

INSTITUTION OF ENGINEERS, BANGLADESH (IEB)
Bangladesh Professional Engineers Registration Board
PROFESSIONAL ENGINEER (PEng)
WRITTEN EXAMINATION

Generic Engineering Practice — Common Paper
Three (3) Hours

Examination	Professional Engineer (PEng) — Written Paper
Discipline	Any Engineering Discipline (Civil, Mechanical, Electrical, Chemical, Computer, Industrial, etc.)
Practice Area	Generic — common professional-engineering competencies, discipline-agnostic
Approach	Candidates answer in the context of their own practice area. Examples may be drawn from any engineering discipline relevant to the applicant's professional work.
Duration	Three (3) hours
Framework	BPERB Applicant's Manual v4.1 (March 2026) — CPCS A–E mapped to IPEA EC1–EC13 (aligned with IEA GAPC v4)
Candidate ID	_____ Date: _____
Practice area declared	_____

Compliance: *This paper is set in accordance with the BPERB Applicant's Manual v4.1 (March 2026), Section 3.0 (Competence Standards) and Section 4.2.4 (Assessment Major Steps — Written Examination).*

Instructions to the Candidate

1. Read every question carefully before you begin. Plan your time across all three sections.
2. The paper has THREE sections — A: Knowledge & Analysis, B: Design, Solving & Sustainability, C: Professional Practice, Ethics & Judgement. ALL questions must be answered.
3. This is a discipline-agnostic paper. Answer every question in the context of YOUR declared engineering practice area (for example: civil/structural, geotechnical, mechanical, electrical, electronics, chemical, computer/software, industrial, environmental, energy). Clearly state the practice area and the specific project context you are drawing on at the start of your script.
4. Sketches, free-body diagrams, block diagrams, process-flow diagrams, single-line diagrams, P&IDs, system architecture diagrams, or simple flowcharts — whichever is appropriate to your discipline — are encouraged. Neat, labelled diagrams will be considered by the assessors.
5. Cite the codes, standards and regulations that govern your practice in Bangladesh — for example, BNBC 2020, IEEE / IEC / ISO / API / ASME standards, BSTI, Department of Environment (DoE) rules, Bangladesh

Labour Act 2006, or any other applicable national/international code. State assumptions, formulas, and reasoning.

6. Each question is mapped to one or more of the thirteen Engineering Competencies (EC1–EC13). The mapping is shown for your guidance and to help you frame complete answers.

7. Use a non-programmable calculator only. Mobile phones and other electronic devices must be switched off and kept away. The examination hall is monitored by video and audio.

8. No marks are printed on this paper. The assessors will mark holistically against the BPERB competence standard, in line with GAPC v4 §3.4 ("competence must be assessed holistically").

SECTION A — Knowledge, Analysis & Jurisdiction

Approximately 50 minutes. Answer all three questions.

Question 1. Fundamental Principles of Your Practice Area

Mapped EC(s): EC1 (primary)

Every engineering practice rests on a small set of governing principles (for example: equilibrium and constitutive behaviour in civil/mechanical; conservation of mass and energy in chemical/thermal; Kirchhoff's laws and Maxwell's equations in electrical; reliability and complexity bounds in computer/software).

- (a) State THREE first-principle laws, theorems or governing equations that you most frequently apply in your declared practice area. For each one, write the equation or statement and identify every symbol.
- (b) Choose ONE of the three principles above and show, with a worked numerical example from your own practice, how it leads from given inputs to a usable design or analysis output. Show all assumptions, units, and intermediate steps.
- (c) Briefly discuss the typical limitations and validity range of that principle (for example: small-strain assumption, steady-state assumption, linearity, ideal-gas assumption, lumped-element assumption) and what you would do when those limits are exceeded.

Question 2. Problem Definition and Analysis from Incomplete Data

Mapped EC(s): EC1 (primary), EC3

A client approaches you with a problem in your practice area that is only partially defined: the performance target is known qualitatively, but several inputs (loads, demand profile, ambient conditions, throughput, traffic, etc.) are not yet measured. Your task is to convert this into a defensible engineering problem statement and a preliminary analysis.

- (a) Write a clear problem statement of about 80–120 words in the form: "Given ... determine ... subject to ... such that ...". Identify the objective, the decision variables, the principal constraints, and the performance criteria.
- (b) List the data you would collect (field measurements, manufacturer data, monitoring, surveys, simulation) and the engineering analyses (hand calculation, code-based check, numerical simulation, statistical analysis) you would perform to reach a preliminary answer. Show your reasoning in a short flow-chart or numbered list.
- (c) State the simplifying assumptions you would adopt at the preliminary stage and how you would later validate or relax them.

Question 3. Codes, Standards and Jurisdiction in Bangladesh

Mapped EC(s): **EC2 (primary), EC7**

Every PEng in Bangladesh practices under a defined statutory framework administered by BPERB under the IEB.

- (a) Tabulate at least SIX codes, standards or regulations that govern your declared practice area in Bangladesh. Examples (use the ones relevant to your discipline): BNBC 2020, Bangladesh Labour Act 2006, Bangladesh Environment Conservation Act 1995 and the ECR Rules, Bangladesh Energy Regulatory Commission rules, BSTI / BDS standards, ASTM / ISO / IEC / IEEE / ASME / API standards, and the BPERB Rules of Ethics and Conduct (Appendix B of the v4.1 manual). State what each code governs.
- (b) State the statutory duty of a Professional Engineer when signing and sealing engineering drawings, reports or test certificates in Bangladesh. What records would you maintain to demonstrate that the work is code-compliant, traceable, and reviewable by a peer auditor?
- (c) Identify at least THREE Bangladesh-specific contextual factors (e.g., seismic Zone 2/3 hazards, monsoon flooding, soft alluvial soils, frequent grid disturbances, voltage fluctuations, high ambient humidity, supply-chain constraints, load-shedding) that meaningfully influence engineering decisions in your practice area.

SECTION B — Design, Solving & Sustainability

Approximately 70 minutes. Answer all three questions.

Question 4. Conceptual Design with Multiple Alternatives

Mapped EC(s): **EC4 (primary), EC3**

Choose a representative project from your declared practice area where you, as the PEng of Record, would be required to develop a conceptual design. State the project briefly (one paragraph): purpose, scale, key performance requirements, the principal stakeholders (owner, end-user, regulator, neighbours), and the site / operating environment.

- (a) Propose at least THREE feasible design alternatives to meet the requirements. For each alternative, state the working principle, the principal components or sub-systems, and the indicative size / capacity.
- (b) Compare the three alternatives in a short table on at least five criteria: technical performance, capital cost, operating cost, reliability / maintainability, safety, and environmental impact. Show your weighting and recommend a preferred option with clear reasoning.
- (c) For the preferred option, draw a single labelled diagram (block diagram, schematic, single-line diagram, process-flow diagram, system architecture, or plan view as appropriate to your discipline) showing the main components, interfaces and flows.

Question 5. Verification, Validation and Risk-Informed Evaluation

Mapped EC(s): **EC5 (primary), EC4**

Once a design has been completed, the PEng must be able to demonstrate that it actually meets the performance, safety and reliability targets — both on paper and through commissioning. This applies whether the deliverable is a structure, a machine, an electrical system, a process plant, or a software-controlled product.

- (a) For your preferred design from Q4, list at least FIVE verification & validation activities you would perform (e.g., independent design check, FEA / CFD / circuit simulation, factory acceptance test, site

acceptance test, load test, integrated commissioning test, software unit & integration tests). State what each activity is intended to confirm.

(b) Identify the THREE most critical failure modes for this design. Present them in a brief FMEA-style table with columns: failure mode, cause, effect, severity (H/M/L), likelihood (H/M/L), and the engineering control or design feature you would introduce to mitigate each.

(c) Define the principal Key Performance Indicators (KPIs) or acceptance criteria you would use to evaluate the design in service over the first year of operation, and how those KPIs would be measured.

Question 6. Sustainability and Lifecycle Impact

Mapped EC(s): **EC6 (primary), EC5**

BPERB and the IEA GAPC v4 expect every PEng to integrate sustainability — environmental, social and economic — into design and decision-making.

(a) For the project of Q4, discuss the principal environmental, social and economic effects across the full life cycle: materials sourcing & manufacture, construction or installation, operation, maintenance, and end-of-life decommissioning / recycling.

(b) Recommend at least FOUR mitigation measures (for example: low-carbon materials, energy-efficient drives or controls, water recycling, waste-heat recovery, modular re-use, circular-economy procurement, climate-resilient design margins). Briefly indicate which UN Sustainable Development Goals (e.g., SDG 7 — affordable & clean energy, SDG 9 — industry, innovation & infrastructure, SDG 11 — sustainable cities, SDG 12 — responsible consumption, SDG 13 — climate action) are supported by your mitigations.

(c) State qualitatively how you would estimate the lifecycle carbon footprint of the project — naming a method (e.g., ISO 14040/44 LCA, embodied-carbon catalogues, OpenLCA / SimaPro modelling) and the key data inputs you would need.

SECTION C — Professional Practice, Ethics & Judgement

Approximately 60 minutes. Answer all six questions.

Question 7. Public Health, Safety and Statutory Duty

Mapped EC(s): **EC7 (primary)**

During a routine site / facility / project review in your practice area, you observe THREE concurrent issues that put workers, end-users or the public at risk. Choose any combination relevant to your discipline — for example: missing edge protection on a deep excavation, unguarded rotating machinery, an electrical panel without proper earthing or arc-flash labelling, a pressure vessel operating beyond its set pressure, untreated effluent being discharged, or a safety-critical software change deployed without testing.

(a) State the immediate engineering actions you would take on site. Cite the relevant Bangladesh provisions (e.g., BNBC 2020 Part 7 — Construction Safety, Bangladesh Labour Act 2006, Bangladesh Electricity Rules, Environmental Conservation Rules, or sector-specific guidelines) that support each action.

(b) Draft, in point form, a brief Site / Facility Safety Memo (about half a page) addressed to the contractor or facility manager, listing each corrective action, the person responsible, and the time-frame for compliance.

Question 8. Ethics — A Test Result that Fails*Mapped EC(s): EC8 (primary), EC12, EC13*

An acceptance test on a critical deliverable in your project — choose one appropriate to your practice (a pile load test, a pressure / hydro test, an insulation-resistance or high-pot test, a Type Test on a transformer or switchgear, a FAT on a pump or boiler, a security penetration test, a load test on a software system, an environmental discharge test) — fails to meet the relevant code or specification. Rectifying it would delay the project by about six weeks. The contractor and the client request that you certify the item as acceptable on the basis of revised "engineering judgement" and offer you additional consultancy fees for issuing the certification.

- (a)** Using the IEB Code of Ethics and the BPERB Rules of Ethics and Conduct (Appendix A and Appendix B of the BPERB Applicant's Manual v4.1) as your framework, identify the ethical issues in this situation, including conflict of interest, public safety, and professional integrity.
- (b)** Describe the decision you would take and explain your reasoning. State what you would say to the client, what records you would keep, what additional verification (if any) you would request, and what you would do if the client insisted on the unsafe certification.

Question 9. Integrated Case Study from Your Practice*Mapped EC(s): EC3, EC4, EC9 (holistic)*

Describe an integrated, multi-disciplinary project from your declared practice area that involves at least TWO other engineering disciplines (e.g., a building project involving structural + MEP + geotechnical; a power-plant retrofit involving mechanical + electrical + instrumentation; a process plant involving chemical + safety + control systems; an IT system involving software + networking + electrical infrastructure). Use a real or representative project.

- (a)** Outline the project scope, the principal sub-systems, and the interfaces between disciplines. Identify the role you would play as PEng of Record in your discipline, and the matrix of design responsibilities across the other disciplines.
- (b)** Identify the THREE most important interface risks (e.g., differential settlement between two foundation systems, voltage / harmonic compatibility between a drive and a generator, control logic mismatch, thermal-mechanical interface) and explain how you would manage each through coordinated design, joint design reviews, and shared test / commissioning protocols.
- (c)** Describe how you would plan, schedule and supervise the work — including resource loading, design-review checkpoints, and the integrated commissioning sequence.

Question 10. Communication and Stakeholder Engagement*Mapped EC(s): EC10 (primary), EC9*

You are the lead PEng on the project described in Q9. The project team includes engineering peers from other disciplines, sub-contractors, the client, the regulator, and affected members of the public or end-users.

- (a)** Prepare a one-page Communication and Coordination Plan for the implementation phase. Include: meeting cadence (daily / weekly / monthly), document control (revision numbering, drawing register, version log), responsibilities (who decides what), a RACI matrix for at least four key decision items, and the escalation path when issues exceed the team's authority.
- (b)** Write a short note of about 120 words, in plain Bangla-friendly English, that you would send to non-technical stakeholders (e.g., a community group, a building owners' association, end-users, a worker

representative) explaining one technical aspect of the project and what they should expect during implementation.

Question 11. Continuing Professional Development

Mapped EC(s): **EC11 (primary), EC6**

(a) Prepare a three-year CPD plan for yourself (minimum 30 CPD hours per year as required by BPERB Applicant's Manual v4.1 §4.9). Specify activities, expected learning outcomes, evidence, and approximate hours. Cover at least TWO emerging areas relevant to your practice in Bangladesh — for example: artificial intelligence / machine learning, digital twins and simulation, climate-resilient design, renewable energy & energy storage, performance-based seismic design, electric mobility, cybersecurity, smart-grid technology, additive manufacturing, or LCA & circular economy.

Question 12. Judgement under Uncertainty

Mapped EC(s): **EC12 (primary), EC13**

During execution, your contractor reports a condition that was NOT predicted by the original investigation, specification or design basis — for example: an unexpected hard or soft layer during piling, a manufacturing defect found at inspection, a previously-unmeasured harmonic disturbance on the grid, a clash between mechanical and electrical routing, a security vulnerability discovered after rollout, or unforeseen ambient-temperature peaks. Some work has already been executed under the original basis, and the project is already behind schedule.

(a) Describe the decision-making process you would follow under this uncertainty. State the additional information you would seek (e.g., confirmatory tests, independent peer review, vendor data, condition monitoring), the alternatives you would consider, and how you would weigh safety against schedule and cost.

(b) State the decision you would take regarding the work already executed and the remaining work. Identify what records you would keep and whom you would formally notify (client, designer of record, contractor, regulator) to demonstrate sound judgement and responsibility as the Engineer of Record.

End of Question Paper

Examiner's note (not for candidate): *this is the generic, discipline-agnostic Common Paper of the PEng written examination. It is intended for any applicant in any engineering practice area; the candidate's own declared practice area provides the context for every answer. The paper tests every Engineering Competency (EC1–EC13) under the BPERB Applicant's Manual v4.1, mapped to the five Core Professional Competence Standards (CPCS A–E). Difficulty is intentionally moderate.*

EC coverage summary (cross-checked):

- CPCS A (Knowledge & Understanding) — EC1: Q1, Q2; EC2: Q3.
- CPCS B (Design, Development & Solving) — EC3: Q2, Q4, Q9; EC4: Q4, Q5, Q9; EC5: Q5, Q6; EC6: Q6, Q11.
- CPCS C (Responsibility, Management & Leadership) — EC7: Q3, Q7; EC9: Q9, Q10; EC12: Q8, Q12; EC13: Q8, Q12.
- CPCS D (Communication & Interpersonal Skills) — EC10: Q10.
- CPCS E (Personal & Professional Commitment) — EC8: Q8; EC11: Q11.