पाठ्यक्रम तथा परीक्षा प्रणाली

IOE, B.E./B.Arch. Entrance Examination

शैक्षिक वर्ष २०७२/०७३ को B.E./B.Arch. तहको प्रवेश परीक्षा सूचना प्रबिधिका आधारमा कम्प्युटर परीक्षा प्रणाली बाट सचांलन गरिने छ ।

कम्प्युटर परीक्षा प्रणाली बाट सचांलन गरिने स्नातक तहको २ घण्टाको प्रवेश परीक्षा अंग्रेजी, गणित, भौतिकशास्त्र, रसायन शास्त्र तथा Engineering Aptitude Test गरी जम्मा ५विषयमा १४० पूर्णाङ्कको हुनेछ । प्रति प्रश्न १ अंकका जम्मा ६० वटा वस्तुगत प्रश्नहरु तथा प्रति प्रश्न २ अंकका जम्मा ४० वटा बस्तुगत प्रश्नहरु रहनेछन ।

परीक्षाको अंक बिभाजन निम्न अनुसार हुनेछ

विषय	परीक्षाको पूर्णाङ्क	परीक्षा समय	प्रश्नपत्र संख्या	अंक भार १ का जम्मा प्रश्नहरु	अंक भार २ का जम्मा प्रश्नहरु
गणित	४०	२ घण्टा	२५	१०×१=१०	१५×२=३०
भौतिकशास्त्र	४०		२५	१०×१=१०	१५×२=३०
अंग्रेजी	२२		१८	१४×१=१४	४×२= ८
रसायन शास्त्र	२०		१६	१२×१=१२	४×२= ८
Engineering Aptitude Test	१८		१६	१४×१ =१४	२×२=४
जम्मा	**१४०**	**२ घण्टा**	**१००**	**६०×१=६०**	**४०×२=८०**

B.E./B.Arch. Entrance Examination
Curriculum and Examination System
2072/73

The entrance examination for the academic year 2072/73 will be a Computer Based Examination of two hours duration. According to the following subjects and marks allocated, total number of questions in the examination will be 100, among which 40 questions will be of 2 marks each and 60 questions will be of 1 mark each. Each question will be of an objective type with multiple – choice answers.

Subject	Full Marks	Total No. of Questions	One Mark Questions	Two Marks Questions	Exam Duration
English	22	18	14	4	Two Hours
Chemistry	20	16	12	4	
Physics	40	25	10	15	
Mathematics	40	25	10	15	
Engineering Aptitude Test	18	16	14	2	
Total	140	100	60x1=60 Marks	40x2=80 Marks	

Entrance Examination Syllabus

Subject: English — Full Marks: 22

Comprehension of reading passages on a variety of topics and style with special references to (i) General English and (ii) Technical English.

Grammar – Familiarity with the following aspects:

Parts of Speech, Basic Grammatical Patterns / Structures, Tense and Aspect, Conditional sentences, Verbals: infinitives, Participles and Gerunds, Direct and Indirect Speech, Active and Passive Voice , Kinds of Sentences, Transformation of sentences, Concord /Agreement, Vocabulary, Use of Prepositions, Idiomatic expressions, Punctuation, Phonemes and phonetic symbols, Word Stress.

Subject: Chemistry — Full Marks: 20

Language of Chemistry & Physical Chemistry: Symbol, formulate valency and chemical questions, Problems based on chemical equations (relation with weight and weight, and weight and volume); ***Atomic Structure:*** Study of Cathode rays, and discovery of electrons, Rutheford's X-ray scattering experiment and discovery of nucleus. Rutherford model of atom., Bohr model of atom, Elementary concept of quantum numbers, Electron configuration of the elements.; ***Electronics Theory to Valency:*** Octet rule, Electrovalency, covalency and coordinate valency, General characteristics ionic and covalent compounds; ***Oxidation and Reduction:*** Classical definitions, Electronic interpretations of oxidation and reduction, Balancing of redox equations by oxidation number method; ***Periodic Classification of Elements:*** Mendeleev's periodic law, anomalies of Mendeleev's periodic table, Modern periodic Law, Periodic Properties viz. ionization potential, electronegativity and atomic radii, and their variation in the periodic table; Equivalent Weight and Atomic Weight: Concept of equivalent weight, and its determination by hydrogen displacement method and oxide method, Concept of atomic weight, equivalent weight and valency, determination of atomic weight using Dulong and Petit's rule; ***Molecular Weight and Mole:*** Avogardo's hypothesis and its deductions, Avogadro number and concept of mole, Determination of molecular weight by Victor Meyer's method; Electro–Chemistry; Electrolytes and non-electrolytes, strong electrolytes and weak electrolytes, Faraday's laws of electrolysis, Solubility product principle and its applications in qualitative analysis; Theories of Acids and Bases: Arrhenius theory, Bronsted and Lowry theory, Lewis theory; Volumetric Analysis Equivalent weights of acids, base and salts, Principles of acidimetry and alkalimetry, pH and pH scale

Non-Metals

Water**:** Hard water and soft water, Causes and removal of hardness of water**;** Nitrogen and its Compounds: Nitrogen cycle, Preparation of ammonia and nitric acid in the lab, and their properties, Manufacture of ammonia and nitric acid**,** Sulphur and its Compound.

Allotropy of sulphur, Preparation of hydrogen sulphide, sulphure dioxide in the lab, and their properties, Manufacture of sulphuric acid by contact process; Halogens and Their Compound: Position of halogens in the periodic table, Preparation of chlorine and hydrogen chloride in the lab, and their properties.

Metals

Compounds of Metals: General methods of preparation and properties of oxides, hydroxides, chlorides, nitrates, sulphates and carbonates of metals; Sodium: Extraction of Sodium (Down's process), Manufacture of caustic soda sodium carbonate; Copper: Extraction of copper from copper pyrite, Manufacture of Blue vitriol; Zinc: Extraction of zinc from zinc blend, Galvanization; Iron: Extraction of cast iron from hematite, Cast iron, steel and wrought iron, Types of steel, Manufacture of steel

Organic Chemistry

Sources and Purification of organic Compounds: Characteristics of organic compounds, Sources of organic compounds, Purification of organic compounds; Classification and nomenclature of organic Compounds: Functional group, homologous series, and isomerism (structural only), Classification of organic compounds, Common names, and I.U.P.A.C. naming system

Saturated and unsaturated Hydrocarbons & Aromatic compound

Preparation and properties of methane, Preparation and properties of ethylene and acetylene, Alkyl Halides: Preparation and properties of ethyl iodide; Aromatic Compounds: Structure of benzene, Preparation of benzene in the laboratory, Properties of benzene

Subject: Physics — Full Marks: 40

Mechanics

Dimensions, Equations of motion, Motion of a projectile. Laws of motion. Addition and subtraction of vectors. Relative velocity. Equilibrium of forces. Moments. Centre of mass. Centre of gravity. Solid friction. Work, power and energy. Conservation of energy. Angular speed. Centripetal force. Moment of inertia. Torque on a body. Angular momentum. Rotational kinetic energy. Laws of gravitation. Gravitational intensity, Gravitational potential. Velocity of escape. Simple harmonic motion. Energy of SHM. Hooke's Law. Breaking stress. Modules of elasticity. Energy stored in stretched wire. Surface tension phenomenon. Surface energy. Capillarity. Fluid pressure. Pascal law of transmission of fluid pressure. Archimedes' principle. Flotation Stokes' law. Terminal velocity,

Heat

Heat and temperature. Temperature scale. Measurement of heat energy. Specific heat capacity. Latent heat. Saturated and Unsaturated vapour. Relative humidity and dew point. First law of thermodynamics. Reversible isothermal and adiabatic changes. Gas laws. Kinetic theory of gases. Second Law of thermodynamics. Carnot's engine. Transfer dof Heat. Conduction, convection and radiation. Expansion of solid, liquid and gas.

Optics

Formation of images by plane and curved mirrors. Refraction of light through plane surfaces. Total internal reflection. Critical angle. Refraction through prism. Maximum and minimum deviation. formation of images by lenses. Dispersion. Achromatic combination of lenses visual angle. Angular magnification. Defect of vision. Telescope and microscope. Wave theory of light: introduction to Huygen's principle and its application interference diffraction and polarization of light.

Sound

Damped vibration. Forced oscillation. Resonance. Progressive waves, Principle of superposition. Velocity of sound in solid, liquid and gas: Laplaces correction. Characteristics of Sound wave. Beat phenomenon. Doppler effect. Stationary waves. Waves in pipes. Waves in String.

Electricity

Electric Charge. Gold leaf electroscope. Charging by induction Faraday's ice pail experiment. Coulomb's law. Permitivity. Electric field. Gauss's law and its application. electric potential. Capacitors. Ohm's Law. Resistance – combination of resistances. emf. Kirchhoff's law and its application. Heating effect of current. Thermoelectricity. Chemical effect of current. Potentiometer. Wheatstone bridge. Galvanometer. Conversion of galvanometer into voltmeter and ammeter. Magnetic Field. Earth's magnetism. Magnetic Flux. Force on a current carrying conductor. Ampere's law, Biot-Savart's law and their applications. Solenoid. Electromagnetic induction. AC circuits.

Atomic Physics and Electronics:

Discharge electricity through gases. Cathode rays. Electronic mass and charge Bohr's theory of atomic structure. Energy level. X-rays. Photoelectric effect Radioactivity. Nuclear – fission and fusion.

Semiconductors. Junction Transistor.

Subject: Mathematics Full Marks: 40

Set and Function

Set and relations, Functions and graphs, Algebraic, Trigonometric, Exponential, Logarithmic and hyperbolic functions and their inverses.

Algebra

Determinats, matrices, Inverse of a matrix, uses of complex numbers, Polynomial equations, sequence and series, Permutation and combination, Binomial theorem, exponential, Logarithmic series.

Trigonometry

Trigonometric equations and general values, Inverse trigonometric functions, Principal values, Properties of triangles; Centroid, incentre, Orthocentre and circumcentre and their properties.

Coordinate Geometry

Coordinates in a plane, Straight lines, Pair of lines, Circles, Conic sections: Parabola, ellipse and hyperbola. Standard equations and simple properties, Coordinates in space, Plane and its equation.

Calculus

Limit and continuity of functions, Derivatives and application of derivative – Tangent and normal, Rate of change, differentials dy and actual change Δy. Maxima and Minima of a function.; Antiderivatives (Integrations): rules of Integration, Standard Integrals, Definite integral as the limit of a sum. Application to areas under a curve and area between two curves.

Vectors

Vectors in space, addition of vectors. Linear combination of vectors, Linearly dependent and independent set of vectors, Scalar and vector product of two vectors, simple applications.

Subject: Engineering Aptitude Test **Full Marks: 18**

1. Concept of Polygons (Triangle, Square, Pentagon, Hexagon, Octagon), Circle, Inscribing and Circumscribing Circle; Arcs and Tangents; Introduction to Geometrical Solids (Cylinder, Cone, Prism and Pyramid)
   Orthographic Views of Lines and Surface (Horizontal, Vertical and Inclulined), Orthographic Views of Geometrical Solids, Objects consisting of Plane Surfaces, Curved Surfaces and Rectangular/cylindrical holes.
2. Two-Stroke and Four Stroke Engines, Petrol and Diesel Engines, Renewal Energy.
3. Traffic Signals, Cement, Aggregates, Bricks and Stones.
4. Series and Parallel Electric Circuits, Energy Resources, Transformers, Electrical Energy Generation, Measurement of Electric Current, Voltage and Power.
5. Number System, Diode and Transistor, Logic Gates, Memory, CPU, Input/output Devices, Operating Systems, Internet and Email.

Tribhuvan University
Institute of Engineering
Computer Based B.E/ B.Arch. Entrance Examination
2072
SAMPLE QUESTIONS

Full Marks : 140
Time : 2 hours

A) Number of Questions: (60x1=60)

Select the Best Alternative

1. Which of the following word is accented on its third syllable?
   a) cosmology b) cosmopolitan c) cosmetic d) cosignatory
2. The word 'corrupt' is pronounced as:
   a) /k∂r∧pt/ b) /k∧r∂pt/ c) /kor∧pt/ d) /k∂rupt/
3. The number of atoms of oxygen present in 11.2 litre of oxygen gas at NTP will have
   a) $\frac{1}{2} \times 6.023 \times 10^{23}$ b) $2 \times 6.023 \times 10^{23}$
   c) 6.023×10^{2} d) 1.6×10^{24}
4. The oxidation number of sulphur in H_2SO_5 will be
   a) 8 b) 7 c) 6 d) 4.5
5. The equivalent weight of $kmno_4$ in basic medium is
   a) Mol wt/6 b) Mol wt/5 c) Mol wt/3 d) Mol wt/1
6. The dimension of permittivity of a medium is
   a) $M^{-1}L^{-3}I^2$ b) $M^1L^3TI^2$ c) $MLTI^{-2}$ d) $MLT^{-2}I$
7. An object of mass m is revolving in a vertical circle of radius r. The tension in the object at the top of the vertical circle will be
   a) mg b) $\frac{mv^2}{r} + mg$ c) $\frac{mv^2}{r}$ d) $mg - \frac{mv^2}{r}$
8. When a metal sphere is heated, the percentage expansion is maximum for its
   a) area b) diameter c) volume d) length
9. The latent heat energy of a substance signifies
   a) decrease in the internal energy of the substance
   b) increase in the temperature of the substance
   c) to produce the chemical changes in the substance
   d) increase in the internal energy of the substance
10. Let A = (-3, 2) and B = (-2, 3) then A – B =
    a) [-3, 3] b) (-3, 3) c) [-3, -2] d) (-2, 2)
11. If sinx = $\frac{1}{2}$ and Cosx = - $\frac{\sqrt{3}}{2}$ then x =
    a) $2n\pi + \frac{\pi}{6}$ b) $2n\pi - \frac{\pi}{6}$ c) $2n\pi + \frac{\pi}{3}$ d) $2n\pi + \frac{5\pi}{6}$
12. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ then adj. A =
    a) $\begin{bmatrix} -2 & -3 \\ -5 & 2 \end{bmatrix}$ b) $\begin{bmatrix} -2 & 3 \\ 5 & 2 \end{bmatrix}$
    c) $\begin{bmatrix} 2 & -3 \\ -5 & -2 \end{bmatrix}$ d) $\begin{bmatrix} -2 & -3 \\ -5 & -2 \end{bmatrix}$
13. If the equation $x^2 + 2(k+2)x + 9k = 0$ has equal roots, then k =
    a) 1 or 4 b) – 1 or -4 c) 1 or -4 d) -1 or 4
14. The eccentricity of a hyperbola is
    a) less than 1 b) equal to 1
    c) greater than 1 d) equal to zero

B) Number of Questions: (40x2=80)

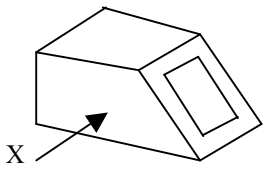
Read the passage and answer the questions

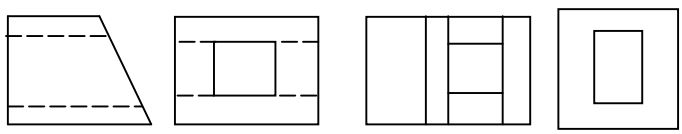
Most people may think it's hard to follow a weight – loss diet and exercise regime. But people with diabetes ignore the risks at their peril! All diabetes is serious, and can lead to devastating complications that are usually irreversible and often fatal. Too much sugar in your blood damages the vascular system and organs. That means people with diabetes are much more prone to cardiovascular disease and are three times more likely than most people to have high cholesterol, high blood pressure or obesity. Many people with diabetes end up dying as a result of a heart attack or stroke.

Blood glucose can also damage the small blood vessels, which causes problems in the eyes, kidneys, feet and nerves. That means that if the diabetes isn't well-controlled, people are looking at kidney failure or lower limb damage requiring amputation.

Exercising losing weight can reduce the risk of all of these complications, but what many people don't realize is that their diabetes is a progressive disease. "Only about 10% of patients are able to maintain normal glucose levels with lifestyle modifications, and that too only up to one or two years, says Dr. Makkar. "Most patients will eventually require lifelong medication."

15. This passage is mainly about …….
    a) Cure of diabetes b) cause of diabetes
    c) effect of diabetes d) problem of diabetes
16. The term 'obesity' means ……
    a) curiosity b) observation
    c) unhealthy weight growth d) healthy weight growth
17. 100CC of centimolar H_2SO_4, 50 ml of decimolar HCl and 500CC of 0.012 molar KOH is mixed, the resultant solution will be
    a) acidic b) basic c) neutral d) am phot……
18. A young boy requires 12000 KJ energy per day. The amount of energy evolved from 1 more of glucose is 2808 KJ. What weight of glucose be needs for a week.
    a) 769.64 gm b) 2.694 kg c) 5.39 kg d) 10.78 kg
19. A reversible Carnot cycle engine operates between temperature of 1000 K and 250 K. If 16 kJ of heat is transferred to the engine at 1000 K in one cycle, the heat transferred from the engine at 250 K in kJ is
    a) 2 b) 4 c) 6 d) 8
20. Two identical electric bulbs rated 1 KW; 220V are connected in series and the combination is connected to 200V supply line. The power dissipated in each bulb is around.
    a) 50W b) 100W c) 200W d) 250W
21. If α and β are imaginary cube roots of unity then $\alpha^4 + \beta^4 + \frac{1}{\alpha\beta}$ is
    a) 3 b) 0 c) 1 d) 2
22. The principal value of $\sin^{-1}\left[\sin\left(\frac{2\pi}{3}\right)\right]$ is
    a) $-\frac{2\pi}{3}$ b) $\frac{\pi}{3}$ c) $\frac{4\pi}{3}$ d) $\frac{5\pi}{3}$
23. An isometric view of an object is as shown below. When looking to the direction of arrow X, which of the following elevation is correctly drawn?





a) b) c) d)