8/7/2025

“Digital Pakistan Speed Programming Contest 2025”

Final Event Report

Ignite Partners:

howmuch

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1. Executive Summary

The Digital Pakistan Speed Programming Competition (DPSPC) 2025, branded as CodePK, marked a national milestone in programming excellence. Powered by Ignite – National Technology Fund, under the Ministry of IT and Telecommunication, and executed in partnership with the International Collegiate Programming Contest (ICPC) Asia Topi Region, the initiative aimed to identify and nurture top programming talent across Pakistan while promoting digital skills in alignment with the Digital Pakistan vision.

The competition journey began with a nationwide training campaign. Over 25 training sessions were conducted in hybrid mode (onsite and online) across six major cities, equipping more than 3,400 students with programming fundamentals and advanced algorithmic problem-solving skills. Following these trainings, a total of 1,375 teams—comprising 4,273 contestants—were shortlisted to participate in the Online Round, held on June 28–29, 2025.

The Online Round witnessed record-breaking participation:

- 1,375 teams from across 192 educational institutions
- 56 cities represented, showcasing a truly national footprint
- 26% female participation, highlighting diversity and inclusion efforts

Following a rigorous evaluation process—factoring in problem-solving accuracy, time efficiency, and AI-based code plagiarism detection—57 top-performing teams were shortlisted for the Final Onsite Round. Special effort was made to include deserving teams from remote regions, underrepresented institutions, and women-led teams, reaffirming the inclusivity mission of the competition.

The Onsite Round was hosted at the Ghulam Ishaq Khan Institute of Engineering Sciences and Technology (GIKI) on July 16–17, 2025. A highly curated panel of national and international jury members and problem setters led the event, ensuring integrity, fairness, and competitive quality. The 57 finalist teams competed on a challenging set of nine algorithmic problems designed by experts to test deep computational thinking.

The event concluded with a vibrant Closing Ceremony, attended by Ms. Wajiha Qamar, Minister of State for Federal Education and Professional Training, as Chief Guest. Top three teams were honored with substantial cash prizes:

- PKR 1.5 million for the Champion Team
- PKR 1 million for the 1st Runner-Up
- PKR 0.5 million for the 2nd Runner-Up

Key addresses were delivered by Mr. Adeel Aijaz Shaikh (CEO, Ignite), Dr. Fazal Ahmad Khalid (Rector, GIKI), Dr. Masroor Hussain (Project Director, DPSPC 2025), and Ms. Wajiha Qamar, emphasizing the importance of such initiatives in driving Pakistan's digital talent development.

DPSPC 2025 has successfully created a pipeline of skilled programmers ready to contribute to the digital economy. With nationwide outreach, gender representation, and world-class standards, it sets a new benchmark in academic competitions in Pakistan.

2. Introduction

The Digital Pakistan Speed Programming Competition (DPSPC) 2025, also known as CodePK, was launched as a national-level initiative to identify, train, and recognize Pakistan's top programming talent. Spearheaded by Ignite – National Technology Fund under the Ministry of IT & Telecom, in partnership with ICPC Asia Topi Region and Howmuch, the competition aimed to promote computational thinking, problem-solving, and coding excellence among university, college and school students across the country.

Recognizing the global demand for skilled programmers and digital problem solvers, the contest was designed to provide an equitable and inclusive platform for students from diverse educational and geographic backgrounds. In alignment with Pakistan's digital transformation agenda, the event not only focused on talent identification but also emphasized capacity building through widespread training programs, rigorous evaluation, and fair competition.

The competition was structured into four key phases:

Registrations

Registrations for DPSPC 2025 were open from May 15 to June 3, 2025, during which **1,511 teams** registered from various schools, colleges and universities across Pakistan. After an initial screening process, **1,375 teams** were shortlisted and invited to participate in the training phase.

Training Sessions

To provide equitable access to learning resources, training sessions were organized from June 16 to June 20, 2025**,** across six major cities**:** Islamabad, Lahore, Peshawar, Multan, Karachi, and Quetta**.** These sessions were conducted in a hybrid format—allowing both onsite and online participation—to cater to students from far-flung areas and those unable to travel. Over 3,400 students were trained through these sessions, covering programming fundamentals, advanced algorithms, and competitive programming techniques. The training component was a crucial pillar of the competition, designed to prepare participants for the rigorous contest environment.

Online Round

Following the training phase, the Online Round of DPSPC 2025 was held on June 28–29, 2025**,** attracting participation from 1,375 teams representing 192 educational institutions and 56 cities nationwide. The problems for the online round were curated to test logical reasoning, algorithm design, time-efficient coding, and problem-solving under pressure.

The online contest was used as the primary shortlisting mechanism, leading to the selection of the top 57 teams for the final onsite round. Evaluation was carried out with careful attention to accuracy, time taken, and code originality, ensuring a merit-based and transparent selection process.

Onsite Round

The Final Onsite Round of DPSPC 2025 was held on July 16–17, 2025, at the GIK Institute of Engineering Sciences and Technology. A total of 57 top teams from the online round participated in-person in a highly competitive and collaborative environment.

Challenging problems were designed by a panel of national and international problem setters, and the event was supervised by a distinguished jury to ensure fairness and transparency. The onsite round highlighted Pakistan's emerging digital talent, with diverse participation from across the country, and reinforced DPSPC's mission to nurture competitive programmers and bridge regional gaps**.**

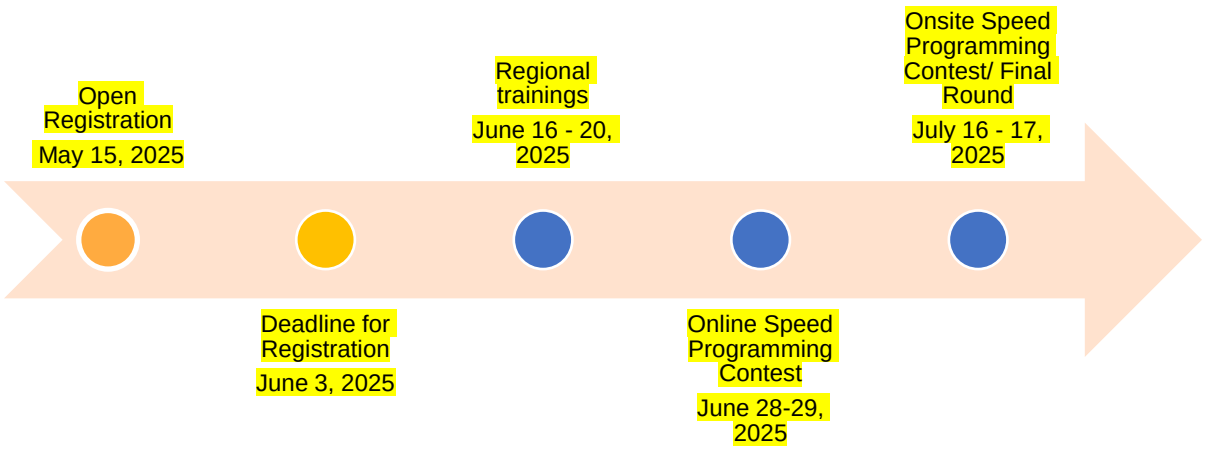


Figure 1. Tentative three-month timeline of the Project

3. Objectives of the Speed Programming Competition

Aligned with the vision articulated in the RFP, the Digital Pakistan Speed Programming Competition (DPSPC) 2025 was structured around comprehensive objectives extending beyond conventional programming contests. The initiative was meticulously designed to deliver a multifaceted experience, promoting technical mastery, personal advancement, and professional growth.

- **Skill Development and Critical Thinking**

The competition aimed to significantly enhance participants' coding proficiency and analytical problem-solving capabilities. By challenging contestants to solve complex algorithmic problems under stringent time constraints, participants honed their ability to think critically, optimize solutions effectively, and continuously develop their technical skills.

- **Talent Identification and Career Opportunities**

Understanding the importance of recognizing and nurturing talent, the competition provided a prominent platform for technology companies and educational institutions to identify outstanding participants. Top performers and winners were awarded job offers, scholarships, and numerous career advancement opportunities, reinforcing their professional trajectories.

- **Community Collaboration and Knowledge Sharing**

Promoting a spirit of constructive competition, the DPSPC 2025 facilitated meaningful interactions among participants. Beyond competition, the event fostered collaboration, networking, mentorship, and knowledge exchange among like-minded individuals, strengthening the coding community and building enduring professional relationships.

- **Creative Problem-Solving and Real-World Applications**

Participants tackled a variety of challenging problems specifically designed to stimulate creative problem-solving skills. These scenarios were carefully crafted to reflect real-world challenges, equipping contestants with practical experiences valuable for addressing complex, real-life issues throughout their professional careers.

- **Time Management and Pressure Handling**

Conducted under tight time constraints, the competition nurtured essential skills such as efficient time management and the ability to perform effectively under pressure. These transferable competencies are critical for success in diverse professional environments.

- **Exposure to Emerging Technologies**

Recognizing the rapidly evolving technological landscape, segments of the competition introduced participants to cutting-edge technologies, programming languages, and contemporary tools, including DOMjudge, Codeforces, and advanced Integrated Development Environments (IDEs). This exposure significantly expanded participants' technical skill sets and adaptability.

- **Encouraging Innovation and Algorithmic Thinking**

Through uniquely challenging problems, the competition stimulated innovative thought processes, driving participants to develop creative algorithms and groundbreaking solutions. This approach underscored the importance of innovation and originality in algorithmic thinking.

4. Capacity Building: Training Campaign

As part of the preparatory phase of the Digital Pakistan Speed Programming Competition 2025 (CodePK), the teams shortlisting and training sessions were successfully executed in accordance with the planned schedule. These activities marked a critical milestone in the competition's roadmap, setting the stage for an engaging and competitive experience for young programmers across Pakistan.

Team Registrations and Shortlisting

Team registrations for CodePK 2025 were conducted via Google Forms, which were open from 15th May to 3rd June 2025. During this period, a total of 1,511 teams from universities, colleges, and schools across Pakistan registered to participate. After a rigorous screening process, 1,375 teams were shortlisted by 12th June 2025, based on the eligibility criteria outlined below:

Eligibility Criteria for Shortlisting:

1. Each team must comprise up to three distinct members.

2. Teams must be formed from the same academic institution. Cross-university teams were not allowed.

3. Participants must be under the age of 25.

4. Multiple teams from a single institution were permitted.

5.Incomplete or improperly filled forms were disqualified.

The finalized list of shortlisted teams is attached as Annex A.

Training Sessions

To ensure participants were well-prepared and familiar with the competition format, a series of regional training sessions were conducted across six major cities of Pakistan including Karachi, Quetta, Islamabad, Multan, Peshawar and Lahore. The training phase offered participants a robust and immersive learning experience. Held in parallel sessions, each training session spanned between 5 to 7 hours, ensuring comprehensive coverage of key programming concepts and contest mechanics. To maximize participant engagement and retention, the sessions included:

- Live coding demonstrations
- Interactive Q&A segments
- Hands-on problem-solving exercises

Participants actively practiced real-time coding while receiving personalized guidance and feedback from experienced trainers and ICPC Asia Topi mentors. The training sessions were conducted as per the schedule shown in Table 1.

Table 1. City-wise Training Schedule

Venue	Location	Date
Karachi	Habib University	16-Jun-25
Quetta	BUITEMS	16-Jun-25
Lahore	UCP	18-Jun-25
Peshawar	FAST-NUCES	18-Jun-25
Islamabad	FAST Uni	20-Jun-25
Multan	ISP Multan	20-Jun-25

Analysis of Nearest Training Centre Preferences

A total of 1,511 teams responded to the Google form survey regarding their preferred training centre for the CodePK 2025 training sessions. The goal of this data collection was to allocate resources, trainers, and venue support efficiently across different regions of Pakistan.

The distribution is summarized below:

City-Wise Preferences

- **Karachi – 23%**

Karachi emerged as the city with the highest number of respondents selecting it as their nearest training centre, accounting for 23% of the total registrations. This high turnout reflects the vibrant and well-established programming ecosystem in the southern region of Pakistan. Karachi is home to several leading universities, technical institutes, and a growing tech industry, all of which contribute to a strong culture of competitive programming and software development.

- **Lahore – 21.8%**

Lahore closely followed Karachi in the number of respondents, capturing 21.8% of the total registrations. This strong representation indicates a high level of interest and engagement from Central Punjab and its surrounding regions.

- **Islamabad – 20.5%**

Islamabad showed significant participation, accounting for 20.5% of the total team registrations. This strong turnout reflects active engagement from students in the capital city as well as from neighbouring areas, particularly the twin cities of Islamabad and Rawalpindi.

- **Quetta – 16.7%**

A healthy turnout from Baluchistan, particularly centred around Quetta, highlights the growing enthusiasm for coding and digital skills in historically underserved regions. With 16.7% of the total team registrations, this participation reflects a positive shift in access to technology education and interest in national-level competitions

- **Multan – Small segment (~4.5%)**

Multan's responses reflect meaningful representation from South Punjab, even though the number of registrations was smaller compared to major metropolitan centres. This indicates that interest in competitive programming is steadily growing in the region. As educational institutions in South Punjab continue to adopt and promote digital learning, platforms like CodePK 2025 offer valuable exposure and opportunities for students to enhance their programming skills. The participation from Multan highlights the importance of expanding outreach and resources to further strengthen engagement in emerging tech communities outside the main urban hubs.

- **Peshawar – Smaller group (~3.5%)**

Registrations from Peshawar accounted for a smaller portion of the overall total but still reflected active interest from Khyber Pakhtunkhwa. While the numbers were modest compared to larger cities, the enthusiasm shown by participants highlights the potential for growth in the region’s tech and programming ecosystem. Continued efforts to engage students in KP can help bridge the gap and foster a more inclusive national programming community.

Alternative Options Selected

- **Online for Far-Flung Areas – Small but Important Share (~3%)**

A small yet meaningful portion of teams, approximately 3%, opted to attend the training sessions online due to geographical constraints or limited access to nearby training centers. This option played a vital role in ensuring inclusivity, allowing students from remote or underserved regions to benefit from the CodePK 2025 training program without the barrier of travel. The online format helped extend the reach of the initiative and demonstrated a commitment to equitable access to digital learning opportunities.

- **Training Not Needed – Approximately 5%**

Around 5% of the registered teams chose not to attend any training session, indicating a level of self-assurance in their existing skills. These participants were likely already familiar with competitive programming and felt well-prepared to participate in the competition without additional guidance. This response reflects the presence of a segment of highly motivated or experienced individuals within the overall participant pool, underlining the diverse range of skill levels catered to by CodePK 2025.

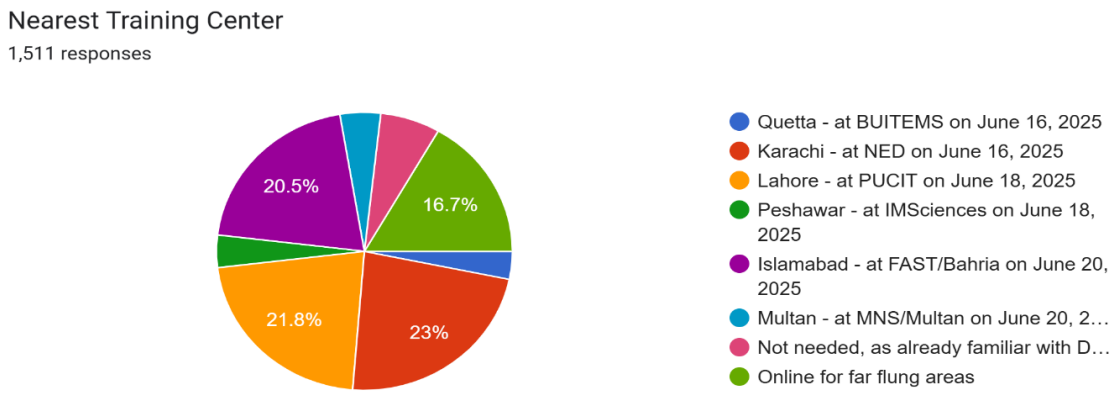


Figure 2. Distribution of Team Registrations by Nearest Training Centre – CodePK 2025

The chart demonstrates strong nationwide participation, with Karachi, Lahore, and Islamabad accounting for most of the in-person training interest. The provision of online training and opt-out flexibility helped cater to diverse needs across skill levels and geographies. These insights were crucial in finalizing venue bookings, trainer assignments, and content customization for CodePK 2025.

Training Modules Covered

To equip participants with the necessary skills and confidence to compete in the Digital Pakistan Speed Programming Competition 2025 (CodePK), the training sessions were carefully designed around three core modules. These modules ensured a structured and progressive learning experience for students from diverse backgrounds and experience levels.

Environment Familiarization

The first module focused on introducing participants to the essential tools and platforms used in competitive programming. The objective was to reduce technical barriers and familiarize students with the workflow of real contest environments. Key components included:

- **Overview of Common Contest Platforms:** A walkthrough of popular platforms such as Codeforces for solving practice problems, analyzing editorial solutions, and engaging with the global programming community.
- **Hands-On with IDEs and Tools:** Guidance on configuring local development environments, including lightweight IDEs and compilers commonly used in programming contests.
- **DOMjudge Simulation:** Participants were introduced to DOMjudge, a contest management system used to replicate real-time contest conditions. Mock contests were held to simulate submission, compilation, and automated judging workflows.
- **Collaborative Coding Practices:** Teams were trained on effective collaboration strategies under time constraints, including shared problem-solving, debugging, and systematic division of tasks.

Problem Solving Techniques

This module emphasized the cognitive and analytical processes behind effective competitive programming. The goal was to strengthen participants' ability to think algorithmically and tackle problems under pressure. Key areas covered:

- **Structured Problem Analysis:** Participants learned how to read and dissect problem statements efficiently, identify input-output constraints, and formulate a roadmap before coding.
- **Algorithm Design Strategies:** Core algorithmic thinking was reinforced, including choosing the right data structures, designing efficient algorithms, and considering time and space complexity.

- **Debugging and Optimization:** Techniques were introduced for quickly identifying logical errors, using sample test cases effectively, and optimizing code for performance in constrained environments.
- **Avoiding Common Pitfalls:** Discussions included typical mistakes beginners make, such as off-by-one errors, uninitialized variables, or misunderstanding edge cases—along with methods to avoid them.

Challenge Sets by Category

To reinforce theoretical learning through practice, each training session concluded with a set of curated challenges that varied in difficulty and topic. This enabled students to test their understanding and prepare for real competition scenarios.

- **Basic-Level Challenge – Divide and Conquer:**

  An introductory problem designed to help participants grasp recursive problem-solving patterns and break problems into manageable subproblems.

- **Intermediate-Level Challenge – Greedy Algorithms:**

  A medium-difficulty challenge where students had to apply greedy strategies to optimize outcomes. Emphasis was placed on identifying optimal substructures and proving correctness.

- **Advanced-Level Challenge – Dynamic Programming:**

  A complex problem requiring the use of DP techniques such as memorization, tabulation, and state transition logic. This challenged students to model problems and manage overlapping subproblems effectively.

These challenge sets not only assessed the participants' grasp of core concepts but also enhanced their problem-solving speed, which is crucial for success in CodePK's timed contest environment. This structured training methodology ensured that participants left the sessions better equipped, both technically and strategically, to perform in the CodePK 2025 Online Competition.

Objectives of the Training Sessions

The training sessions organized under the Digital Pakistan Speed Programming Competition 2025 (CodePK) provided participants with numerous valuable outcomes, significantly contributing to their personal and professional development in the field of competitive programming.

1. Skill Enhancement

The training sessions were meticulously designed to strengthen participants' algorithmic thinking, problem-solving strategies, and coding proficiency. Through a combination of interactive lectures, hands-on exercises, and real-time challenge sets, students gained practical exposure to a wide range of programming techniques. The structured curriculum ensured that both novice and intermediate-level coders could elevate their capabilities and apply these skills effectively in the upcoming competition and beyond.

2. Confidence Building

By engaging with simulated contest environments, including live mock rounds using platforms such as DOMjudge, participants became familiar with the pressure and workflow of actual competitions. This real-time experience significantly boosted their confidence, enabling them to navigate time-bound problem-solving scenarios with greater composure and efficiency. Exposure to the tools, submission systems, and evaluation methods helped demystify the competitive process and reduced performance anxiety.

3. Networking and Community Building

The sessions offered participants the opportunity to connect with ICPC Asia Topi mentors, experienced trainers, and technical experts from across the country. This interaction fostered a strong sense of national collaboration and community engagement within Pakistan's growing programming ecosystem. By interacting with peers from different regions, participants broadened their perspectives and gained insights into diverse learning strategies and experiences, reinforcing the spirit of healthy competition and mutual growth.

4.Time Management

Participants enhanced their time management skills by engaging in problem-solving exercises under strict time constraints. Regular practice in prioritizing tasks, allocating time effectively, and swiftly adapting to dynamic contest environments significantly improved their efficiency and productivity in competitive scenarios.

Together, these benefits have not only prepared the participants for CodePK 2025 but also contributed to their long-term growth as future problem solvers, developers, and technology leaders.

Table 2: City-wise Distribution of Instructors for Training Sessions of CodePK 2025

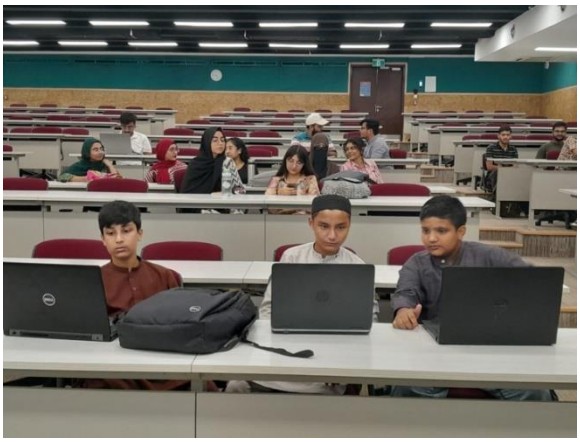
City	Venue	Date	Lead Instructor	Instructors
Karachi	Habib University	16-Jun-2025	Dr. Waqar Saleem	Dr. Muhammad Rafi, Mr. Hisham Malik, Mr. Mehrul Hassan, Ms. Alishba
Quetta	BUITEMS	16-Jun-2025	Dr. Adeel Cheema	Dr. Masroor Hussain, Dr. Usman Habib, Mr. Sohail Hassan, Ms. Ushna
Lahore	University of Central Punjab	18-Jun-2025	Mr. Syed Atif Mehdi	Mr. Mateen, Mr. Yasir Niaz Khan, Mr. Hisham Malik, Ms. Kanwal Atif, Mr. Mehrul Hassan
Peshawar	FAST-NUCES	18-Jun-2025	Dr. Usman Habib	Dr. Adeel Cheema, Ms. Asima Sarwar, Ms. Anmol, Dr. Masroor Hussain, Dr. Junaid
Islamabad	FAST-NUCES	20-Jun-2025	Dr. Arshad Islam	Mr. Hisham Ali, Mr. Usman Habib, Ms. Sarah, Ms. Esha, Dr. Junaid & Team
Multan	Institute of Southern Punjab	20-Jun-2025	Dr. Muhammad Rafi	Dr. Waqar Saleem, Dr. Adeel Cheema, Mr. Mehrul Hassan, Ms. Umme Rubab

Karachi (Habib University) - June 16, 2025

The training session at Karachi was hosted at Habib University and attracted a massive turnout of approximately 300 teams comprising 1,000 students. Due to the large number of participants, the training was conducted in three shifts, each lasting 2.5 hours. The first 30 minutes were allocated for check-in and settling, followed by a 2-hour training session in each shift. Each training included live lectures and problem-solving demonstrations.

Instructors:

- Dr. Waqar Saleem (Lead)
- Dr. Muhammad Rafi
- Mr. Hisham Malik
- Mr. Mehrul Hassan
- Ms. Alishba

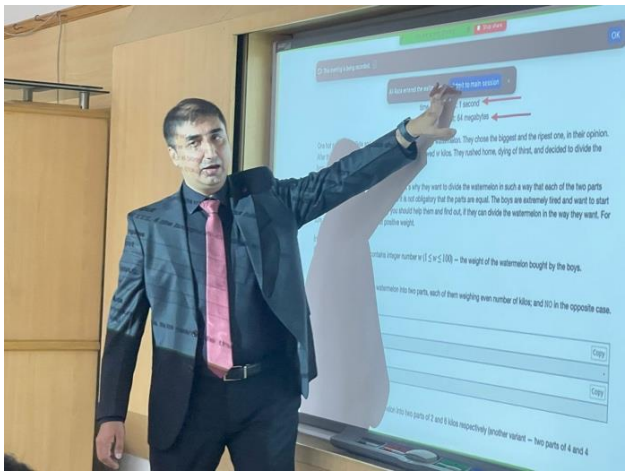


Quetta (BUITEMS) - June 16, 2025

The Quetta session took place at BUITEMS with participation from 44 teams (132 students). Conducted in a single shift, the session covered all training modules and provided a hands-on problem-solving experience to participants.

Instructors:

- Dr. Adeel Cheema (Lead)
- Dr. Masroor Hussain
- Dr. Usman Habib
- Mr. Sohail Hassan
- Ms. Ushna



Lahore (University of Central Punjab) - June 18, 2025

Lahore hosted its training at the University of Central Punjab, witnessing participation from 302 teams comprising 906 students. The session was conducted in three shifts to ensure smooth delivery of content. Each shift included lectures, live demonstrations, and practice problems.

Instructors:

- Mr. Syed Atif Mehdi (Lead)
- Mr. Mateen
- Mr. Yasir Niaz Khan
- Ms. Kanwal Atif
- Mr. Mehrul Hassan

Peshawar (FAST-NUCES) - June 18, 2025

The Peshawar training session was conducted at FAST-NUCES, with 48 teams (144 students) participating in a single shift. The session included a comprehensive overview of contest platforms, algorithm training, and live coding.

Instructors:

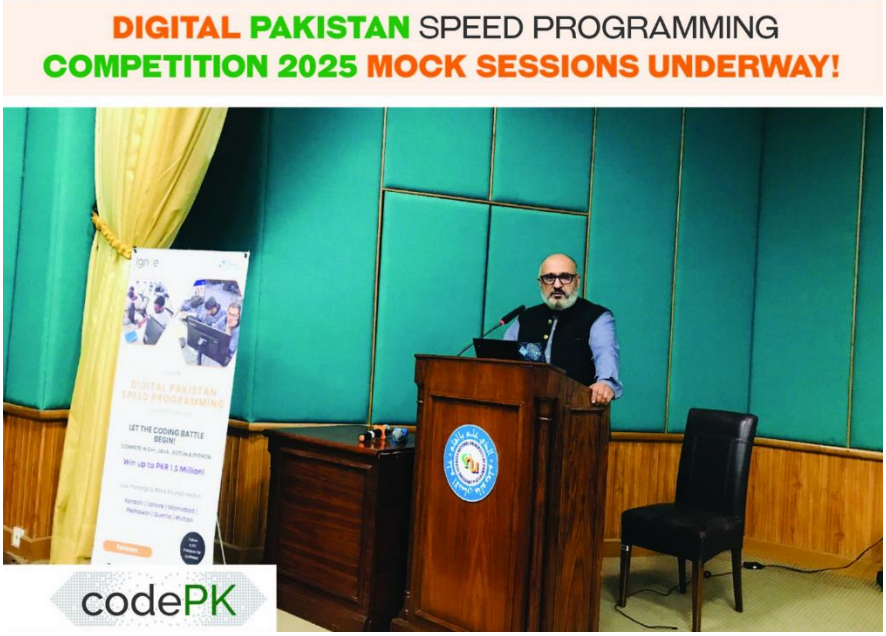
- Dr. Usman Habib (Lead)
- Dr. Adeel Cheema
- Ms. Asima Sarwar
- Ms. Anmol
- Dr. Masroor Hussain
- Dr. Junaid (Ignite)

Islamabad (FAST-NUCES) - June 20, 2025

The Islamabad session, hosted at FAST-NUCES, attracted 290 teams comprising 870 students. The training was conducted in three shifts, each providing an in-depth learning experience through lectures and guided problem-solving.

Instructors:

- Dr. Arshad Islam (Lead)
- Mr. Hisham Ali
- Mr. Usman Habib
- Dr. Masroor Hussain
- Dr. Zeeshan
- Dr. Junaid & Team (Ignite)



Multan (Institute of Southern Punjab) - June 20, 2025

The Multan session was held at the Institute of Southern Punjab with participation from 60 teams (180 students). Conducted in a single shift, the training provided full coverage of the training modules and practice rounds.

Instructors:

- Dr. Muhammad Rafi (Lead)
- Dr. Waqar Saleem
- Dr. Adeel Cheema
- Mr. Mehrul Hassan
- Ms. Umme Rubab

Hybrid Training Delivery for Inclusive Participation

To ensure maximum accessibility and nationwide inclusion, **all six major training sessions held across Karachi, Lahore, Islamabad, Quetta, Peshawar, and Multan** were conducted in a **hybrid format**. Each session was delivered **onsite at designated venues** and simultaneously **broadcast live via Zoom**, enabling students who could not attend in person to participate remotely in real time.

This hybrid approach was instrumental in ensuring that **no participant was left behind**. Students joining online were provided full access to the session content, live presentations, problem-solving discussions, and Q&A segments. Dedicated moderators and facilitators were assigned to manage online queries and ensure that all questions from virtual attendees were promptly addressed, maintaining an interactive and inclusive learning environment.

In addition to the city-based hybrid sessions, a **separate online-exclusive training session** was organized specifically for students from **remote and far-flung regions** who had opted for online training only. This dedicated session focused on revisiting the core training modules, addressing unique connectivity and accessibility needs, and providing extended support to help students engage effectively despite geographical limitations.

Through this blended delivery model, **CodePK 2025 successfully reached students across urban and rural regions**, demonstrating a commitment to equitable access, digital empowerment, and capacity building for competitive programming at the national level.

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5. Online Round Execution

Following the conclusion of the nationwide training sessions, the Online Round of the *Digital Pakistan Speed Programming Competition (DPSPC) 2025* was held over two days, providing participants with a structured and immersive competitive programming experience.

- **June 28, 2025**: The event commenced with a **2-hour mock contest**, designed to help participants familiarize themselves with the contest platform, rules, and technical environment. This preparatory session played a crucial role in easing contestants into the dynamics of the actual competition, ensuring they were well-versed in both the interface and time-bound nature of the event.
- **June 29, 2025**: The **main competition** followed with an intensive **5-hour online contest**, where participants were challenged to solve a curated set of algorithmic problems. These problems were carefully designed to assess a range of programming competencies, including logic, analytical thinking, algorithm design, and team collaboration under pressure. The rigor of the contest pushed participants to apply their training in real time and demonstrate both technical mastery and strategic problem-solving.

Hosted entirely through a virtual platform, the Online Round enabled **seamless participation** from students representing a diverse spectrum of educational institutions—spanning **universities, colleges, and schools across Pakistan**. The scale of the competition was unprecedented, with **4,125 contestants forming 1,375 teams**, underscoring the growing enthusiasm for competitive programming in the country and the deep reservoir of emerging talent. Given below is the event schedule of the online round of the DPSPC 2025.

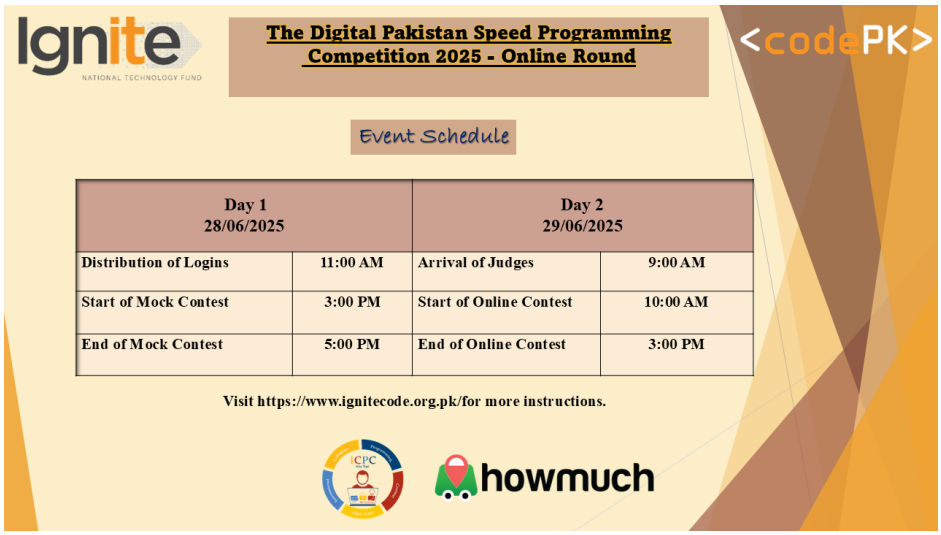


Figure 3. Event Schedule of the Online Round

i. Problem Setting Panel

A cornerstone of the **Digital Pakistan Speed Programming Competition (DPSPC) 2025** was the quality, depth, and diversity of the problems presented during the Online Round. To ensure a world-class competitive experience, the problems were **meticulously designed and reviewed by a distinguished panel of judges**, comprising some of the most accomplished minds in computer science and competitive programming—both from Pakistan and abroad.

The problem set aimed to challenge participants across a broad spectrum of skills, including fundamental algorithm design, optimization, data structures, and creative problem-solving. Each problem was carefully calibrated to align with international standards while remaining accessible to Pakistan's diverse student population.

Leading this prestigious panel was **Dr. Syed Fawad Hussain**, **Professor at the University of Birmingham, Dubai Campus**, who served as the **Chief Judge** for the Online Round. Under his guidance, the problem-setting committee delivered a well-balanced and intellectually stimulating contest experience.

The panel of problem setters included the following experts, each contributing problems of varying difficulty levels:

Table 3: Problem Setters for the Online Round of DPSPC 2025 and Corresponding Difficulty Levels

S.no.	Name	Affiliation	Problem Difficulty
1.	Syed Fawad Hussain (Chief Judge)	University of Birmingham, Dubai	Easy to Medium
2.	Adeel Cheema	FAST-NUCES, Faisalabad	Easy
3.	Abdul Mateen	PUCIT, Lahore	Medium to Hard
4.	Raja Hashim Ali	University of Europe for Applied Sciences, Germany	Medium
5.	Usman Habib	FAST-NUCES, Islamabad	Easy to Medium
6.	Atif Mehdi	UCP, Lahore	Medium to Hard
7.	Arshad Islam	FAST-NUCES, Islamabad	Hard
8.	Waqar Saleem	Habib University, Karachi	Easy
9.	Muhammad Rafi	FAST-NUCES, Karachi	Hard

Their collective expertise ensured a high-quality contest environment, where problems were not only technically sound but also diverse in style, structure, and strategy. The inclusion of varying

difficulty levels made the contest accessible to newer participants while still providing rigorous challenges for the most advanced teams.

This collaborative effort between national and international academia stands as a testament to the growing global recognition of Pakistan's programming ecosystem and its commitment to fostering excellence in computing education.

ii. Contest Jury Panel

The integrity and success of the Online Round of the Digital Pakistan Speed Programming Competition (DPSPC) 2025 were ensured by an accomplished **jury panel comprising 22 distinguished members** from both academia and industry. Representing prestigious institutions across **Pakistan, Germany, and the UAE**, the jury brought together a rich blend of academic excellence, technical expertise, and practical insight.

This diverse panel played a pivotal role in supervising the competition, validating submissions, resolving disputes, and maintaining fairness and transparency throughout the event. The inclusion of experts from international institutions and key government and industry organizations added depth and credibility to the evaluation process.

The jury members were carefully selected for their extensive experience in programming, computer science education, and technology-driven innovation. Their collective oversight ensured that the contest upheld global standards while aligning with the local educational landscape.

The following table lists the members of the jury along with their designations and affiliations:

Table 4: Jury Members for the Online Round of DPSPC 2025

S. No.	Name	Designation	Affiliation
1	Dr. Arshad Islam	Professor	FAST-NUCES, Islamabad
2	Dr. Adeel Cheema	Assistant Professor	FAST-NUCES, Faisalabad
3	Mr. Abdul Mateen	Assistant Professor	PUCIT, Lahore
4	Dr. Raja Hashim Ali	Professor of Digital Business and Data Science	University of Europe for Applied Sciences, Germany
5	Dr. Usman Habib	Associate Professor	FAST-NUCES, Islamabad
6	Dr. Atif Mehdi	Content Architect	Educative
7	Dr. Syed Fawad Hussain	Professor	University of Birmingham, Dubai Campus
8	Dr. Waqar Saleem	Associate Professor	Habib University, Karachi

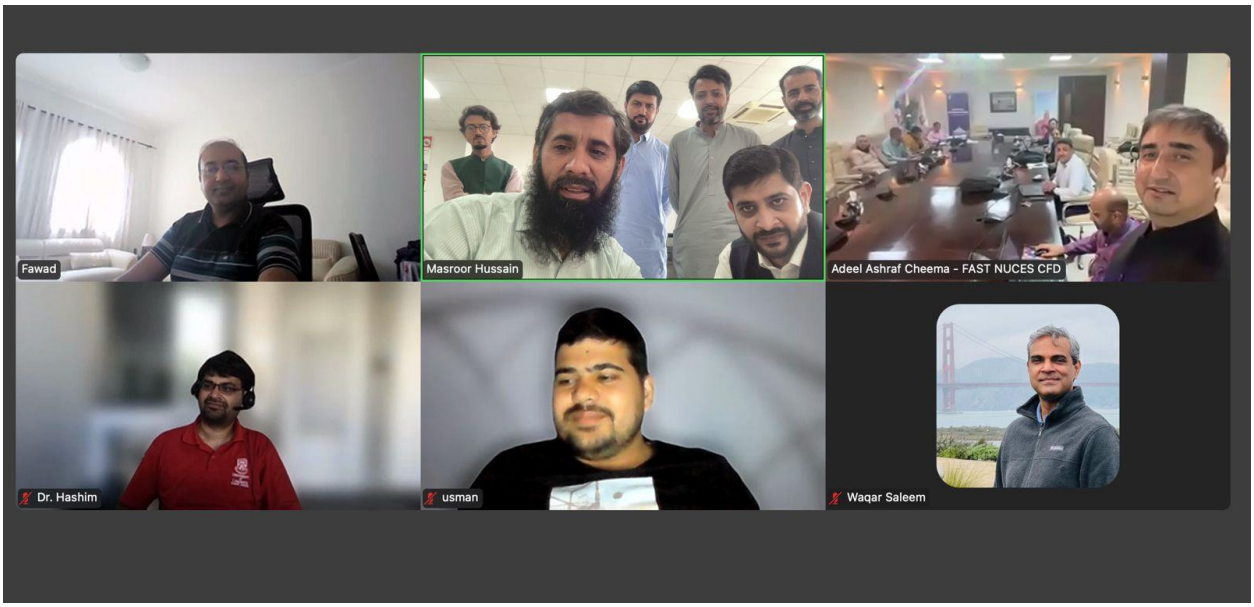
9	Dr. Muhammad Rafi	Professor	FAST-NUCES, Karachi
10	Ms. Kanwal Atif	Research Associate	University of Central Punjab
11	Dr. Yasir Niaz Khan	Chief Technology Officer	Punjab Safe Cities Authority
12	Mr. Azib Gondal	Software Engineer	Kawai Enterprise
13	Mr. Ali Shaukat	Manager Marketing	GIK Institute
14	Ms. Safia Baloch	Lecturer	GIK Institute
15	Dr. Farhan Khan	Assistant Professor	GIK Institute
16	Dr. Iffat Maab	Researcher	NIIT, Japan
17	Dr. Ehtisham	Assistant Professor	CUST
18	Ms. Nazia Shehzadi	Lecturer	GIK Institute
19	Mr. Hisham Malik	CEO	Howmuch
20	Dr. Usman Haider	Postdoc researcher	University of Galway, Ireland
21	Mr. Mutharib Ayub	Software Engineer	Pakistan
22.	Dr. Muhammad Abdullah	Assistant Professor	PUCIT, Lahore

The contest was jointly managed from two primary coordination sites. While the core systems, organizing team, and technical infrastructure were based at the **GIK Institute of Engineering Sciences and Technology**, several members of the **jury panel** participated remotely from the **University of Central Punjab (UCP), Lahore**. This collaborative setup ensured seamless contest execution and effective coordination among all judges and support staff, enabling real-time oversight and decision-making throughout the event.

The following page features selected photographs from the Online Round of DPSPC 2025. These images capture key moments from the contest day, highlighting the participation of judges based at **UCP Lahore**, actively monitoring and evaluating the competition. Simultaneously, the **technical systems team**, along with **Dr. Masroor Hussain**, coordinated the contest operations from the **GIK Institute of Engineering Sciences and Technology,** ensuring smooth execution and real-time technical support across both sites.

Glimpse of the Judges Panel from UCP, Lahore and Systems Staff at GIK Institute during the Online Round of DPSPC 2025

The image below illustrates the seamless coordination among the judges and systems team during the Online Round of DPSPC 2025. All jury members and technical staff remained virtually connected throughout the event. **Dr. Syed Fawad Hussain** (joining from Dubai), **Dr. Raja Hashim Ali** (from Germany), **Dr. Usman Haider** (from Ireland), and **Dr. Waqar Saleem** (from Karachi) participated remotely, while the remaining members of the jury panel convened in person at the **conference room of UCP Lahore**. The **systems and technical team**, stationed at the **GIK Institute**, worked in close coordination to ensure smooth contest operations.



iii. Problem Setting Guidelines for Online Round of DPSPC 2025

A well-defined problem is the responsibility of the problem setter, not the contestant. In competitive programming, the challenge should lie in solving the problem—not in understanding it. Hence a clear set of guidelines was set forth for the problem setters.

Each problem submission was required to include a complete **problem packet**, consisting of the following components:

- **Problem Statement (Word file)**: Contained the problem description, input/output formats, examples, and constraints.
- **Test Cases (ZIP archive)**: Included input-output file pairs (`i.in` and `i.out`).
- **Editorial (Word file)**: Provided an explanation of the intended solution.
- **Solution Code**: Matched the approach described in the editorial.

1. Problem Statement

- Clarity and consistency were emphasized. Simple, direct language and consistent terminology were expected.
- Parameters (e.g., `n`, `m`) had to be introduced early and used uniformly throughout.
- Any advanced terms were to be briefly explained, assuming a high school-level background.
- Indexing conventions (0-based or 1-based) had to be stated clearly and used consistently.
- For complex problems, a worked-out example was included in the statement to aid understanding.

2. Input Format and Constraints

- Test cases were grouped under a single input. Typically, the first line indicated the number of test cases.
- Parameter names had to remain consistent, and each input value needed a brief explanation.
- The type and valid range of each parameter had to be clearly specified.
- Floating-point inputs were avoided unless necessary, in which case precision was defined.
- Input structures were explained line by line, especially when dependent on variables like `n`.

3. Time and Memory Limits

- Time and memory limits were specified per test. The default was **2 seconds and 256 MB**.
- Adjustments were allowed only when necessary and had to be properly justified.

4. Output Format

- The output format clearly stated the number of lines and the content of each line.
- Consistency with the parameter names used in the input and description was maintained.

5. Examples

- Each problem included 2 to 4 sample test cases with explanations.
- Test cases covered edge conditions, typical values, and larger inputs.
- If a worked-out example was included in the description, it was repeated or referenced here.

6. Hidden Tests

- Hidden test cases were used to verify correctness and efficiency.
- A minimum of 50 test cases were included, covering the full range of parameters.
- Sample inputs were placed at the beginning, followed by diverse test scenarios.
- The problem setter used their own solution to generate and verify outputs.

7. Editorial

- The editorial provided a concise explanation of the key idea behind the solution.
- It avoided line-by-line code walkthroughs and focused on logic and reasoning.
- Consistent terminology and parameter names were used throughout.

8. Solution Code

- The solution implemented the editorial's logic and was submitted as a separate file.
- Variable names matched those in the editorial.
- The solution was also used to validate test cases and ensure compliance with constraints.

iv. Problems for the Online Round of DPSPC 2025

Problem 1: COVID Vaccination Center Placement

Problem Designer: *Dr. Arshad Islam, Professor, FAST-NUCES, Islamabad*

Summary:

This problem draws inspiration from the public health challenges posed during the COVID-19 pandemic. It focuses on the strategic placement of mobile vaccination centers to ensure optimal access for all towns in a given region.

Problem Description:

The Ministry of Health is responding to a COVID-19 outbreak by deploying K mobile vaccination units across a country comprising N towns connected via M bidirectional roads. These towns and roads form a connected, undirected graph**,** where each road has a travel time represented as a positive integer.

The goal is to place the K vaccination centers in such a way that every town has access to at least one center within the shortest possible maximum travel time. In other words, the solution must minimize the longest distance any town must travel to reach its nearest vaccination center.

This reflects a real-world problem of resource allocation and equitable healthcare access under logistical constraints.

Technical Challenge:

Participants are required to select K towns for deploying vaccination units such that the maximum of the shortest distances from each town to its nearest center is as small as possible. This optimization problem involves concepts from graph theory, shortest paths**,** and greedy or binary search-based strategies**.**

Though the original problem references complex centrality and entropy models, these are intended for narrative enrichment. The core challenge lies in computationally efficient facility placement under distance minimization constraints.

Educational Value:

This problem tests participants' understanding of graph traversal algorithms (like Dijkstra's or BFS), optimization techniques, and the ability to model real-life scenarios in algorithmic form. It encourages practical thinking, algorithm design, and performance tuning under tight constraints.

Problem 2: Whisper Codes

Problem Designer: Dr. Adeel Cheema, Assistant Professor, FAST-NUCES, Faisalabad

Summary:

Inspired by the world of cybercrime investigations, this problem focuses on detecting covert communication hidden within seemingly ordinary text messages. Contestants must design an efficient system to search for secret keywords, known as whisper codes, embedded in large volumes of chat data.

Problem Description:

Investigators have intercepted an enormous chat log suspected to contain secret messages exchanged among members of an underground network. These secret messages are embedded as patterns known as whisper codes, which may include wildcard characters (represented by '?') and inconsistent use of uppercase or lowercase letters to avoid detection.

The task is to search for all occurrences of a given pattern in the chatlog, with the following matching criteria:

- The search is case-insensitive (i.e., 'A' matches 'a', and vice versa).
- Each wildcard character '?' in the pattern can match any single character.

Technical Challenge:

Participants must implement an efficient string-matching algorithm capable of scanning large amounts of text quickly, even when patterns include wildcards and case variations. The solution needs to be optimized to handle tight time limits and large input sizes, requiring a strong grasp of string processing techniques such as sliding window, hashing, or finite automata.

Educational Value:

This problem introduces students to robust pattern matching, a fundamental concept in computer science with applications in text processing, cybersecurity, and data mining. It emphasizes the importance of precision, efficiency, and adaptability when working with real-world unstructured data.

Problem 3: In-order Binary Integer

Problem Designer: Mr. Abdul Mateen, Assistant Professor, PUCIT, Lahore

Summary:

This problem combines elements of binary number representation with binary tree traversal. It challenges participants to simulate a creative transformation process that blends data structure manipulation with number theory.

Problem Description:

Nomi, a student learning about binary trees, has come up with an interesting way to experiment with numbers. Given any positive integer, he first converts it into its binary form. Using this binary string, he then builds a binary tree with a specific set of rules.

The tree construction starts by making the first digit of the binary string the root of the tree. As he reads the remaining digits from left to right:

- A '0' is inserted as the left child of the current node.
- A '1' is inserted as the right child of the current node.
  The “current node” is updated every time a new node is inserted.

Once the tree is fully constructed, Nomi performs an in-order traversal of the binary tree (visiting nodes in the order: left, root, right). The sequence of digits obtained from this traversal forms a new binary string, which he then converts back to a decimal number.

The task is to automate this transformation: given a positive integer as input, simulate Nomi’s process and return the resulting decimal number after the tree-based transformation.

Technical Challenge:

The problem requires a solid understanding of binary representation, dynamic binary tree construction, and tree traversal algorithms. Participants must carefully simulate the custom tree-building logic and handle the in-order traversal efficiently to produce the correct output within the time constraints.

Educational Value:

This problem introduces students to fundamental operations on binary trees, particularly dynamic insertion and traversal. It reinforces concepts such as binary conversion, traversal order effects, and tree-based transformations, making it a fun and educational blend of number systems and data structures.

Problem 4: Perfect Cover Drive

Problem Designer: Dr. Raja Hashim Ali, Professor of Digital Business and Data Science, University of Europe for Applied Sciences, Germany

Summary:

This problem presents an elegant intersection of sports strategy and computational geometry. Based on the popular game of cricket, it challenges participants to identify the largest gap in field coverage through which a batter can safely hit the ball.

Problem Description:

In a game of cricket, a batter stands at the origin of a 2D field and aims to hit the ball in a direction where it cannot be intercepted by any fielder. The field is populated with n fielders, each positioned at fixed coordinates and equipped with a circular zone of influence of radius r. Any ball traveling through this zone is considered intercepted.

The batter can strike the ball in any direction, and the ball travels in a straight line infinitely, with no bounce or deceleration.

The task is to calculate the maximum angular gap between the ranges of influence of any two fielders—essentially identifying the widest open sector from the origin where the ball can be hit without entering any fielder’s zone.

Technical Challenge:

The solution requires converting the positions and ranges of the fielders into angular intervals and efficiently identifying the largest uncovered angular region. Participants must use principles of trigonometry, angular sorting, and interval merging to solve the problem within the given time constraints.

Educational Value:

This problem introduces participants to concepts from computational geometry, including angular sweep techniques and geometric reasoning. It demonstrates how spatial data can be modeled and processed for decision-making, reflecting real-world use cases in sports analytics, robotics, and surveillance systems.

Problem 5: The Last Light of Makran – Adversarial Restoration

Problem Designer: Dr. Usman Habib, Associate Professor, FAST-NUCES, Islamabad

Summary:

Set against the backdrop of a large-scale blackout in the Makran region, this problem explores the challenges of designing resilient infrastructure in the face of uncertainty and potential sabotage. It asks participants to strategically upgrade a power grid to ensure reliable electricity delivery under worst-case conditions.

Problem Description:

Gwadar is the final city in Makran to regain electricity following a massive blackout. The power must travel from a remote origin point—Turbat—through a network of substations and transmission lines. These substations are labeled from 0 to N - 1, where substation 0 (Turbat) is the source and substation N - 1 (Gwadar) is the destination.

There are M transmission lines, each connecting a pair of substations. Every line has a given capacity, representing the maximum megawatts (MW) of power it can carry. Some or all of these lines may be upgraded to increase their capacity, but each upgrade comes at a cost. The total upgrade expenditure must not exceed the given budget B.

Once the upgrades are committed, a saboteur—capable of destroying up to K transmission lines—may attack the grid. The task is to determine whether there exists an upgrade strategy, within the budget, that ensures at least D MW of electricity can still reach Gwadar, regardless of which K lines are destroyed.

Technical Challenge:

Participants must devise an upgrade plan that accounts for both budget limitations and adversarial interference. The problem requires careful application of algorithms from network flow theory, resilience analysis, and optimization under uncertainty. It combines maximum flow computation with combinatorial strategy, demanding both algorithmic depth and intelligent resource allocation.

Educational Value:

This problem simulates real-world concerns in power systems and network security. It strengthens students' understanding of graph algorithms, particularly flow networks, and introduces them to the complexities of planning under adversarial conditions—an essential skill in infrastructure design, cybersecurity, and operations research.

Problem 6: Hop On – Hop Off

Problem Designer: Dr. Syed Atif Mehdi, Content Architect, Educative

Summary:

This problem draws from urban mobility and tourism planning. It tasks participants with developing an efficient route-finding system for tourists in a city with an extensive but circular transportation network. The focus is on minimizing transport changes while navigating from one point of interest to another.

Problem Description:

A globally renowned city has developed a vast network of public transport options—including trams, buses, subways, and trains—spread throughout its cultural and recreational sites. A unique aspect of the system is that all routes are circular in nature, meaning a traveler can board and eventually return to the same station without changing transport.

Each site within the city offers an immersive full-day experience, so tourists typically visit just one or two locations during their short stay. To optimize their journey, the city administration encourages visitors to plan their transportation route in advance by selecting entry and exit points that require the fewest transport changes.

However, not all visitors are tech-savvy. To address this, the city requires a system that helps tourists determine the minimum number of transport changes required to reach a destination from a given starting point. It is possible that, in some cases, no route exists between the selected points.

Technical Challenge:

Participants must model the city's circular transport routes as overlapping cycles within a graph and identify the shortest path (in terms of transport switches) from source to destination. The solution requires mapping stations to their routes and effectively navigating interconnections using graph traversal algorithms, such as Breadth-First Search (BFS**)**, while minimizing route transitions.

Educational Value:

This problem introduces concepts from multi-layered graph modeling**,** cycle detection, and state-space exploration**,** and reflects real-world applications in navigation systems, transit planning**,** and urban logistics. It encourages participants to design user-focused solutions for real-life mobility challenges.

Problem 7: Project Optimization

Problem Designer: Dr. Syed Fawad Hussain, Professor, University of Birmingham, Dubai Campus

Summary:

This problem presents a practical scenario from the world of software project management, where the goal is to minimize project delivery time using parallel team structures. It models a real-world optimization challenge involving dynamic decision-making and conditional costs across sequential project phases.

Problem Description:

Efficient Partners (EP) Inc., a consultancy firm, helps software houses streamline their operations by dividing large projects into specialized phases. Each phase—ranging from Requirement Engineering to Testing and Deployment—is handled by a designated team. To ensure agility and redundancy, each software house is advised to maintain two versions of every team: a main team and an alternate team.

Each phase must be completed in a strict sequential order. For every phase i of the project ($1 \leq i \leq n$), the main and alternate teams take mi and ai days, respectively. In addition, the project may incur a transition cost when switching between team types across phases:

- A cost of tm,i is incurred when switching from the (i-1)th main team to the ith alternate team.

- A cost of ta,i is incurred when switching from the (i-1)th alternate team to the ith main team.

There is no cost when continuing with the same type of team across consecutive phases (main to main or alternate to alternate).

At the start of the project, an initial cost m0 or a0 is incurred depending on whether the project begins with the main or alternate team. The deployment phase, which concludes the project, takes dm or da days depending on the team type used.

The challenge is to determine the optimal sequence of team assignments (main or alternate) for each phase such that the total project time—including any switching costs—is minimized.

Technical Challenge:

This problem requires participants to implement a dynamic programming algorithm that carefully evaluates every possible team assignment for each project phase. The algorithm must consider base conditions, recursive transitions, and conditional switching costs to compute the overall minimum project time.

Educational Value:

The problem serves as an excellent exercise in dynamic programming, decision path optimization, and conditional cost modeling. It mirrors real-world challenges in workflow planning, resource management, and industrial engineering, where time and transition overheads must be balanced for optimal outcomes.

Problem 8: Garebi

Problem Designer: Dr. Waqar Saleem, Associate Professor, Habib University, Karachi

Summary:

This lighthearted yet logically rich problem combines food, fun, and analysis in a fictional setting that challenges participants to simulate a quirky restaurant game. Despite its playful context, the problem requires a sharp grasp of state-based transitions and termination conditions.

Problem Description:

After a long day of intense programming practice, you head to the SP Hotel for a hearty serving of nihari. You place an order for n naans and p plates of nihari. Since each naan pairs perfectly

with a single plate of nihari, you consume min (n, p) servings in each round. However, things take an unexpected turn if the quantities of naan and nihari don't match.

Whenever there's a mismatch, the restaurant initiates its famous Garebi Game, a tradition meant to test your fortune—and your fate. The rules are as follows:

- If you run out of naans but still have plates, the restaurant gives you half (rounded down) of the naans you had at the start of the previous round.
- If you run out of plates but still have naans**,** you receive half (rounded down) of the plates you had at the start of the previous round.
- If you run out of both naans and plates at the same time, you win the game and leave without paying.
- The rounds continue until either you win or get stuck in a state where you can no longer make progress.

If you get stuck without being able to win, your penalty is steep: you must join the kitchen staff of SP Hotel for the rest of the month—and worse, miss the upcoming speed programming contest!Given the initial values of n and p, your task is to simulate the game and determine whether the player wins and in how many rounds, or if they are doomed to spend the next 30 days in the kitchen.

Technical Challenge:

This problem has a naive solution, namely simulating repeated transformations of a system's state using conditional logic. However, the problem constraints ensure that the naive approach does not pass. A deeper analysis of the state transitions yields a solution based on a simple computation involving modular arithmetic. The problem tests participants' ability to analyze a problem in order to build a mathematical model, and to refine and simplify the model. Skills in modular arithmetic also come into play

Educational Value:

Although the setting is whimsical, the problem offers strong educational value in logical analysis, mathematical modeling, and modular arithmetic. It is particularly useful for strengthening logical modeling, while providing a welcome break from more conventional problem statements.

Problem 9: Raju and Rani

Problem Designer: Dr. Muhammad Rafi, Professor, FAST-NUCES, Karachi

Summary:

This problem is rooted in classic tree data structures but framed through a strategic two-player game. It challenges participants to reason about **independent sets, connectivity**, and **minimal cuts** in trees—merging game theory with graph theory in an elegant way.

Problem Description:

During a Data Structures class, Raju and Rani decide to play an intellectual game on a tree—a connected graph with no cycles. The rules are simple but require sharp reasoning:

- Raju picks a subset of nodes such that no two nodes in his selection are adjacent (i.e., an **independent set**).
- After Raju has made his selection, Rani responds by selecting a different subset of nodes (not overlapping with Raju's). She **destroys** these nodes.
- Rani's objective is to choose the **smallest number of nodes** that can disconnect all the nodes in Raju's subset from each other. That is, no two of Raju's nodes should remain connected in the remaining tree.
- Your goal is to help Raju choose his subset in such a way that **Rani is forced to destroy the largest possible number of nodes.**

Rani always plays optimally, using the fewest possible nodes to disconnect Raju's set.

Technical Challenge:

The problem requires participants to analyze the tree's structure to determine the optimal independent set that maximizes the **minimum vertex cut** needed to isolate its nodes. This involves concepts from **tree dynamic programming, vertex cover**, and **strategic subset selection** under adversarial constraints.

Educational Value:
This problem bridges multiple fundamental areas of computer science: **graph theory, greedy strategies, tree-based dynamic programming, and adversarial thinking.** It deepens the participant's understanding of how structure and connectivity influence optimization in constrained environments.

v. Top Performing Teams – Online Round

After a rigorous evaluation process, the esteemed jury shortlisted the **57 teams** out of the **1,375 teams** that participated in the Online Round of the *Digital Pakistan Speed Programming Competition (DPSPC) 2025*. These teams demonstrated strong algorithmic skills, logical thinking,

and collaborative efficiency under high-pressure conditions—earning their place in the **Final Onsite Round**, to be held at the GIK Institute of Engineering Sciences and Technology on July 16-17, 2025**.**

Below is a snapshot of the frozen scoreboard, captured 180 minutes before the conclusion of the contest. During this freeze period, all submissions made by teams remain visible but are marked as pending, with their verdicts hidden to preserve the suspense and competitive spirit until the end of the contest.

DOMjudge Scoreboard Problemset Login 1:07:54

RANK	TEAM	SCORE		1_CVCP	2_WC	3_IBI	4_PCD	5_AR	6_HOHO	7_PO	8_GR	9_RaR
1	0 or 1 FAST NUCES, Islamabad	7	777	83 1 try	102 6 tries	31 1 try	53 1 try		75 1 try	2 + 3 tries	136 5 tries	117 1 try
2	Pixel Pirates Sukkur IBA University	6	461	36 1 try	52 1 try	72 1 try	43 1 try		114 1 try	124 2 tries	3 + 1 tries	0 + 1 tries
3	Teen Patti FAST NUCES, Karachi	6	755	103 1 try	143 7 tries	50 1 try	122 1 try		135 2 tries	0 + 1 tries	42 2 tries	0 + 2 tries
4	Proxima FAST NUCES, Karachi	6	829	150 1 try	74 4 tries	16 1 try	141 1 try		124 4 tries	0 + 1 tries	144 4 + 1 tries	5 + 2 tries
5	The Binary Beasts UET Lahore	5	198	18 1 try	26 1 try	30 1 try	42 2 tries		62 1 try	1 try	0 + 1 tries	3 + 1 tries
6	Lambda Lords Iqra University, Islamabad	5	258	52 1 try	7 tries	90 1 try	23 1 try	1 + 2 tries	5 tries	27 1 try	46 2 tries	3 tries
7	Techieez Fazia College of Education for Women, Lahore	5	325	115 1 try	53 2 tries	26 1 try	43 1 try		68 1 try	0 + 2 tries	1 + 4 tries	
8	Rage-Developer National University of Modern Languages (NUML)	5	364	120 4 tries	47 1 try	35 1 try	41 1 try	0 + 1 tries	61 1 try	0 + 1 tries	6 + 1 tries	2 + 1 tries
9	Chaiwalay FAST NUCES, Karachi	5	397	19 1 try	141 3 tries	25 1 try	133 1 try		2 + 3 tries	1 + 1 tries	39 1 try	1 + 3 tries
10	Binary Sentinels Punjab University College for Information Technology (PUCIT)	5	406	116 1 try	44 4 tries	22 1 try	48 2 tries		76 2 tries	0 + 1 tries	0 + 2 tries	

Figure 4. Frozen Scoreboard Snapshot – DPSPC 2025 Online Round

DOMjudge clarifications 9 submissions rejudgings 1 scoreboard masroor.hussain DPSPC-Online-2025 start delaye

RANK	TEAM	SCORE		1_CVCP	2_WC	3_IBI	4_PCD	5_AR	6_HOHO	7_PO	8_GR	9_RaR
1	Participants Code Paladins Habib University	8	1884	330 4 tries	146 3 tries	45 1 try	51 2 tries	1 try	99 4 tries	317 1 try	270 7 tries	326 1 try
2	Chaiwalay FAST NUCES, Karachi	7	776	19 1 try	141 3 tries	25 1 try	133 1 try		276 5 tries	23 1 try	39 1 try	5 tries
3	Teen Patti FAST NUCES, Karachi	7	986	103 1 try	143 7 tries	50 1 try	122 1 try		135 2 tries	187 1 try	66 3 tries	
4	Saad Hasan Ellahie Ghulam ishaq khan institute of science and technology (GIKI)	7	996	81 1 try	196 9 tries	38 2 tries	60 2 tries		71 1 try	121 1 try	209 2 tries	6 tries
5	Proxima FAST NUCES, Karachi	7	1091	150 1 try	74 4 tries	16 1 try	141 1 try		124 4 tries	340 5 tries	46 1 try	8 tries
6	UNWANTED FAST NUCES, Lahore	7	1185	27 1 try	205 5 tries	38 1 try	48 1 try		227 8 tries	237 1 try	183 1 try	
7	Hollows FAST NUCES, Lahore	7	1381	172 1 try	142 6 tries	28 1 try	63 1 try		131 2 tries	353 3 tries	272 4 tries	2 tries
8	Rumbling Punjab University College for Information Technology (PUCIT)	7	1470	166 2 tries	246 13 tries	59 1 try	79 2 tries		178 1 try	329 3 tries	93 1 try	6 tries
9	Tech Learner Bahria University, Karachi	7	1487	352 4 tries	84 1 try	91 2 tries	135 2 tries	3 tries	207 1 try	218 1 try	300 1 try	5 tries
10	AC47 Ghulam ishaq khan institute of science and technology (GIKI)	7	1547	288 2 tries	194 4 tries	21 1 try	129 1 try		319 5 tries	293 1 try	123 2 tries	3 tries
11	Tech Monsters Iqra University, Islamabad	7	1650	126 2 tries	346 15 tries	47 2 tries	68 1 try	3 tries	256 2 tries	159 1 try	268 3 + 1 tries	3 tries
12	Techieez Fazia College of Education for Women, Lahore	6	588	115 1 try	53 2 tries	26 1 try	43 1 try		68 1 try	263 1 try	5 tries	

Figure 5. Scorecard at the top 12 teams before the Plagiarism Check

After a thorough plagiarism check and evaluation the jury announced the results of the online round on July 6, 2025. Among the shortlisted teams, the top three performers stood out for their remarkable accuracy, speed, and strategic problem-solving approach. These teams demonstrated exceptional technical depth, coordination, and persistence**,** outperforming hundreds of others in a highly competitive environment. Their success not only qualifies them for the Final Onsite Round but also positions them as strong contenders for national recognition.

The following table highlights the top three winning teams of the Online Round:

Table 5: Top Three Teams of the Online Round – DPSPC 2025

S. No.	Team Name	University	Contestants	Problems Solved
1	Code Paladins	Habib University	Muhammad Saad, Musab, Meesum Abbas	8
2	AC47	GIK Institute of Engineering Sciences and Technology	Hamza Hassan Ellahie, Mujtaba Omar, Syed Basim Mehmood	7
3	Rumbling	Punjab University and College of Information Technology (PUCIT)	Aisha Siddiqa, Aisha Ejaz, Tuaha Imran	7

Presented below is a snapshot of the top 12 teams from the Online Round of DPSPC 2025. The contest scoreboard, detailing the performance of the shortlisted 57 teams, is provided in **Annex B** for reference.

Digital Pakistan Speed Programming Competition
Online Qualifier Round
Shortlisted Teams for Onsite

S.No.	Team Name	University Name	Prob Solved
1	Code Paladins	Habib University (Muhammad Saad, Musab, Meesum Abbas)	8
2	AC47	Ghulam ishaq khan institute of science and technology (GIKI) (Hamza Hasan Ellahie, Mujtaba Omar, Syed Basim Mehmood)	7
3	Rumbling	Punjab University College for Information Technology (PUCIT) (Aisha Siddiqa, Ayesha Ejaz, Tauha Imran)	7
4	Hollows	FAST NUCES, Lahore (Muhammad Taha, Ehan Ayaz, Abdul Rafay Tahir)	7
5	Proxima	FAST NUCES, Karachi (Abdul Rafay Mughal, Abdul Ahad Munaf, Hamees Ehsan)	7
6	MORTALS	Ghulam ishaq khan institute of science and technology (GIKI) (Saad Hasan Ellahie,Saad Khurshid Qurashi,Muhammad Bilal S	7
7	Binary Sentinels	Punjab University College for Information Technology (PUCIT) (Muhammad Saad Sabir, Fahad Rahman, Usairum Khan)	7
8	Teen Patti	FAST NUCES, Karachi (Valihasan Jalees,Muhammad Asim,Munnazzar Shahzad)	7
9	0 or 1	FAST NUCES, Islamabad (Muhammad Ibrahim Sultan, Laiba Nadeem, Hassan Kamal)	7
10	Chaiwalay	FAST NUCES, Karachi (Muhammad Ashar Usmani,Musaddiq Kamal Khan,Minhaj Mateen)	7
11	Codex_2	FAST NUCES, Chiniot-Faisalabad (Muhammad Ali Mustafa, Mustafa Mansoor, M Husnain Afzal)	7
12	Lambda Lords	Iqra University, Islamabad (RIZWAN ZAHID, Maqsood Ahmed, Shoaib Tariq)	6

Figure 6: Top 12 Teams – Online Round Scoreboard Snapshot (DPSPC 2025)

In addition to merit-based selection of 51 teams, **six special invitations** were extended to teams in recognition of the competition's commitment to **inclusivity and equitable representation**. These teams were carefully selected from:

- **Remote or underrepresented regions**
- **Lower-tier or less-resourced universities**
- **Female-led or all-female teams**, to encourage and promote women's participation in competitive programming

These special invitations reflect DPSPC's broader vision to empower students across diverse academic and demographic backgrounds, ensuring that talent is recognized regardless of geography or institutional ranking.

This blend of merit-based and inclusive selections reinforces the DPSPC's role not just as a competition, but as a **national platform for discovering and uplifting emerging programming talent** from every corner of Pakistan.

Table 6. Special Invitation Teams

S.no.	Team Name	University	Contestant 1	Contestant 2	Contestant 3
1	Compile Crew	NUST Balochistan	Ahmed Yar	Ayaan Hassan Khan	Hamza Sajid
2	code crafters	Rawalpindi Woman University	Mehak	Syeda Rida Masood	Qurat-ul-Ain
3	Flame forge	Govt. Postgraduate college for Women Haripur	Amna Jadoon	Rasti Batool	Areesha Nawaz
4	Propycode	USWA Education System	Tajamill Hussain	Azhar Abbas	Jabir Hussain
5	The Beginners	Women University Swabi	Umaima Aftab	Nadra Khan	Warda Khan
6	Powerpuff Girls	Air University, Multan	Rooha Tanveer	Iram Ramzan	Aymen Majid

The Online Round of the Digital Pakistan Speed Programming Competition 2025 (CodePK) was a resounding success. It highlighted the incredible talent, technical capability, and enthusiasm of Pakistan's youth in the field of computer programming and algorithmic problem solving.

The hybrid model adopted for training and participation ensured maximum outreach and inclusion, while the collaborative efforts of academia and industry enriched the quality and credibility of the event.

vi. Evaluation Methodology

This section outlines the comprehensive evaluation framework used to assess team performances and ensure the integrity of the Digital Pakistan Speed Programming Competition (DPSPC) 2025 Online Round. The methodology incorporated scoring, time-based penalties, plagiarism detection

(including generative AI usage), and a robust appeals process, all overseen by a panel of experienced judges and academic professionals.

Contest Evaluation Criteria

To determine the top teams for the Final Onsite Round, the jury adopted a transparent and standardized evaluation system based on the following parameters:

- **Number of Problems Solved:** Teams were primarily ranked by how many problems they successfully solved during the contest.
- **Time to Solve:** Among teams solving the same number of problems, ranking was determined by the total time taken to reach correct solutions.
- **Penalty for Incorrect Submissions:** Each incorrect submission resulted in a **20-minute time penalty**, which was added to the team's cumulative solving time. This penalty-based model encouraged careful, thoughtful submissions over random guesses.

The **final score** for each team was computed based on:

- Total number of problems solved
- Total time taken (including penalties)
- Sequence and timing of accepted submissions

Plagiarism and Generative AI Detection Process

To ensure fairness and academic honesty, the jury implemented a multi-step code authenticity verification process. This was critical in light of increasing access to AI-powered coding tools.

Detection Tools & Methodology:

- The official **AI Code Detector GPT Plugin** was used for initial automated analysis. Tool Link: AI Code Detector GPT
- Manual inspection of suspicious code snippets was performed to validate results and eliminate false positives.

Scope of Review:

- **134 teams** were shortlisted for plagiarism analysis based on their strong performance (typically teams that solved **4 or more problems**).

- Submissions were scrutinized for:
    - High similarity to AI-generated code
    - Copy-paste behavior
    - Matching code blocks (even 5–10 lines)
    - Identical logic structures, variable names, and formatting
- Any team with **95–100%** AI-generated or plagiarized code was immediately **disqualified**.
- Teams with highly suspicious patterns were flagged for further review or placed under appeal eligibility.

Shortlisting and Appeals Procedure

Initial Shortlisting:

- In the first round of evaluation**,** the jury finalized a **list of 37 clean teams** whose code passed all plagiarism checks and met performance criteria.

Appeals Window:

- A formal appeals process was opened between **July 3 and July 6, 2025**, to ensure transparency and offer a fair chance to teams whose submissions were flagged.
- Teams disqualified during or after the contest due to plagiarism or suspected use of generative AI were notified and invited to submit appeals**.**

Appeals Review & Outcomes:

- A total of **44 appeals** were submitted.
- Each case was reviewed individually, focusing on submission timing, coding patterns, and team justifications.
- After comprehensive deliberations, the jury granted the **benefit of the doubt to 14 teams**, reinstating them for the Final Onsite Round.

Table 7 below provides a summary of all appeals received, the final decision made by the jury, and the corresponding reason. Teams marked as Accepted were reinstated and allowed to proceed to the Final Onsite Round, primarily on the basis of credible explanations or benefit of the doubt.

Table 7: Appeal Review Outcomes for Disqualified Teams – DPSPC 2025 Online Round

Sr. No.	Team	Decision	Reason
1	Endgame.exe	Not accepted	AI-based IDE, not allowed
2	Tech Learner	Not accepted	Common pattern, language changed
3	MUST Mavericks	Not accepted	Common pattern, AI generated
4	Team-72	Not accepted	Common pattern, AI generated
5	Powerpuff Gurls	Not accepted	Common pattern, AI comments
6	Tiny Coders	Not accepted	Self Acceptance
7	Retarded Coders	Accepted	Benefit of doubt
8	404 NOT FOUND	Not accepted	Self Acceptance
9	Code Warriors	Not accepted	Self Acceptance, chatGPT
10	Code Crushers_1	Accepted	Ask for codeForce, Leetcode links
11	CMON	Not accepted	Common pattern, excessive comments
12	MuFaSa	Accepted	LeetCode Profiles
13	0 or 1	Accepted	Ask for codebase links
14	Code Smashers	Not accepted	Self Acceptance
15	Unwanted	Not accepted	Common pattern, AI generated
16	Runtime Terrors_2	Not accepted	Common Pattern
17	Core Dumped	Accepted	Benefit of doubt
18	Bandits Coders	Not accepted	AI generated with comments
19	Adriot	Not accepted	Self Accepatance
20	GATO	Accepted	Benefit of doubt
21	ASI	Not accepted	Self Acceptance
22	Semi Circle	Not accepted	Common pattern, AI generated, Self Acceptance
23	Gizemplex	Not accepted	Common pattern
24	NULL POINTERS	Not accepted	No appeal made
25	Code Crafters	Not accepted	Common pattern
26	WorknConnect	Accepted	Benefit of doubt
27	Codexa	Not accepted	Common pattern
28	CodeX_1	Not accepted	Self Acceptance
29	CodeX_2	Accepted	Benefit of doubt
30	The Sprinters	Accepted	Benefit of doubt
31	Compile Crew	Not accepted	Common Pattern
32	Tech-Panda	Not accepted	Self Acceptance
33	ProPyCode	Not accepted	Self Acceptance
34	Coding Killers	Not accepted	Common pattern, AI generated
35	Asia_Worst	Accepted	Benefit of doubt
36	FlameForge	Not accepted	Self Acceptance
37	3_CP_14	Accepted	Benefit of doubt
38	Code Red	Accepted	Benefit of doubt

39	ttl3	Accepted	Benefit of doubt
40	Enigma Coders	Accepted	Benefit of doubt
41	No.txt	Not accepted	Common pattern, AI generated
42	Thrash	Not accepted	Common pattern, AI generated
43	Tribit 101	Not accepted	Self Acceptance
44	Crypto_Lovers	Not accepted	Common pattern, AI generated

Appeals Jury Panel

The appeals process was handled by a distinguished jury comprising senior academics, researchers, and experienced ICPC judges. The panel ensured a fair and unbiased review of all submitted appeals.

Table 8: Panel of Judges for Plagiarism and Appeals Review

S. No.	Name	Designation	Affiliation
1	Dr. Azib Ali	Software Engineer	Kawai Enterprises
2	Dr. Yasir Niaz Khan	Chief Technology Officer	Punjab Safe Cities Authority
3	Dr. Syed Atif Mehdi	Content Architect	Educative
4	Dr. Waqar Saleem	Associate Professor	Habib University, Karachi
5	Dr. Syed Fawad Hussain	Professor	University of Birmingham, Dubai Campus
6	Dr. Usman Habib	Associate Professor	FAST-NUCES, Islamabad
7	Mr. Abdul Mateen	Assistant Professor	PUCIT, Lahore
8	Dr. Masroor Hussain	Professor	GIK Institute
9	Dr. Adeel Cheema	Assistant Professor	FAST-NUCES, Faisalabad
10	Mr. Usman Haider	Postdoc Researcher	University of Galway, Ireland
11	Dr. Muhammad Rafi	Professor	FAST-NUCES, Karachi
12	Dr. Raja Hashim Ali	Professor of Digital Business & Data Science	University of Europe for Applied Sciences, Germany

This robust evaluation methodology ensured merit-based selection while maintaining high ethical standards. The proactive measures taken to detect AI-generated content and provide a fair appeal process underscore the competition's commitment to **excellence, inclusivity, and integrity.**

6. Onsite Contest Execution

The Onsite Round of DPSPC 2025 was organized as a comprehensive two-day speed programming event hosted at the GIK Institute of Engineering Sciences and Technology. With all preparations in place, the environment offered a professional, competitive atmosphere conducive to high-level problem-solving.

Contest Format

The onsite round followed a well-structured two-day format designed to ensure participants were fully acclimatized to the contest environment:

- **Mock Round – July 16, 2025 (2 Hours):**

The first day featured a 2-hour mock contest, aimed at helping teams familiarize themselves with the DOMjudge platform, contest rules, and the physical lab environment. This session served as a crucial dry run, ensuring that participants understood the platform mechanics, submission protocol, and system response—setting the stage for a smooth and efficient final round.

- **Final Round – July 17, 2025 (4 Hours 30 Minutes):**

The main contest was held the next day and spanned 4 hours and 30 minutes. Teams competed to solve a carefully curated set of algorithmic problems, designed to assess a range of skills including algorithmic thinking, logical reasoning, and collaborative problem-solving under time pressure. The contest tested the participants' technical proficiency, strategic approach, and ability to perform under stress.

Organizational Support & Logistics

The successful execution of the onsite round of DPSPC 2025 was the result of meticulous planning and strong collaboration between the **GIK Institute administration** and the **ICPC Asia Topi organizing committee.** The event logistics—from receiving participants to ensuring their comfort and engagement—were handled with care and professionalism.

Arrival, Registration, and Accommodation

Participating teams began arriving at the GIK Institute on July 15, 2025**.** Upon arrival, teams were received at the New Academic Block, where a dedicated registration desk facilitated a smooth onboarding process. Each team was formally registered for the onsite round and received official Ignite-branded goodie bags**,** containing:

- Customized DPSPC 2025 t-shirts
- P-caps
- Drafting pads and pens

After registration, the teams were allotted rooms in the GIK student hostels**,** providing them comfortable and secure accommodation for the duration of their stay. All boarding and lodging arrangements were jointly managed by ICPC Asia Topi and the GIK Institute, ensuring participants had access to well-maintained facilities and necessary amenities.

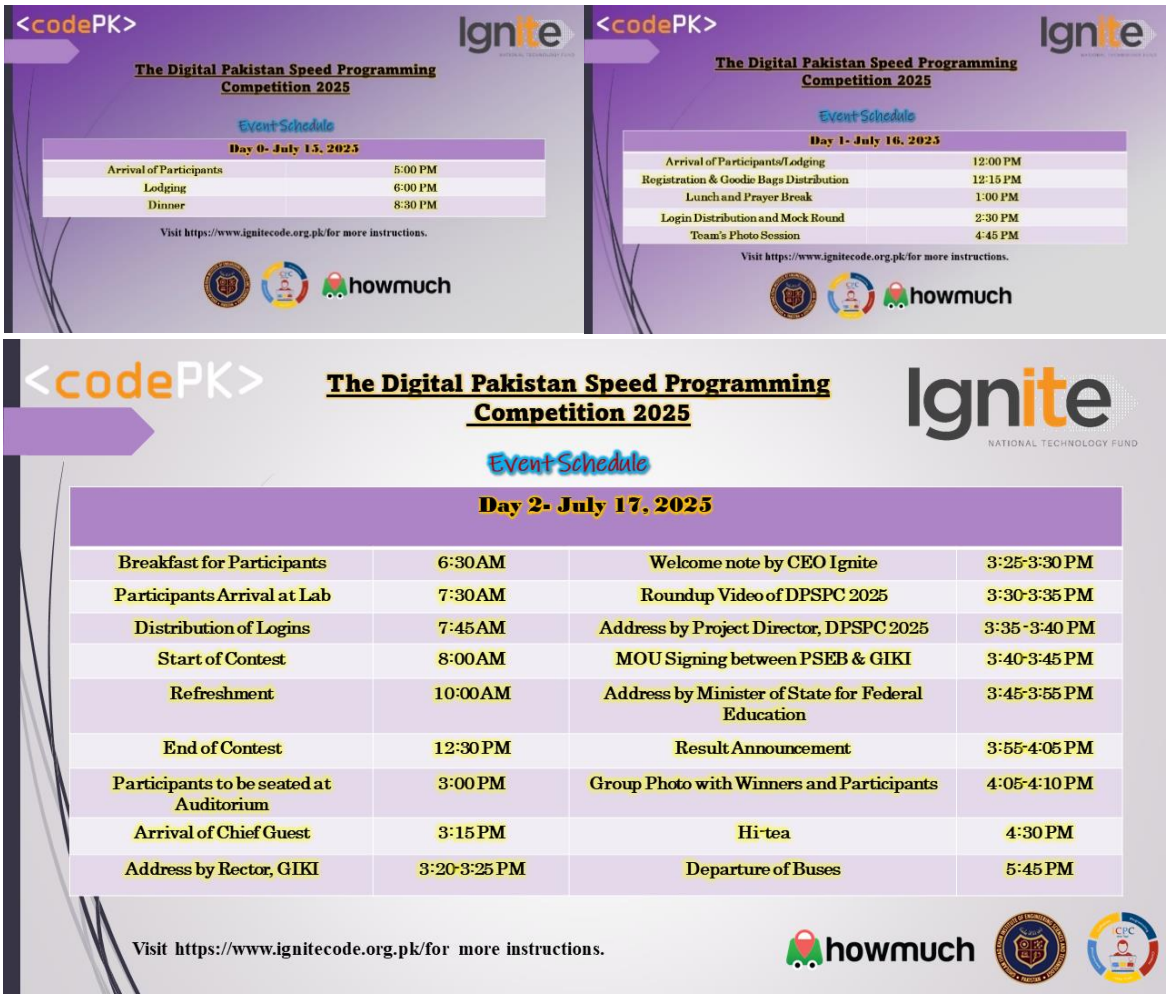


Figure 7: Event Schedule of DPSPC 2025

Onsite Coordination and Support

Dedicated volunteers from the GIK ACM Society were deployed to assist participants throughout their arrival, stay, and transition to contest venues. The GIK ACM Society played an instrumental role in ensuring the event ran smoothly. Their responsibilities included:

- Coordinating logistics, team arrivals and registration
- Managing distribution of goodie bags
- Assisting with room allotments and hostel coordination
- Providing on-ground guidance and event support

This collaborative model of execution ensured a welcoming, well-organized, and professional experience for all participants.

Students Travelling to GIK Institute

GIK Institute Cafe

Dinner being served at the GIKI Cafe

Contest Environment

The contest was hosted in three state-of-the-art computer laboratories at the New Academic Block of GIK Insitute:

1. Cybersecurity Lab
2. Data Analytics Lab
3. Artificial Intelligence Lab

Each lab was equipped with standardized systems and monitored closely using the DOMjudge contest management system, ensuring real-time judging, submission handling, transparent scoring and continuous scoreboard updates.

The DOMjudge contest management system was hosted locally by the GIK Institute to ensure secure and efficient execution of the onsite round. To maintain the integrity of the competition, internet access for all contestant machines was completely disabled throughout the contest duration. All judges, invigilators, and contestants accessed the DOMjudge server through a secure internal network, ensuring a controlled environment free from external interference. The overall layout and infrastructure setup for the onsite contest, including lab distribution and connectivity, is illustrated in Figure 2.

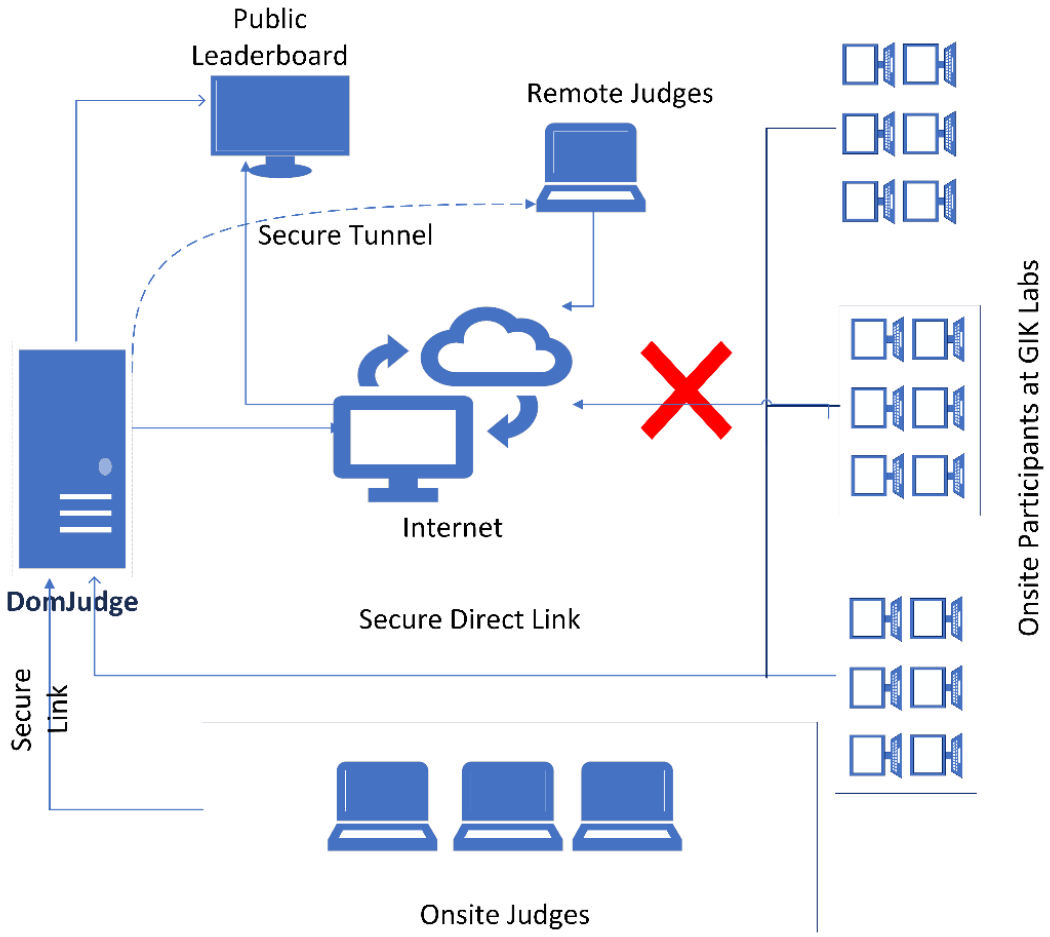


Figure 8: Network Architecture of the Onsite Contest

A Glimpse of the Final Onsite Contest from the Labs - *(July 17, 2025)*

Technical & Invigilation Support

To ensure a fair and smooth contest experience, dedicated **faculty invigilators** and **technical staff** were deployed in each lab. Their responsibilities included monitoring participant conduct, resolving technical queries, and ensuring adherence to contest protocols.

Table 9: **Lab-Wise Invigilators and Technical Support Staff**

Artificial Intelligence (AI) Lab	Data Analytics Lab	Cyber Security Lab
Invigilation Members		
Mr. Basit Ali	Ms. Safia Baloch	Ms. Nazia Shahzadi
Ms. Asima	Ms. Fatimah	Ms. Iqra
Ms. Asim Bhatti	Mr. Adnan Haider	Ms. Aleena
Technical Assistance Member		
Mr. Andan	Mr. Waqas Khan	Mr. Saud Ahmed
Support Staff		
Mr. Sajid	Mr. Nasir Khan	Mr. Yasir

Table 10: **Systems Staff for DPSPC 2025**

S.no.	Systems Staff
1.	Dr. Usman Haider
2.	Mr. Shakir Ahmad
3.	Mr. Sagheer
4.	Mr Saud
5.	Mr Khizar
6.	Mr. Adnan Anjum
7.	Mr Waqas

Problem Setting Panel and Contest Jury

The onsite round of DPSPC 2025 featured a robust and diverse set of algorithmic problems, carefully curated by a distinguished panel of problem setters from both academia and industry. Leading this prestigious panel was **Dr. Syed Fawad Hussain**, **Professor at the University of Birmingham, Dubai Campus**, who served as the **Chief Judge** for the Onsite Round. The panel was responsible for designing, reviewing, and validating the contest problems to ensure they met global standards in difficulty, fairness, and clarity. Each problem was constructed to test a wide

spectrum of skills, including problem-solving, algorithm design, data structure proficiency, and time efficiency.

The problem-setting process spanned several weeks, involving collaborative sessions, internal testing, and rigorous vetting. The problems were reviewed for balance, solvability within the given time, and alignment with the learning objectives of the competition. The final set of problems reflected a thoughtful progression in complexity, enabling all participants to attempt a range of challenges while distinguishing the most proficient teams.

The panel of problem setters included the following experts, each contributing problems of varying difficulty levels:

Table 11: Problem Setters for the Onsite Round of DPSPC 2025 and Corresponding Difficulty Levels

S.no.	Name	Affiliation	Problem Difficulty
1.	Syed Fawad Hussain (Chief Judge)	University of Birmingham, Dubai	Medium
2.	Adeel Ashraf Cheema	FAST-NUCES, Faisalabad	Easy
3.	Abdul Mateen	PUCIT, Lahore	Hard
4.	Raja Hashim Ali	University of Europe for Applied Sciences, Germany	Medium
5.	Usman Habib	FAST-NUCES, Islamabad	Easy to Medium
6.	Atif Mehdi	UCP, Lahore	Medium to Hard
7.	Arshad Islam	FAST-NUCES, Islamabad	Hard
8.	Waqar Saleem	Habib University, Karachi	Hard
9.	Muhammad Rafi	FAST-NUCES, Karachi	Hard
10.	Mr. Azib Gondal	Dispo Genius, Lahore	Medium

The success and integrity of the Onsite Round of the Digital Pakistan Speed Programming Competition (DPSPC) 2025 were ensured by a highly qualified contest jury, comprising seasoned academics, researchers, and professionals from renowned national and international institutions.

The jury was responsible for supervising the conduct of the onsite competition, overseeing real-time submissions and validating results. Their presence was instrumental in maintaining a transparent, impartial, and rigorous contest environment.

With members joining from institutions across Pakistan, Germany, Ireland, and the UAE, the jury brought together a breadth of global insight and experience. The collective expertise of this panel guaranteed that the onsite contest met ICPC standards while addressing the unique needs of a national-level programming competition.

The following table provides a list of jury members, along with their designations and affiliations:

Table 12: Jury Members for the Onsite Round of DPSPC 2025

S. No.	Name	Designation	Affiliation
1	Dr. Arshad Islam	Professor	FAST-NUCES, Islamabad
2	Dr. Adeel Cheema	Assistant Professor	FAST-NUCES, Faisalabad
3	Mr. Abdul Mateen	Assistant Professor	PUCIT, Lahore
4	Dr. Raja Hashim Ali	Professor of Digital Business and Data Science	University of Europe for Applied Sciences, Germany
5	Dr. Usman Habib	Associate Professor	FAST-NUCES, Islamabad
6	Dr. Atif Mehdi	Content Architect	Educative
7	Dr. Syed Fawad Hussain	Professor	University of Birmingham, Dubai Campus
8	Dr. Waqar Saleem	Associate Professor	Habib University, Karachi
9	Dr. Muhammad Rafi	Professor	FAST-NUCES, Karachi
10	Dr. Yasir Niaz Khan	Chief Technology Officer	Punjab Safe Cities Authority
11	Mr. Azib Gondal	Software Engineer	Kawai Enterprise
12	Mr. Hisham Malik	CEO	Howmuch
13	Dr. Usman Haider	Postdoc researcher	University of Galway, Ireland
14	Mr. Mutharib Ayub	Software Engineer	Pakistan
15	Dr. Muhammad Abdullah	Assistant Professor	PUCIT, Lahore

Jury members monitoring real-time submissions via the DOMjudge platform during the final onsite round of DPSPC 2025.

CEO Ignite, Mr. Adeel Aijaz Shaikh, and Rector GIK Institute, Dr. Fazal Ahmad Khalid, visit the contest jury during the onsite round of DPSPC 2025 at the conference room to observe live monitoring and evaluation proceedings.

Problem Set Summary – DPSPC 2025 Onsite Round

The DPSPC 2025 Onsite Round featured a thoughtfully curated set of diverse and challenging algorithmic problems designed to evaluate a broad range of skills in competitive programming. The problems spanned across classical topics such as greedy algorithms, graph theory, trees, data structures, computational geometry, combinatorics, and dynamic programming, with real-world contextual backdrops to enhance relevance and engagement. For reference, the problem set from the Onsite Round has been included as Annex D.

Problem 1: Roadside Sensors

Designed by: Dr. Adeel Ashraf Cheema

This problem modeled a highway maintenance scenario, where potholes needed to be covered by sensors with a fixed range. Contestants were required to determine the **minimum number of sensors** needed to fully cover the road segment. The task involved **sorting** the pothole positions and applying a **greedy interval covering strategy** to ensure optimal sensor placement.

Key Concepts: Greedy Algorithms, Sorting, Interval Coverage.

Problem 2: The Network of Knowledge

Designed by: Dr. Usman Habib

In a tree-structured communication network of universities, each node introduced a processing delay. Participants had to process multiple queries to calculate the **total transmission time** between pairs of universities. This problem required efficient computation using **Lowest Common Ancestor (LCA)** and **path sum techniques.**

Key Concepts: Trees, LCA, Path Queries, Offline/Online Query Handling.

Problem 3: Hint: Think about Seg Tree

Designed by: Mr. Azib Gondal

Given an array of integers, the goal was to **replace a single element** in order to **maximize the Greatest Common Divisor (GCD)** of the entire array. Efficient solutions leveraged **prefix/suffix GCD arrays** and **segment trees** to evaluate optimal replacements quickly.

Key Concepts: Segment Trees, GCD Optimization, Number Theory.

Problem 4: Return Angle in Tennis

Designed by: Prof. Dr. Raja Hashim Ali

A computational geometry problem where drones monitored portions of a **180-degree angular cone**. Contestants were asked to find the **largest unmonitored angular gap**, requiring precise handling of **overlapping angular intervals** and smart geometric reasoning.

Key Concepts: Geometry, Angle Sorting, Trigonometry, Interval Gaps.

Problem 5: Work Allocation Model (WAM)

Designed by: Dr. Syed Fawad Hussain

Inspired by real-world project teams, this problem involved assigning employees to tasks based on **ranked mutual preferences**. Contestants implemented variations of the **Gale–Shapley stable matching algorithm** to ensure optimal and stable assignments.

Key Concepts: Bipartite Matching, Stable Marriage Problem, Greedy Logic.

Problem 6: Password for Safe Deposit

Designed by: Dr. Atif Mehdi

Given a safe-lock number and a threshold, participants had to find the **smallest number ≥ X** such that the **product of its digits** is divisible by the given lock number. The solution involved **brute-force techniques**, optimized by **digit analysis and modular arithmetic.**

Key Concepts: Brute Force with Optimization, Integer Properties, Modulo Logic.

Problem 7: Raju's Matrix Runs

Designed by: Dr. Muhammad Rafi

This grid-based problem required finding the **longest strictly increasing path** in a 2D matrix, moving only in four cardinal directions. Dynamic programming with **depth-first search (DFS)** and **memoization** was essential to avoid redundant calculations.

Key Concepts: Dynamic Programming, DFS, Grid Traversal.

Problem 8: Unique Binary Search Trees

Designed by: Mr. Abdul Mateen

Given a **level-order traversal** of a binary tree, contestants had to **identify and print all maximal unique Binary Search Trees (BSTs)** within it using **pre-order traversal.** The challenge lay in validating subtrees and performing structured recursion.

Key Concepts: Tree Traversals, BST Validation, Subtree Extraction.

Problem 9: Shopping Cart Patterns

Designed by: Dr. Muhammad Arshad Islam

A graph pattern recognition problem set on **bipartite graphs** representing customers and items. Participants needed to count the number of **butterfly subgraphs**, which are indicative of collaborative shopping behavior.

Key Concepts: Graph Theory, Subgraph Enumeration, Bipartite Structures.

Problem 10: Shor Zinger's Burgers

Designed by: Dr. Waqar Saleem

In this **simulation-based problem**, contestants toggled the quantum state of burgers based on input queries and had to compute the **average number of fresh burgers** visible across various operations. Efficient use of **segment trees** and **range updates** was critical.

Key Concepts: Simulation, Lazy Propagation, Segment Trees.

Each problem was carefully vetted by the contest jury for clarity, solvability, difficulty balance, and edge case robustness. The complete set reflected real-world relevance while maintaining a strong focus on algorithmic rigor.

Top Performing Teams – Onsite Round

The final standings of the Digital Pakistan Speed Programming Competition (DPSPC) 2025 Onsite Round were determined using a rigorous evaluation methodology based on International Collegiate Programming Contest (ICPC) standards. The competition tested algorithmic thinking,

problem-solving under time pressure, and team collaboration across a range of advanced programming challenges.

Evaluation Methodology

Teams were evaluated using the following criteria:

- **Number of Problems Solved:** The primary metric for ranking.
- **Time to Solve:** The cumulative time taken to solve problems correctly.
- **Penalty for Incorrect Submissions:** Each incorrect attempt before a correct submission added 20 minutes to the total time, as per standard ICPC scoring rules.

Submissions were judged through the DOMjudge platform, and the results were continuously monitored by an expert jury to ensure fairness and integrity. For a comprehensive overview of team performances, please refer to the scorecard in Annex E.

Cash Prize Winners

From a pool of 57 finalist teams at the DPSPC 2025 Onsite Round, the top three teams emerged as clear standouts for their exceptional performance. In recognition of their achievement, they were awarded significant cash prizes, generously sponsored by **Ignite – The National Technology Fund**. These awards celebrate their technical excellence, strategic collaboration, and success under pressure in a highly competitive environment.

Table 13: Top 3 Winning Teams of DPSPC 2025 and Cash Awards

Rank	Team Name	Institution	Team Members	Problems Solved	Cash Prize
1st	SundarSTEM Comp	SundarSTEM School	Kaleem Raza, Syed Muhammad Saram , Ghulam Junaid	10	PKR 1,500,000
2nd	SundarSTEM ATTACK ON ICPC	SundarSTEM School	Muhammad Aneeq, Faisal, Ahmed Imran Malik	7	PKR 1,000,000
3rd	SundarSTEM leftovers	SundarSTEM School	Muhammad Umair Ahmad Mirza, Jawad Akbar Khan, Abdullah Ishfaq	7	PKR 500,000

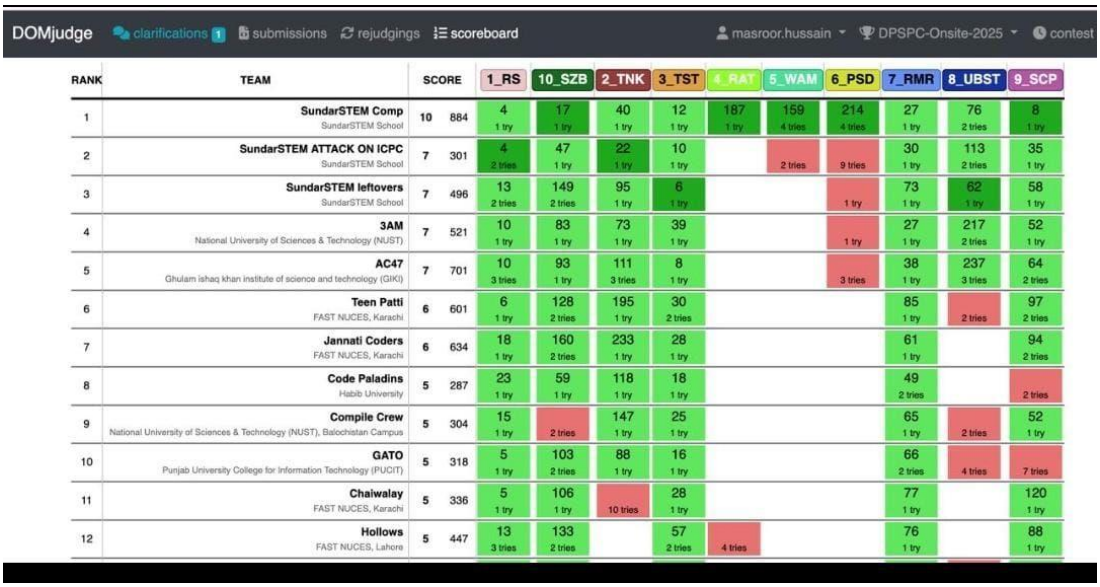
Medal-Winning Teams

In addition to the cash awards, 12 top-ranking teams were recognized with medals for their outstanding performance:

- Gold Medals: Rank 1 to 4
- Silver Medals: Rank 5 to 8
- Bronze Medals: Rank 9 to 12

Table 14: Medal Distribution for Top 12 Teams at DPSPC 2025 Onsite Round

Rank	Team Name	Institution	Medal
1	SundarSTEM Comp	SundarSTEM School	Gold
2	SundarSTEM ATTACK…	SundarSTEM School	Gold
3	SundarSTEM leftovers	SundarSTEM School	Gold
4	3AM	NUST	Gold
5	AC47	GIK Institute	Silver
6	Teen Patti	FAST NUCES, Karachi	Silver
7	Jannati Coders	FAST NUCES, Karachi	Silver
8	Code Paladins	Habib University	Silver
9	Compile Crew	NUST, Baluchistan Campus	Bronze
10	GATO	PUCIT	Bronze
11	Chaiwalay	FAST NUCES, Karachi	Bronze
12	Hollows	FAST NUCES, Lahore	Bronze



RANK	TEAM	SCORE		1_RS	10_SZB	2_TNK	3_TST	4_RAT	5_WAM	6_PSD	7_RMR	8_UBST	9_SCP
1	SundarSTEM Comp SundarSTEM School	10	884	4 1 try	17 1 try	40 1 try	12 1 try	187 1 try	159 4 tries	214 4 tries	27 1 try	76 2 tries	8 1 try
2	SundarSTEM ATTACK ON ICPC SundarSTEM School	7	301	4 2 tries	47 1 try	22 1 try	10 1 try		2 tries	9 tries	30 1 try	113 2 tries	35 1 try
3	SundarSTEM leftovers SundarSTEM School	7	496	13 2 tries	149 2 tries	95 1 try	6 1 try			1 try	73 1 try	62 1 try	58 1 try
4	3AM National University of Sciences & Technology (NUST)	7	521	10 1 try	83 1 try	73 1 try	39 1 try			1 try	27 1 try	217 2 tries	52 1 try
5	AC47 Ghulam ishaq khan institute of science and technology (GIKI)	7	701	10 3 tries	93 1 try	111 3 tries	8 1 try			3 tries	38 1 try	237 3 tries	64 2 tries
6	Teen Patti FAST NUCES, Karachi	6	601	6 1 try	128 2 tries	195 1 try	30 2 tries				85 1 try	2 tries	97 2 tries
7	Jannati Coders FAST NUCES, Karachi	6	634	18 1 try	160 2 tries	233 1 try	28 1 try				61 1 try		94 2 tries
8	Code Paladins Habib University	5	287	23 1 try	59 1 try	118 1 try	18 1 try				49 2 tries		2 tries
9	Compile Crew National University of Sciences & Technology (NUST), Balochistan Campus	5	304	15 1 try	2 tries	147 1 try	25 1 try				65 1 try	2 tries	52 1 try
10	GATO Punjab University College for Information Technology (PUCIT)	5	318	5 1 try	103 2 tries	88 1 try	16 1 try				66 2 tries	4 tries	7 tries
11	Chaiwalay FAST NUCES, Karachi	5	336	5 1 try	106 1 try	10 tries	28 1 try				77 1 try		120 1 try
12	Hollows FAST NUCES, Lahore	5	447	13 3 tries	133 2 tries		57 2 tries	4 tries			76 1 try		88 1 try

Figure 9**:** Final Scoreboard showing Top 12 Team Performances in DPSPC 2025 Onsite Round

7. Closing Ceremony

The Closing Ceremony of the **Digital Pakistan Speed Programming Competition (DPSPC) 2025** Onsite Round was held on **July 17, 2025**, at the **GIK Institute of Engineering Sciences and Technology**, marking the successful conclusion of a nationally impactful initiative to promote programming excellence.

The event was graced by **Ms. Wajiha Qamar**, **Minister of State for Federal Education and Professional Training**, who served as the **Chief Guest**. In her remarks, she applauded the talent demonstrated by the young participants and emphasized the significance of inclusive digital education in shaping Pakistan's future. She particularly appreciated the 26% female participation rate and acknowledged the winning team's outstanding performance—especially noting the presence of exceptionally young talent. She further commended **Ignite – National Technology Fund** for conceptualizing and supporting the initiative, highlighting such collaborations as essential to achieving national goals in digital transformation and technological advancement.

Mr. Adeel Aijaz Shaikh, CEO of Ignite, addressed the audience with a forward-looking message focused on the importance of investing in youth-driven innovation. He emphasized the role of DPSPC and similar programs in discovering and nurturing digital talent from across the country, and reiterated Ignite's commitment to building a tech-enabled future for Pakistan. He underscored the importance of academic-industry linkages and continuous engagement in national-level technical competitions to foster excellence in computing and innovation

Dr. Fazal Ahmad Khalid, Rector of GIK Institute, acknowledged Ignite's leadership in launching the strategic initiative of DPSPC 2025. He further expressed his appreciation for all the participating teams and encouraged students to remain focused on emerging technologies and continue striving for global competitiveness.

Dr. Masroor Hussain, Project Director DPSPC 2025 and Regional Contest Director, ICPC Asia Topi, shared insights on the contest's journey—from the registration and training phases to the final onsite round. He expressed sincere gratitude to Ignite, organizing partners, academic institutions, and volunteers for their contributions in making the competition a resounding success.

Following the speeches by the distinguished guests, the awards segment commenced. **Ms. Wajiha Qamar, Dr. Fazal Ahmad Khalid, and Mr. Adeel Aijaz Shaikh** jointly conferred medals, certificates, and cash prize cheques to the top-performing teams in recognition of their exemplary performance. The ceremony culminated with formal award presentations, commemorative group photographs, and closing acknowledgments. This celebratory conclusion not only honored the exceptional talent demonstrated by Pakistan's emerging programmers but also reinforced a unified commitment to advancing digital excellence and nurturing the country's future tech leaders.

Ms. Wajiha Qamar, Chief Guest, along with Professor Dr. Fazal Ahmad Khalid, Rector of GIK Institute, and Mr. Adeel Aijaz Shaikh, CEO of Ignite, presenting the cash prize cheque of PKR 1,500,000 and medals to the winning team from SundarSTEM School, for their outstanding achievement in the DPSPC 2025 competition solving all the ten problems in the least time.

Ms. Wajiha Qamar, Chief Guest, along with Professor Dr. Fazal Ahmad Khalid, Rector of GIK Institute, and Mr. Adeel Aijaz Shaikh, CEO of Ignite, presenting the cash prize cheque of PKR 1,000,000 and medals being awarded to the first runner-up team from SundarSTEM for their exceptional performance in the DPSPC 2025 competition.

Cash prize cheque of PKR 500,000 presented to the second runner-up team from SundarSTEM, in recognition of their outstanding performance in the DPSPC 2025 competition.

Group photo of the top three winning teams from SundarSTEM School, proudly celebrating their exceptional performance at DPSPC 2025, adorned with medals and awarded cash prizes for securing all top three positions.

Top 12 teams of DPSPC 2025 receiving Bronze, Silver, and Gold medals in recognition of their outstanding performance in the final onsite round.

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Ms. Wajiha Qamar, Chief Guest, presenting a shield to Dr. Syed Fawad Hussain, Chief Judge of DPSPC 2025, in recognition of his outstanding contributions to the contest. Dr. Hussain joined the event from the University of Birmingham, Dubai Campus, bringing international academic insight to the competition.

A token of appreciation to Dr. Yasir Niaz Khan, Chief Technology Officer of Punjab Safe Cities Authority, in recognition of his valuable contribution as a judge for DPSPC 2025.

Dr. Usman Haider, System Chair for DPSPC 2025 from the University of Galway, Ireland, receiving a token of appreciation for his instrumental role in managing the contest infrastructure and technical systems.

Ms. Wajiha Qamar presenting a commemorative shield to Dr. Fazal Ahmad Khalid, Rector of GIK Institute, in recognition of the institute's pivotal role in hosting the DPSPC 2025 Onsite Round.

Dr. Fazal Ahmad Khalid, Director of GIK Institute, and Mr. Adeel Aijaz Shaikh, CEO of Ignite, presenting a shield to Ms. Wajiha Qamar, Chief Guest, in recognition of her invaluable contribution and support to the success of DPSPC 2025.

- ## Annex A – List of Shortlisted Teams for the Training Sessions

The list of shortlisted teams for the training sessions of DPSPC 2025 is attached as Annex A.

- ## Annex B – Scorecard of the Online Qualifier Round

The scorecard of the online round of DPSPC 2025 showing the 57 shortlisted teams for the final onsite round has been attached as Annex B.

- ## Annex C – Problem Set for Online Round DPSPC 2025

For reference, the problem set from the Online Round of DPSPC 2025 has been included in Annex C.

- ## Annex -D Problem Set for the Onsite Round of DPSPC 2025

For reference, the problem set from the Online Round of DPSPC 2025 has been included in Annex D.

- ## Annex – E Team Roster for the Onsite Round of DPSPC 2025

The full team roster for the onsite round of DPSPC 2025 is attached as Annex E.

- ## Annex – F Scorecard of the Onsite Round of DPSPC 2025

For a comprehensive overview of team performances in the final onsite round of DPSPC 2025, please refer to the scorecard attached as Annex F.