2022

GUIDE BOOK

INTERNATIONAL
WALISONGO SCIENCE COMPETITION

"Building a brilliant future through science"

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International Walisongo Science Competition

IMPLEMENTATION INSTRUCTIONS (JUKLAK) AND TECHNICAL INSTRUCTIONS (JUKNIS) *INTERNATIONAL WALISONGO SCIENCE COMPETITION 2022*

A. NAME OF COMPETITION

This activity is named the *International Walisongo Science Competition* (IWSC).

B. BACKGROUND

The COVID-19 case in early 2020 had an impact not only on the world economy but also in the education sector. This causes the emergence of obstacles and obstacles that occur in the implementation of learning and research. The current pandemic condition requires Indonesia to implement a 'new normal', including a new normal in the field of education. The definition of new normal according to the Indonesian government is a new order to adapt to COVID-19. This new order needs to exist because until now there has not been found a vaccine for the treatment of the corona virus.

The challenge in the world of education in this pandemic period is being able to be adaptive in the face of the new normal era. The national science competition event in the form of the KTI competition as a form of adaptive ability in the new normal era is in line with the Vision of UIN Walisongo Semarang which reads "A leading research Islamic university based on the unity of science for humanity and civilization in 2038". Students' understanding and knowledge are very diverse, relevant to the new normal conditions in the environment, which are expected to be able to answer the challenges in the new normal era.

The development of science and technology can be realized through creativity to produce new findings in various forms of innovation and engineering. Departing from this view, the establishment of the Olympic competition is an effort to accommodate the creativity of students to channel useful ideas in the fields of science and technology for a more advanced Indonesia.

C. INTENTION & PURPOSE

1. Intention of Activity
   Improve students' academic abilities in competing internationally in the field of science in the New Normal era.
2. Purpose of Activity
   Through this competition, students are expected to be able to compete in the field of science in the New Normal era. This student Olympiad competition also aims to make students able to hone their knowledge at the international level.

D. THEME

The theme of this competition is “Building a Brilliant Future Through Science”.

E. TIME AND PLACE OF IMPLEMENTATION

There are two stages in this competition, namely the preliminary stage and the final stage. Details of activities as shown in the table below.

Description	Elimination	Final
Day	Tuesday	Thursday
Date	28 June 2022	21 July 2022
Implementation Model	Computer-based Test System	Zoom Meeting

F. COMPETITION MECHANISM (SELECTION)

1. Participants register online through the website address **http://iwsc.walisongo.ac.id.**
2. The committee conducts administrative selection.
3. The committee announces participants who pass the administrative selection through the website **http://iwsc.walisongo.ac.id**.
4. Participants take part in the elimination stage with a total of 40 multiple choice questions within 90 minutes via the website **http://iwsc.walisongo.ac.id**.
5. Participants with top 10 scores in each competition branch will advance to the final round.
6. Participants who qualify for the final stage will be announced at 5 July 2022 on the website **http://iwsc.walisongo.ac.id**.
7. Participants who are declared to have passed the final must attend the technical meeting (TM) at 7 July 2022.
8. Participants who advance to the final must send a science project video with a maximum duration of 15 minutes as part of the final stage of the assessment process through the google form provided by the committee.
9. In the final stage, the finalists will present the video content, then the jury will deepen the video content for a maximum of 15 minutes.
10. The jury determines the participants in the first to tenth place from each competition branch.
11. The selection of the winner of the favorite video is determined by the most likes (♥) on YouTube.

G. PARTICIPANT REQUIREMENTS

The requirements for participating in this competition are as follows:

a. All participants are active students at the Undergraduate or D3 (Vocational) level as shown by a scan of a valid Student Identity Card or KTM from their university.

b. Students get a recommendation from the home campus at least at the study program level
c. Each campus is given the opportunity to delegate a maximum of 5 students for each branch of the competition.
d. If any fraud is found by the committee, either before, during, or after the competition takes place, the participant in question will be disqualified.

H. QUESTIONS RANGE

1. Mathematics

a. Abstract Algebra
   1) Group Theory (Group, Subgroup, Group Homomorphism, Quotient Group)
   2) Ring Theory (Ring, Subring, Ideal, Ring Homomorphism, Quotient Ring, Euclidean Domain, Principal Ideal Domain, Unique Factorization Domain, Polynomial Ring)

b. Linear Algebra
   1) Linear Equation System
   2) Vector Space (Subspace, Bases and Dimension)
   3) Linear Transformation (Kernel, Image, Rank, Change of Bases, Similarity of Matrices)
   4) Quotient Spaces, Dual Bases, Annihilator

c. Combinatorics and Discreet Mathematics
   1) Fundamental Principle of Counting (Rule of Sum, Rule of Product, Permutation, Combination)
   2) Properties of Integers
   3) The Principle of Inclusion-Exclusion
   4) Pigeon Hole Principle
   5) Generating Functions
   6) Recurrence Relations
   7) Graph Theory

d. Differential Equations
   1) First-Order Differential Equation (Separable, Homogeneous, Exact, Linear, Bernoulli)
   2) Second-Order Linear Homogeneous Differential Equations with Constant Coefficients
   3) nth-Order Linear Homogeneous Differential Equations with Constant Coefficients
   4) Laplace Transform

e. Calculus
   1) The Number Systems
   2) Functions

3) Limits
4) Continuity
5) Derivatives
6) Integrals
7) Sequences
8) Series
9) Vector-valued Functions
10) Multivariable Functions
11) Partial Derivatives
12) Multiple and Triple Integrals

f. Real Analysis
   1) Real Numbers Syatem
   2) Sequences and Series
   3) Limit of Functions
   4) Continuity
   5) Derivative
   6) The Riemann Integral
   7) Sequence of Functions
   8) Metric Space

g. Statistical Mathematics
   1) Analyzing Categoric Data
   2) Displaying and Comparing Quantitative Data
   3) Modeling Data Distributions
   4) Probability
   5) Counting, Permutations, and Combinations
   6) Sampling Distributions
   7) Significance Test (Hypothesis Testing)
   8) Confidence Intervals
   9) Linear Regressions

h. Complex Analysis
   1) Complex Numbers System
   2) Topology on Complex Numbers System
   3) Analytic Functions
   4) Elementary Functions
   5) Complex Integral
   6) Series
   7) Residues and Poles

2. Chemistry

a. Inorganic Chemistry (25%)
   1) Atomic structure and molecular structure

2) solid state chemistry, metallic and ionic crystal structure, lattice energy, molecular symmetry, molecular orbital theory
3) electronic configuration, trend of periodic table
4) stoichiometry, block s, p, and d
5) coordination chemistry

b. Physical chemistry (25%)
1) chemical and phase equilibrium, liquid, and colloids
2) kinetics of chemical reaction
3) thermodynamic
4) hydrogen atom, quantum number, term symbol, Schrodinger equation
5) orbital configuration, diatomic molecule, bond order, Hückel theory, and atomic and molecular spectroscopy (rotation, vibration, dan electronic)

c. Organic Chemistry and Biochemistry (25%)
1) functional groups and stereochemistry
2) reactivity and reaction mechanism of organic compounds, structure elucidation of organic compounds, and synthesis of organic compounds
3) macromolecules, polymer, enzymatic reaction, and biotechnology

d. Analytical Chemistry and Environmental Chemistry (25%)
1) Qualitative analysis of cations and anions: general reaction (Ksp, buffer pH, hydrolysis, salt hydrolysis, complex equilibrium, redox), identification of cations and anions.
2) Quantitative analysis: volumetry (acid base titration, complexometric titration, argentometry titration, oxidimetric/reductive titration), gravimetry, dan electrometry (potentiometry; voltammetry; amperometry).
3) Chemical separation: extraction, distillation, electrochemistry
4) Instrumental analysis: spectrophotometry UV-Vis, AAS, FT-IR, XRD, NMR, MS), chromatography (HPLC dan GC/GC/MS).
5) Proximate analysis.
6) Chemometric.
7) Environmental chemistry: *green chemistry*, current issue.

3. Biology

a. Cell biology:
1) Structure and function of cells
- Chemical components
- Organelles
- Cell metabolism
- Protein synthesis
- Transport through membranes
- Mitosis and meiosis

2) Microbiology
   - Prokaryotic cell organization
   - Morphology
   - Phototrophy and chemotrophy
3) Biotechnology
   - Fermentation
   - Genetic manipulation of organisms

b. Plant anatomy and physiology

Structure and function of tissues and organs involved in:

1) Photosynthesis, transpiration and gas exchange
2) Transport of water, minerals and assimilates
3) Growth and development
4) Reproduction (ferns and mosses included)

c. Animal anatomy and physiology

Structure and function of organs and tissues involved in

1) Digestion and nutrition
2) Respiration
3) Circulation
4) Excretion
5) Regulation (neural and hormonal)
6) Reproduction and development
7) Immunity

d. Ethology

1) Methodology of Ethology
2) Innate and Learned Behaviour
3) Communication and Social Organization
4) Foraging Behaviour

e. Genetics and Evolution

1) Variation: mutation and modification
2) Multiple allelism, recombination, sex linkage
3) Mechanism of evolution

f. Ecology

1) Individual Organisms
2) Population
3) Biotic Communities
4) Ecosystems
5) Biosphere and man

g. Biosystematics

Structure and function, evolutionary and ecological relationships among typical organisms in the following groups.

4. Physics

1) Mechanics
   a. Kinematics
   b. Statics
   c. Dynamics
   d. Celestial mechanics
   e. Hydrodynamics
2) Electromagnetic fields
   a. Maxwell's equations
   b. Interaction of matter with electric and magnetic fields
   c. Circuits
3) Oscillations and waves
   a. Oscillator
   b. Waves
   c. Interference and diffraction
   d. Interaction of electromagnetic waves with matter
   e. Geometrical optics and photometry
4. Relativity
   a. Principle of relativity and Lorentz transformations
   b. Relativistic equation of motion
   5. Quantum Physics
   a. Probability waves
   b. Structure of matter
   6. Thermodynamics and statistical physics
   a. Classical thermodynamics
   b. Heat transfer and phase transitions
   c. Statistical physics

I. EVENT SCHEDULE

The schedule for this competition is as follows:

NO	AGENDA	DATE
1	Registration	1 May – 13 June 2022
2	Administration selection	13 June – 20 June 2022

3	Announcement of participants passing administration	21 June 2022
4	Simulation	27 June 2022
5	Elimination stage implementation	28 June 2022
6	Announcement of elimination results / final participants	5 July 2022
7	Technical Meeting for final participants	7 July 2022
8	Participants Send videos to the committee	14 July 2022
9	Time to collect video likes	16 – 20 July 2022
10	Final Ceremonial and Closing (All Participants are required to participate)	21 July 2022
11	Winner Announcement	24 July 2022

J. JURY MEMBERS

Each field of competitions have three judges with the following details:

a. One lecturer from foreign University/ College (outside Indonesia)
b. One lecturer from University/ College outside UIN Walisongo Semarang
c. One lecturer from UIN Walisongo Semarang

K. ASSESSMENT

The scoring mechanism for this competition is as follows:

a. In the elimination stage: correct answers (+4), incorrect answers (-1), and no answers (0).
b. In the final stage: the weight of the video science project content assessment is 40% and the presentation weight is 60%.

The conditions for obtaining medals for each field are as follows:

a. The first to third highest score will get a gold medal.
b. The fourth to sixth highest score will get a silver medal.
c. The seventh to tenth highest score will get a bronze medal.

L. AWARDS

1. The First Gold Medal Winner gets an *e-certificate award* and incentive
2. The Second Gold Medal Winner gets an *e-certificate award* and incentive
3. The Third Gold Medal Winner gets an *e-certificate award* and incentive
4. The Most-Liked Video Participant gets an *e-certificate award*
5. All Finalists each get an *e-certificate*

M. SECRETARIAT

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N. CLOSING

The success of holding the International Walisongo Science Competition (IWSC) in 2022 is determined by all elements with an interest in carrying out selection activities in an orderly, orderly, disciplined and high sense of responsibility.

By understanding these guidelines, it is hoped that the committee and all related parties can carry out their duties as well as possible, so as to achieve optimal results. Recognizing that there are still many shortcomings in this guide, we expect criticism and suggestions as input for the implementation of the selection in the coming years. Hopefully

this guideline can be used as a reference so that this selection activity can be carried out properly, effectively and efficiently.

IWSC Chief Committee

Mohamad Tafrikan, M.Si