.
5.6   Identify p and p side of the diode.
5.7   Determine the condition of the diode.

6   Show skill in sketching forward and reverse characteristics curves of a semiconductor diode.
6.1   Select meter, power supply, components and materials.
6.2   Complete circuit according to circuit diagram for forward bias.
6.3   Check all connections.
6.4   Measure forward bias and corresponding forward current.
6.5   Record results in tabular form.
6.6   Connect circuit according to circuit diagram of reverse bias.
6.7   Measure reverse bias and corresponding reverse current.
6.8   Record results in tabular form.
6.9   Sketch the curves form data.

7   Show skill in sketching waves of half wave rectifier circuit.
7.1   Select meter, component, oscilloscope and materials.
7.2   Complete circuit of a half wave rectifier according to circuit diagram.
7.3   Check the circuit before operation.
7.4   Measure the input and output voltage and observe wave shapes in the oscilloscope.
7.5   Sketch the output voltage wave shape.

8   Show skill in sketching waves of full wave center tapped rectifier circuit.
8.1   Select meter, component, oscilloscope and materials.
8.2   Complete a full wave rectifier circuit according to circuit diagram.
8.3   Check the circuit supply & polarity of supply.
8.4   Measure the input & output voltages and observe wave shapes in the oscilloscope.
8.5   Sketch the output voltage wave shape.
8.6   Compare the result with half-wave rectifier circuit.

9   Show skill in constructing full wave bridge rectifier.
9.1   Select meter, component, oscilloscope and materials.
9.2   Build the circuit according to the circuit diagram.
9.3   Check the circuit.
9.4   Measure the input and output voltage.
9.5   Observe wave shape.
9.6   Compare the result with other rectifiers.

10   Show skill in identifying the terminals of bipolar junction transistor.
10.1   Select PNP & NPN bipolar junction transistors.
10.2   Take AVO meter and manufacture's literature of transistor.
10.3   Identify transistor legs.
10.4   Measure base-emitter, base-collector, forward and reverse resistance.
10.5   Determine the specifications with help of manufacturer's literatures.
10.6   Identify PNP & NPN transistor.

11   Show skill in determining input and output characteristics of a transistor in common emitter connection.
    11.1   Select component, AVO meters, circuit board and required materials.
    11.2   Construct the circuit.
    11.3   Adjust the biasing voltage to appropriate point.
    11.4   Record input and output voltage and current.
    11.5   Plot the curve with recorded data.

12   Show skill in measuring operating points (V_{CE} and I_C) for Transistor circuit.
    12.1   Select a fixed bias transistor circuit materials.
    12.2   Select required equipment.
    12.3   Prepare the circuit.
    12.4   Check the connections
    12.5 Adjust the circuit**.**

13.   Study the operation of Op-Amp (for IC 741) as inverting adnoun inverting amplifier, adder, comparator, buffer and sub tractor.
    13.1 Select the specific Op-Amp IC.
    13.2 Select &Prepare the experimental circuit. the associate equipments and materials.
    13.3 Buildup the circuit.
    13.4 Observe the input and output wave shape on CRO screen.

14.   Demonstrate the operation of a Hartly, Colpitt and R-C oscillator.
    14.1   Draw the circuit diagram**.**
    14.2   Select tools, equipment and materials.
    14.3   Connect the circuit diagram.
    14.4   Check and energize the circuit.
    14.5   Observe the output for different frequencies

15.   **Study the operation of a transistor astable, monostable & bi-stable multivibrator circuit. Select an experiment circuit.**
    15.1   Select the required tools and materials.
    15.2   Build up the circuit as per diagram.
    15.3   Switch on the power supply.
    15.4   Switch on the trigger signal.
    15.5   Observe the wave shapes at each collector & base of the transistor

REFERENCE BOOKS :
    1. A Text Book of Applied Electronics   - R.S. SEDHA
    2. Principles of Electronics   - V. K. Mehta

66621	DATABASE APPLICATION	T	P	C
		0	6	2

1. Design Database Table

1.1. Follow OSH practices

    1.1.1. Safe work practices are observed according to IT workplace guideline.

    1.1.2. OSH hazards and incidents are reported to appropriate personnel according to Workplace procedures.

    1.1.3. Safe workplace environment are assured.

1.2. Plan database table design

    1.2.1. Pencil, pen, eraser and paper are collected to design the database as per client's requirement.

    1.2.2. Object of the database are identified as per client's specification.

    1.2.3. Entities, attributes and relationship are determined

    1.2.4. Attribute name, data type and description /validation are defined in tabular form.

1.3. Incorporate basic design principles

    1.3.1. Database application is selected as per requirement

    1.3.2. Database application is opened

    1.3.3. Database objects are selected as per plan requirement

    1.3.4. Design tools are selected as per requirement

    1.3.5. Design tools are used

    1.3.6. Database objects are used.

1.4. Develop a table with fields and attributes

    1.4.1. Field name are created according to the design plan

    1.4.2. Data types of a fields are selected

    1.4.3. Field's properties are set

    1.4.4. Field descriptions are written as requirement

    1.4.5. Primary key is determined and set

    1.4.6. Index is established

    1.4.7. Additional attribute is set as required

    1.4.8. Table structure, field name and field properties are edited

    1.4.9. Table structure is saved

1.5. Create a relationship between the tables

    1.5.1. Common field in each table with same data type is ensured

    1.5.2. Primary key and foreign key are assigned

    1.5.3. Closing of all table are observed

    1.5.4. Manipulation of relationship are performed

    1.5.5. Database Tables are saved.

1.6. Shut down the computer and clean workplace

    1.6.1. Database is closed

    1.6.2. Computer is shut down according to Standard Operating Procedure(SOP)

    1.6.3. Clean the workplace as per company rules

2. Create forms

2.1. Follow OSH practices

    2.1.1. Safe work practices are observed according to IT workplace guideline.

    2.1.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.

    2.1.3. Safe workplace environment are assured.

2.2. Create form using wizard

2.2.1.   Form object is selected from the object list
2.2.2.   Create menu is selected from the ribbon
2.2.3.   More forms tool is selected from the ribbon
2.2.4.   Table is selected from the form wizard dialog box
2.2.5.   Fields are selected from the available fields list

2.2.6.   The procedure is finished by clicking the finish button Form is saved

2.3. Insert command buttons on the form using wizard

2.3.1.   Previously created form is opened in design view
2.3.2.   Design tab is selected from menu bar
2.3.3.   Use control wizard is activated from the design ribbon
2.3.4.   Command Button tool is drag & dropped in the form from the design ribbon
2.3.5.   Appropriate category is selected from the category list
2.3.6.   Appropriate action is selected from the action list
2.3.7.   Button insertion is finished by clicking the finish button of the wizard

2.4. Create form manually

2.4.1.   Form object is selected from the object list
2.4.2.   Create menu is selected from the ribbon
2.4.3.   Form design tool is selected from the ribbon
2.4.4.   Add existing fields tool is selected under design ribbon
2.4.5.   Table is selected from the available table list
2.4.6.   Fields are drag & dropped in the form from the available fields list
2.4.7.   Form is viewed in form view
2.4.8.   Form is saved

2.5. Insert command buttons manually

2.5.1.   Previously created form is opened in design view
2.5.2.   Design tab is selected from menu bar
2.5.3.   Command Button tool is drag & dropped in the form from the design ribbon
2.5.4.   Property sheet is viewed by double clicking the button

2.5.5.   Macros are Built by clicking the appropriate event under the event tab

2.5.6.   Records and command buttons are Navigated

2.5.7.   Form is saved

2.6. Manipulate the records using command buttons

2.6.1.   Database is opened properly
2.6.2.   Previously created form is opened in form view
2.6.3.   Records are added by clicking Add new record button
2.6.4.   Records are deleted by clicking Delete record button
2.6.5.   Records are modified

3. Retrieve database information

3.1. Follow OSH practices

3.1.1.   Safe work practices are observed according to IT workplace guideline.
3.1.2.   OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.
3.1.3.   Safe workplace environment are assured.

3.2. Create simple query and retrieve required information

3.2.1.   Existing database and location are accessed
3.2.2.   Query is created by Query Wizard
3.2.3.   Field are selected from existing table
3.2.4.   Data are sorted using simple query
3.2.5.   Parameter is used
3.2.6.   Criteria is used for query
3.2.7.   Query is run and saved

3.3. Create append query

3.3.1. Existing database and location are accessed as required
3.3.2. Query object is selected
3.3.3. Design view is opened of the query
3.3.4. Table(s) are added in the query
3.3.5. Fields are selected as per requirement
3.3.6. Append are performed as per required table.
3.3.7. Query is run and saved

3.4. Create delete query

3.4.1. Existing database and location are accessed as required
3.4.2. Query object is selected
3.4.3. Design view is opened of the query
3.4.4. Table(s) are added in the query
3.4.5. Fields are selected as per requirement
3.4.6. Deletion is performed as per requirement.
3.4.7. Query is run and saved

3.5. Perform Filter Operations

3.5.1. Filter are applied to table and forms
3.5.2. Filter are removed from table and forms

3.6. Sort Records

3.6.1. Data sorted in a table, form and query output in ascending/descending numerical /alphabetical order as required.
3.6.2. Report Based on table and query are created and saved as required

3.7. Shut down the computer and clean workplace

3.7.1. Database is closed
3.7.2. Computer is shut down according to Standard Operating Procedure(SOP)
3.7.3. Clean the workplace as per company rules

4. Generate database Reports

4.1. Follow OSH practices

4.1.1. Safe work practices are observed according to IT workplace guideline.
4.1.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.
4.1.3. Safe workplace environment are assured.

4.2. Create reports

4.2.1. Reports format are planed and determined
4.2.2. Report based on a table and query are created and saved as required.
4.2.3. The arrangement of data fields and headings within a report layout are changed as required.
4.2.4. Data under a specific heading (field) in a report are grouped in ascending/descending order as required.
4.2.5. Specific fields in a grouped report are presented by sum, minimum, maximum, average, count at appropriate break points.

4.3. Modify reports to include or exclude additional requirements

4.3.1. Text in headers, footers in a report are added or modified as necessary.
4.3.2. Report is deleted correctly.
4.3.3. Report is saved and closed correctly.

4.4. Sort Records

4.4.1. Data sorted in a table, form and query output in ascending/ descending numerical /alphabetical order as required.
4.4.2. Report Based on table and query are created and saved as required

4.5. Distribute and print reports in a suitable format

4.5.1. Table, forms, reports are previewed to ensure that errors are detected and corrected.
4.5.2. Report orientation, paper size changed as required

4.5.3. The results of query printed as required
4.5.4. Specific pages in a report or a complete report printed as required

4.6. Export data in various Formats

4.6.1. Report is exported as PDF or XPS.
4.6.2. Report is exported as word Document.
4.6.3. Report is exported as HTML Document.

5. Test and use database

5.1. Follow OSH practices

5.1.1. Safe work practices are observed according to IT workplace guideline.
5.1.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.
5.1.3. Safe workplace environment are assured.

5.2. Plan to test the correctness of the database

5.2.1. Possible errors are listed
5.2.2. Testing sequence is planed

5.3. Verify the feature of the database

5.3.1. Database is opened
5.3.2. Tables, forms and reports are opened
5.3.3. Features of the tables, forms and report are shown
5.3.4. Format of the text are modified if required
5.3.5. Alignment of the tables, forms and reports are changed as per client's requirements.

5.4. Navigate the buttons and forms

5.4.1. Forms are opened
5.4.2. Buttons of the forms are identified
5.4.3. Functions of the buttons are tested to verify the usability for every events.

5.5. Perform data entry operation

5.5.1. Forms are identified for data entry
5.5.2. Data is organized
5.5.3. Forms are opened for data entry
5.5.4. Data is entered in the concern field
5.5.5. Error is detected if any and corrected by modification if required.
5.5.6. All forms are filled up and checked for malfunctions
5.5.7. Malfunctions are corrected if required.

5.6. View and print reports

5.6.1. Table, forms, reports are previewed to ensure that errors are detected and   corrected.
5.6.2. Report orientation, paper size changed as required
5.6.3. The results of query are printed as required
5.6.4. Specific pages in a report or a complete report is printed as required