National Level Quiz for +2 Science Studying Students

PEA Engineering/IT Quiz organized by PEA Association has been conducting since 2075 BS. It is a unique quiz in Nepal based on the syllabus of NEB and IOE Entrance for grade XI and XII. This quiz program encourages the students for their rigorous study and also plays an important role for building up confidence in them for the competitive examinations.

Selection Round will be on different dates in different cities.

Terms & Conditions – PEA Engineering/IT Quiz

1. Each correct answer earns 5 points by the first team and 3 points by the next team receiving the passed question.
2. First team will get 1 minute to answer each question and other teams will get 30 seconds, 20 seconds, and 10 seconds respectively to answer the passed questions.
3. Rules 1 and 2 are not effective for the rapid-fire round. For this round, a maximum of 5 questions are asked within 2 minutes for each team. The questions are not passed to the other teams. Each correct answer earns 3 points.
4. In case of any ambiguity, confusion and dispute, the decision of the Jury will be the final.
5. Participants are not allowed to argue with the quiz personnel or involve in any violent activities. If so, then the team might be expelled from the competition.
6. Participants are not allowed to ask any question to anyone out of the team during the quiz hour.
7. Participants are not allowed to answer in the other team's turn.
8. The point is not awarded for the answer given after the time elapses. Participants should answer within the given time limit.
9. Final answer should be given only by the team leader.
10. Each team comprises of two participants. Each school/college can have maximum of five teams.
11. If there occurs any tie among the participating teams, the winner will be declared by asking additional questions.
12. Participants should be in complete school/college uniform during the event.
13. If any problem arises, college can change one of the two students only in case of emergency. The organizers have every right to consider or not to consider the case by looking at the valid reasons.

Objectives of the Program

- To focus on the syllabi of NEB and IOE entrance examinations.
- To encourage the students in their own study by providing scholarships and valuable prizes.

- To promote IT and Engineering Education in Nepal.
- To bridge the gap between the NEB and IOE syllabi.
- To enhance students' deep learning culture through fair competition.

Course Contents
- Physics
- Chemistry
- Mathematics

Scholarships & Prizes

Winner
- Full Scholarship for B.E./IT Program
- Cash Prize Rs. 1,00,000/-
- Two Laptops
- Free PEA Digitals
- Medal, Trophy and Certificate
- Full scholarship for engineering entrance preparation classes in PEA

1st Runner UP
- Full Scholarship for B.E./IT Program
- Cash Prize Rs. 50,000/-
- Free PEA Digitals
- Medal, Trophy and Certificate
- Full scholarship for engineering entrance preparation classes in PEA

2nd Runner UP
- Full Scholarship for B.E./IT Program
- Cash Prize Rs. 25,000/-
- Free PEA Digitals
- Medal, Trophy and Certificate
- Full scholarship for engineering entrance preparation classes in PEA

Consolation Prize
- Full Scholarship in B.E./IT Program at HIMALAYAN WHITE HOUSE INTERNATIONAL COLLEGE
- Cash Prize Rs. 10,000/-
- Free PEA Digitals
- Medal, Trophy and Certificate
- Full scholarship for engineering entrance preparation classes at PEA

Provincial Topper
- Full Scholarship for B.E./IT Program at HIMALAYAN WHITE HOUSE INTERNATIONAL COLLEGE
- Cash Prize Rs. 10,000/-
- Free PEA Digitals
- Medal, Trophy and Certificate
- Full scholarship for engineering entrance preparation classes at PEA

Participation Prize
- 50% Scholarship for B.E./IT Program
- Free Pre-engineering entrance preparation online class at PEA
- Free revision class for 12th Board Exam 2080
- Full Scholarship in PEA Digitals
- 50% Scholarship in PEA's Engineering/IT Entrance Preparation – 2024

Mode of Payment

Registration can be made by paying cash on the spot. However, we encourage for the advanced payment for proper management. Please scan the QR and send screenshot of payment through viber at 9851140500.

Registration Fee: Rs 2000 for each team (Maximum five teams from each college)

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Programs Available on B.E./IT

1. Civil Engineering
2. Computer Engineering
3. Electronics, Communication and Information Engineering
4. Electrical Engineering
5. IT Engineering
6. Bio-Medical Engineering
7. B. Tech in Bio-Technology
8. BIT

What is PEA Digitals?

PEA Digitals, an initiative by the PEA Association, encompasses various components designed to aid in engineering entrance preparation. This includes PEA's Online Classes, PEA Mentors, and Engineeringdote. These elements collectively form an integrated approach to support individuals aspiring for engineering entrance exams through digital means. It is the comprehensive resources and mentorship for effective exam preparation within the digital realm.

❖ **PEA's Online Classes**

  ➢ Interactive Live Classes
  ➢ Top Entrance Faculties/Mentors
  ➢ Tips & Tricks
  ➢ Learning via Smartboard

❖ **PEA Mentors**

  ➢ 350+ hours Lecture Videos (Engineering)
  ➢ 450+ hours Lecture Videos {CEE (MBBS, BDS, Bsc. Nursing, BASLP, B Perfusion Technology)
  ➢ Designed & Delivered by Top Entrance Experts
  ➢ Testing System
  ➢ Note - Taking System
  ➢ Progress Report & Peer Discussion

❖ **Engineeringdote**

  ➢ 50k+ MCQs with Hints and Solutions
  ➢ Complete Sets of Book in Digitized Version
  ➢ Daily/Weekly/Chapter Wise Live Test Series/Mock Tests
  ➢ Chapter Wise Questions
  ➢ Performance report & Discussion
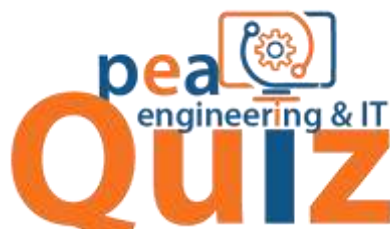
National Level Quiz for +2 Science Studying Students

OBJECTIVE ROUND

(8 questions) (1mins/30sec/20sec/10sec)

1. **If 10 points are selected from a line and 20 points from another line parallel to it, then how many triangles can be formed from these points as the vertices?**

   a. 1600   b. 2500   **c. 2800**   d. 1200   e. 2400

2. **If $\frac{d}{dx}[f(x)] = \ln x$ then which one of the following is $f(x)$?**

   a. $\ln\frac{x}{e}$ b. $\ln\frac{e}{x}$ **c. $x\ln\frac{x}{e}$**   d. $x\ln\frac{e}{x}$ e. $\frac{1}{x}$

3. **In $\triangle ABC$, if r_1, r_2, r_3 are the lengths of the ex- radii, then what is $r_1 r_2 + r_2 r_3 + r_3 r_1$ equal to?**

   a. s^2   b. r^2 c. R^2 d. Δ^2 e. $(abc)^2$

4. **What is the value of $\sin\left\{\frac{\pi}{2} - \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right\}$?**

   a. 1   **b. $\frac{1}{2}$**   c. −1   d. 0   e. $\frac{\sqrt{3}}{2}$

5. **Which one of the following is $\begin{vmatrix} 1 & bc & a(b+c) \\ 1 & ca & b(c+a) \\ 1 & ab & c(a+b) \end{vmatrix}$ equal to?**

   a. 0   b. 1   c. abc d. ab + bc + ca   e. $4abc$

6. **What is the sum of the infinite series $\frac{2}{3!} + \frac{4}{5!} + \frac{5}{7!} + \cdots$?**

   a. e b. e + 1   c. $2e$ d. $e - 1$ **e. e^{-1}**

7. **$\int \frac{(\tan^{-1}x)^2}{1+x^2} dx =$**

   a. $2\tan^{-1}x + c$ b. $\frac{(\tan^{-1}x)^3}{1+x^2} + c$ **c. $\frac{(\tan^{-1}x)^3}{3} + c$**

   d. $\frac{1}{(1+x^2)^3} + c$ e. $\frac{2x}{1+x^2} + c$

8. **If $|\vec{a}| = 2, |\vec{b}| = 3$, and $|\vec{a} \times \vec{b}| = 5$, then what is the value of $(\vec{a}.\vec{b})$?**

   a. 16   b. 9   c. $\sqrt{17}$ **d. $\sqrt{11}$**   e. 7

PHYSICS ROUND

(8 questions) (1 mins/30 sec/20 sec/10 sec)

1. **What is the wavelength of the light in glass of refractive index 1.5 whose wavelength is 7200 Å in air?**

   a. 7200 Å   **b. 4800 Å**   c. 10800 Å   d. 2400 Å   e. 6000 Å

2. **What shunt is required to extend the range of an ammeter of internal resistance 0.9 Ω from 1A to 10 A?**

   a. 0.01 Ω   b. 0.1 Ω   c. 1 Ω   d. 5 Ω   e. 10 Ω

3. **With which of the following is the ratio of electric flux to the magnetic flux dimensionally equal to?**

   a. Velocity   b. Force   c. Acceleration   d. Momentum   e. Energy

4. **Force acting upon a charged particle kept between the plates of a charged capacitor is F. If one of the plates of the capacitor is removed, what is the force acting on the same particle?**

   a. 0   **b. $F/2$**   c. F d. $2F$ e. $4F$

5. **If the horizontal range of a projectile is $4\sqrt{3}$ times its maximum height, then what is the angle of projection with horizontal?**

   a. 45°   b. 60°   c. 90^0 **d. 30°**   e. 15°

6. **If a spring of spring constant 300 N/m is cut into two parts in the ratio 2:3, then what is the spring constant of the smaller part?**

   a. 300 N/m   b. 600 N/m   c. 500 N/m   d. 900 N/m   **e. 750 N/m**

7. **If two lenses with powers +2D and − 4D respectively are placed in contact, then what is the power of their combination?**

   a. +2D   **b. −2D**   c. −4D   d. +6D   e. −8D

8. **What percentage of initial amount of a substance is decayed in 20 min if its half life period is of 5 min?**

   a. 93.75%   b. 75%   c. 25%   d. 6.25%   e. 3.125%

CHEMISTRY ROUND

(4 questions) (1 mins/30 sec/20 sec/10 sec)

1. **When copper is heated with hot and conc. HNO_3, which one of the following is the product?**

   a. $CuNO_3 + N_2O + H_2O$ **b. $Cu(NO_3)_2 + NO_2 + H_2O$**

   c. $Cu(NO_3)_2 + H_2O$ d. $Cu(NO_3)_2 + N_2O + H_2O$

   e. $Cu(NO_3)_2 + NH_4NO_3 + H_2O$

2. **Given that M is the molecular weight of $KMnO_4$. Then, what is the equivalent weight of $KMnO_4$ when it is converted into K_2MnO_4?**

   a. M   b. $M/2$ c. $M/3$ d. $M/4$ e. $M/7$

3. Which of the following best describes electrophiles?
   a. **Electron loving species**
   b. Electron hating species
   c. Nucleus loving reagents
   d. Nucleus hating reagents
   e. Lone pair containing species.

4. If a solution of pH 4 is diluted by 1000 times, what will be the pH of the diluted solution?

   a. 4   b. 7   **c. 6.69**   d. 6.96   e. 8

CREATIVE/VISUAL ROUND

(8 questions/options will not be given) (1 mins/30 sec/20 sec/10 sec)

1. If the slope of the tangent at any point on the curve is equal to the ratio of the abscissa to the ordinate of that point, then what is the locus of the point?
   Answer: Hyperbola

2. What is the length of the latus rectum of the ellipse $3x^2 + 4y^2 = 12$?
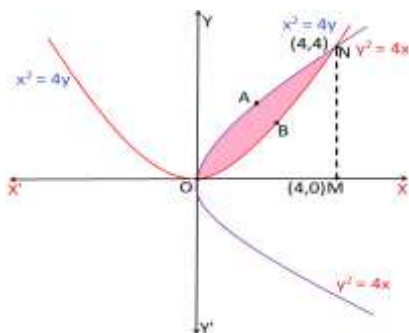   **Answer:** 3

4. What is the degree of the differential equation whose solution is the family of curves

   $y = Ax + A^3$?
   Answer: 3

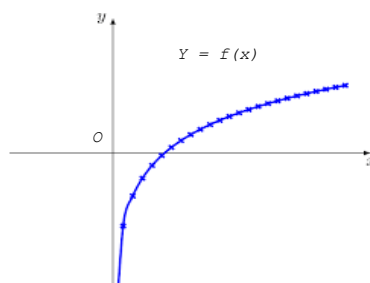4. In $\triangle ABC$, what is the value of $e^{iA} \cdot e^{iB} \cdot e^{iC}$?
   Answer: -1

5. What is the shaded area bounded by the curves as shown in the figure?
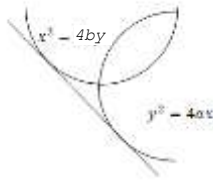

   Answer: $\dfrac{16}{3}$

6. Name the type of the transcendental function which is the inverse function of the function $y = f(x)$ as shown in the graph.
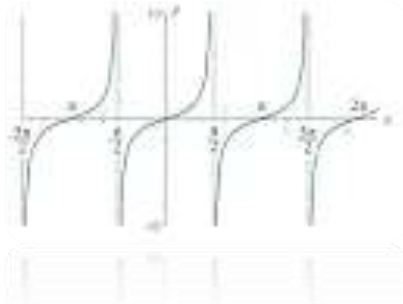
7. **What is the equation of the tangent common to both the curves as shown in the figure?**

8. **Identify the function with graph as shown in the given figure.**

RAPID FIRE ROUND

(5 questions/ 2 minutes for each Team)
(Group -alpha)

1. **How many electrons are unpaired in a carbon atom?**

   a. 0   b. 1   **c. 2**   d. 4

2. **If a lens is immersed in water, then what happens to its focal length?**

   a. increases   b. decreases   c. remains constant   d. becomes 1.33 times

3. **What is the angle of dip at the equator of the earth?**

   a. 0^0   b. 45^0 c. 60^0 d. 90^0

4. **A person has three children. What is the probability that all three are boys?**

   a. $\dfrac{1}{6}$ b. $\dfrac{1}{4}$ c. $\dfrac{2}{3}$ **d. $\dfrac{1}{8}$**

5. **What are the maximum and minimum values of the function $f(x) = 3 - \cos x^0$ in $\mathbb{R}$?**

   a. 1 and -1   **b. 4 and 2**   c. 3 and 0   d. 2 and 1

Note: Similar questions will be there for the Group-beta, Group–gamma and Group-delta. Calculator is allowed in all the rounds except the Rapid Fire Round.

PEA Engineering/IT Quiz – 2024 Syllabus

Mathematics

1. Set, Logic and Functions

1.1 Set, real number system, intervals, absolute value, logic, connectives, laws of logic

1.2 Function, types of functions – injective, surjective, bijective, algebraic, trigonometric, exponential and logarithmic; Inverse of function, composite functions

2. Algebra

2.1 Matrices and determinants, types and properties, inverse of a matrix

2.2 Complex numbers and Polynomial equations

2.3 Sequence and series, Permutation and Combination

2.4 Binomial theorem, exponential and logarithmic series

3. Trigonometry

3.1 Trigonometric equations and general values

3.2 Inverse trigonometric functions, principal value

3.3 Properties of triangles, in-centre, ortho-centre and circum-centre, solution of triangles

4. Coordinate Geometry

4.1 Straight lines, pair of lines

4.2 Circles, equations of circle in different forms, tangent and normal

4.3 Conic sections: Parabola, Ellipse and Hyperbola, standard equations and simple properties

4.4 Coordinates in space, Plane and its equation

5. Calculus

5.1 Limit and continuity of functions, indeterminate forms, L'Hospital's rule

5.2 Derivatives, rules of derivatives, geometrical & physical meanings, higher order derivatives, Applications of derivative: tangent and normal, rate of change, maxima and minima

5.3 Integration, linear properties, rules of integration, standard integrals, definite integral, Applications of definite integral: area under a curve and area between two curves

5.4 Differential equations: definition, order and degree, differential equation of first order and first degree: variable separable method, homogeneous, linear and
exact differential equations, integrating factor

6. Vectors and their Products

6.1 Vectors in plane and space, algebra of vectors, linear combination of vectors, linearly dependent and independent set of vectors

6.2 Product of two vectors, scalar and vector product of two vectors, scalar triple product

7. Statistics and Probability

7.1 Measures of location and measures of dispersion

7.2 Correlation and regression

7.3 Basic terms of probability, conditional and compound probability, additive and multiplicative rules, Bayes' theorem, binomial distribution

Physics

1. Mechanics

1.1 Physical Quantities, Vector and Kinematics: Dimensions, Resolution and Polygon laws of Vector, Vector Algebra, Equations of Motions, Projectile Motion, Relative Motion

1.2 Newton's Laws of Motion and Friction: Conservation of linear momentum, Applications of Newton's Laws in Equilibrium and Non-equilibrium, laws of Solid Friction and verification

1.3 Work, Energy and Power: Work-Energy theorem, Kinetic and Potential energy, Conservation of Energy, Conservative and non-conservative forces, Elastic and inelastic collisions

1.4 Circular motion, Gravitation and SHM: Centripetal force, Conical Pendulum, Banking of Track, Gravitational Potential, variation of g, Motion of satellite, Rocket launch technology, Energy in SHM, Spring-Mass system, simple Pendulum, Damped and Forced oscillation, resonance

1.5 Rotational Dynamics: Moment of Inertia, Radius of Gyration, Rotational KE, Center of gravity and center of mass, Torque, Conservation of Angular momentum

1.6 Elasticity: Hook's law, Young modulus, Bulk modulus, modulus of rigidity, Poissons' ratio, elastic energy

1.7 Fluid Mechanics: buoyancy, flotation, Archimedes' principle, surface tension, capillarity and applications, viscosity, Newton, Stoke and Poiseuille's formula, Reynold number, continuity equation, Bernoulli's equation

2. Heat and Thermodynamics

2.1 Temperature and Quantity of Heat: Thermal Equilibrium, Specific heat, latent heat Method of Mixture, Measurement of specific heat and latent heat, Newton's law

of cooling, triple point

2.2 Thermal expansion: Expansion of Solid & Liquid, Measurement and Applications of expansions

2.3 Transfer of Heat: Conduction, Convection, Radiation, Thermal Conductivity, Black bodyradiation, Stefan- Boltzmann law

2.4 Thermal properties of Matter: Molecular Properties of matter, Kinetic Theory of gases, heatcapacities of gases and solids

2.5 Laws of Thermodynamics: First law, Heat and Work, relation of specific heat of gas, thermodynamics processes, Second law, Heat engine, efficiency, Carnot Cycle, Otto Cycle,Diesel cycle, Refrigerator, Entropy.

3. **Geometric and Physical Optics**

3.1 Reflection: Plane and Curved Mirror, Mirror Formula

3.2 Refraction: Plane Surface, Critical Angle, Total Internal Reflection, Lateral shift, Prism, Minimum Deviation, Lenses, Lens Formula, Lens maker's formula, Combination of lenses in contact, Optical Fiber

3.3 Dispersion: Spectrum, Dispersive Power, Chromatic Aberration, Achromatism, Spherical Aberration, Scattering of light

3.4 Nature and Propagation of Light: Huygen's principle, Velocity of light

3.5 Interference: Coherent sources, Young's double slit experiment

3.6 Diffraction: Fraunhoffer diffraction, Diffraction grating, Resolving power

3.7 Polarization: Brewster's law, Transverse nature of light, Polaroid

4. **Waves and Sound**

4.1 Wave Motion: Travelling and Stationary wave

4.2 Mechanical Waves: velocity of sound in solid, gas and liquid, effect of temperature, pressure,humidity

4.3 Waves in Pipes and String: closed and Open pipes, Resonance, Resonance Tube, string, laws ofvibration of fixed string

4.4 Acoustic Phenomena: Pressure amplitude, intensity level, quality and pitch, Ultrasonic and Infrasonic, Doppler's effect

5. **Electricity & Magnetism**

5.1 Electrostatics: Coulomb's law, Electric field and Gauss law, Potential and potential gradient, Capacitors, combination of capacitors, types of capacitors, effect of dielectrics, Energy stored by capacitors, polarization and displacement

5.2 DC Circuits: Ohm's law, resistivity and conductivity, work and power, Galvanometer and Ohm meter, internal resistance, Joule's law, Kirchhoff's law and applications

5.3 Thermoelectric Effect: Seebeck effect, Thermocouples, Peltier effect, Thermopile, Thomson effect

5.4 Magnetic effect: Force on a conductor and charge, Torque, Hall's effect, Biot-Savart's law,Ampere's law, Force between parallel conductors

5.5 Magnetic properties of matter: Earth magnetism, magnetic materials, permeability, susceptibility,hysteresis

5.6 Electromagnetic Induction: Faraday's law, Induced emf, AC Generators, Self and mutual induction, energy stored by inductor, transformer

5.7 Alternating Currents: RMS value, Phasor diagram of capacitance, inductance and resistance,Quality factor, Power factor

6. **Modern Physics**

6.1 Electrons: Millikons's experiment, Cathode rays, specific charge

6.2 Photons & Quantization of Energy: Photoelectric effect, Plank's constant, Bohr's theory, spectral series, De Broglie theory, Uncertainty principle, X-ray and Bragg's law, Laser

6.3 Solids & Semiconductor Devices: Intrinsic and extrinsic semiconductors, P-N junction, Rectification, Zener diode, Transistor, Logic gates

6.4 Radioactivity & Nuclear Reaction: Atomic mass, Isotopes, Nuclear density, Einstein's mass energy relation, mass defect, fission & fusion, law of radioactive disintegration, carbondating, health hazard

6.5 Recent Trends in Physics

6.5.1 Particle Physics: Particle and anti-particle, Quarks, Lepton, Baryon, Mesons, HiggsBoson

6.5.2 Universe: Big Bang and Hubble's Law, Dark Matter, Gravitational Wave, Black Hole

6.5.3 Seismology: Pressure wave, Surface Wave, Internal wave

6.5.4 Telecommunication: Radio, TV and Mobile, GPS and Remote sensing

6.5.5 Environment: Energy Crisis, Environment Pollution, Ozone Layer

6.5.6 New Technology & Materials: Nano-technology, super conductor & Perfect conductor

Chemistry

1. **Physical Chemistry**

   1.1 Chemical Arithmetic: Dalton's atomic theory and Laws of Stoichiometry, Atomic mass and Molecular mass, Empirical molecular formula and limiting Reactants, Avogadro are Hypothesis and its applications and Equivalent masses.

   1.2 State of Matter: Gaseous state, liquid and solid states.

   1.3 Atomic Structure and Periodic Classification of Elements:

   1.4 Oxidation, Reduction and Equilibrium

   1.5 Volumetric Analysis,

   1.6 Ionic Equilibrium, Acid, Base and Salt

   1.7 Electrochemistry

   1.8 Energetic of Chemical Reaction, Chemical Kinetics, Chemical Bonding andShape of Molecules

2. **Inorganic Chemistry**

   2.1 Non-metal: Hydrogen, Oxygen, Ozone, Water, Nitrogen and its compounds, Halogen, Carbon, Phosphorous, sulphur, Noble gas and Environment pollution.

   2.2 Metals: Metallurgical Principle, Alkali metal, Alkaline Earth metals, Coinage metals: Copper, Silver, Gold

   2.3 Extraction of Metal: Zinc and Mercury, Iron Compound

3. **Organic Chemistry**

   3.1 Introduction: Fundamental principles, Purification of organic compounds, Nomenclatre of Organic compounds, Structure isomerism and idea of reaction mechanism

   3.2 Hydrocarbons: Alkanes, Alkenes and Alkynes, Aromatic hydrocarbons

   3.3 Haloalkanes and Haloarenes

   3.4 Alcohols, Phenols and Ethers

   3.5 Aldehydes, Ketones , Carboxylic Acid and Derivatives, Aliphatic and Aromatic

   3.6 Nitro Compounds and Amines: Aromatic and Aliphatic

pea
engineering & IT
Quiz

National Level Quiz for +2 Science Studying Students

Registration Form

Student 1 Photo

Team No.:

Student 2 Photo

Name	
Grade	
Mobile No.	
Email ID	
Address	

……………………………
Student's Signature

Name	
Grade	
Mobile No.	
Email ID	
Address	

……………………………
Student's Signature

To be filled by the School/College

Office Seal

Name of Director/Principal/Coordinator:

………………………………………………

Name of School/College:

……………………………………….

………………………………………..

Address:

Phone No.:

Email:

………………………

Signature

Mobile No.:

Email: