

# **Professional Practice Examination**

**Reprint – December 2016**

# ASSOCIATION OF PROFESSIONAL ENGINEERS OF ONTARIO

## PROFESSIONAL PRACTICE EXAMINATION – December 3, 2016

### PART “A” – Professional Practice and Ethics

You will be given a total of **90 minutes** to complete this examination.

Use the correct colour-coded Answer Book for each part, place in the correct envelope and **seal after completed**.

*White Answer Book for Part A white question paper.*

*Coloured Answer Book for Part B coloured question paper.*

This is a “**CLOSED BOOK**” examination. **No** aids are permitted other than the excerpts from the 1990 Ontario Regulation 941 covering sections 72 (*Professional Misconduct*) and 77 (*Code of Ethics*) supplied at the examination. Dictionaries are **not** permitted.

The marking of questions will be based not only on academic content, but also on legibility and the ability to express yourself clearly and correctly in the English language. If you have any doubt about the meaning of a question, please state clearly how you have interpreted the question.

All **four** questions constitute a complete paper for Part “A”. Each of the four questions is worth 25 marks.

**WHERE A QUESTION ASKS IF A CERTAIN ACTION BY AN ENGINEER WAS ETHICAL OR NOT, A SIMPLE “YES” OR “NO” ANSWER IS NOT SUFFICIENT. YOU ARE EXPECTED TO COMMENT ON AND DISCUSS THE ACTION OF THE DIFFERENT INDIVIDUALS AND/OR ORGANIZATIONS INVOLVED IN EACH SITUATION.**

You should identify where applicable the appropriate clauses in Regulation 941. **SIMPLE REFERENCE TO THE APPROPRIATE CLAUSES WITHOUT A DISCUSSION OF HOW THE CLAUSE APPLIES IN THE SITUATION DESCRIBED IS NOT SUFFICIENT.**

### Question 1

- (5) (a) In addition to the P.Eng. licence, PEO issues licences to the three following general categories. Please indicate which licence, other than the P.Eng. licence, might be issued to each group:
- individual who meets all the requirements for a P.Eng. licence except for the 12 months of Canadian engineering experience
  - Individual who has a P.Eng in another province
  - Individual who is a technologist with over 8 years of experience?
- (5) (b) PEO allows the use of electronic seals on electronic documents. Briefly discuss the specific steps that a P.Eng. should take when allowing the electronic use of his/her seal.
- (5) (c) PEO issues both a Certificate of Authorization and a Consulting Engineering title. Briefly explain the purpose of each.
- (5) (d) What is the “Fees Mediation Committee”? Describe its function.
- (5) (e) Two of PEO's functions are discipline and enforcement. Explain what enforcement is and how it differs from discipline.

### Question 2

Freelance is a fully licensed consulting professional engineer (P.Eng.) with her own Certificate of Authorization. Freelance is an experienced software design engineer with over 15 years of experience. Freelance is retained by a client to design and supervise the installation of a proprietary warehouse distribution control system.

Following the completion of this work, Freelance is approached by another client and asked to provide an identical control system. The second client had seen the control system in operation and was impressed with the efficiency of its operation. The two clients are in very different industries but their warehouse distribution systems are similar. This client requests that Freelance's fee be lower than that charged to the first client since Freelance could use the same design with minor changes. Freelance is not quite sure how to respond to the second client's request.

- (15) (a) Should Freelance undertake this work? Discuss providing your reasons for or against.
- (10) (b) If Freelance decides to do the design should she accept the lower fee structure? Discuss providing your reasons for or against.
- Use PEO's Codes of Ethics and Professional Misconduct as your guide.

### Question 3

Turbco is a company that manufactures turbines for electrical power generating plants. Turbco recently signed a contract with an independent power producer, PowerCo. to supply a turbine for a new power plant owned by PowerCo. In addition to supplying the turbine, Turbco's contractual responsibilities included providing technical advice and on-site support during installation and commissioning of the turbine.

PowerCo hired MechCo, a separate construction contractor, to construct the power plant, including installing the turbine supplied by Turbco. The construction of the power plant is now almost complete and Mechco is installing the turbine. The contract is running late and MechCo is concerned that any delays will result in them paying penalties for late delivery. MechCo has full responsibility for the safety of the workers.

Turbco sent one of its employees, Valid P.Eng. , to the site to witness the construction and to ensure that their turbine is properly installed. Valid is a very experienced professional engineer and has worked on many different construction sites over the years. Soon after arriving at the site, it became apparent to Valid that MechCo was carrying out its work in an unsafe manner. Although MechCo's workers had the necessary safety equipment ( hardhats, eye protection or safety shoes) they were very lax in using them. In addition MechCo staff were not taking the necessary precautions around the live electrical equipment in their effort to save time and meet the schedule.

Valid raised his concerns with Blithe P. Eng. , MechCo's construction manager. Blithe rejected Valid's concerns reminding him that he was not responsible for the construction workers. Blithe also said that these shortcuts were normal in the industry to allow a contractor to complete work quickly and represented a reasonable balance between safety and efficiency. Blithe refused to take any further action.

Valid is still concerned that the work was proceeding unsafely.

- (15) (a) What, if any, duties does Valid have regarding the potential dangers to MechCo's workers? What consequences would Valid face from PEO?
- (5) (b) Explain whether it matters to Valid's duties that the unsafe practices involved work that was not relevant to the services that Turbco was hired to performs (i.e. work on other parts of the project not related to the turbine itself)?
- (5) (c) Explain whether it matters to Valid's duties that MechCo agreed, in its contract with PowerCo, that MechCo would have overall responsibility for site safety?

Use the Codes of Ethics and Professional Misconduct as your guides

#### Question 4

Green is a professional engineer who is employed on a full-time basis by MajorEng, a large engineering firm. However, for a number of reasons, Green is unhappy and for some time has been thinking about looking for a new job. Although Green's current employment at MajorEng provides good pay and interesting work, Green is finding it difficult to work with Potent P.Eng. who is Green's supervisor at MajorEng.

Since joining MajorEng a year ago, Potent has frequently made derogatory jokes and remarks about Green's race and religion – sometimes even in meetings with other engineers and clients. On many occasions, Green has informed Potent that such remarks are offensive, hurtful and inappropriate and has asked Potent to stop. Potent refuses to do so and says that Green should "toughen up and learn to take a joke" if Green expects to have a successful career at MajorEng.

Recently Green met with a P.Eng. colleague who is a Vice President at EngCo, another engineering company. Upon hearing that Green was interested in considering other opportunities, the colleague offered Green a part-time job to work in the evenings and on weekends on a trial basis as an engineer for EngCo. Green would work under the colleague's direct supervision who would take responsibility for the work. In a few months, if Green preferred working at EngCo, Green would resign from MajorEng and become a fulltime employee of EngCo.

Use the Codes of Ethics and Professional Misconduct as your guides

- (10) (a) Comment on and discuss Potent's conduct with respect to regulation 941
- (5) (b) In relation to the regulation of the practice of professional engineering what should Green consider doing about Potent's conduct?
- (10) (c) Specify and explain the requirements, if any, that Green must satisfy in order to properly undertake such part-time employment with EngCo?

# ASSOCIATION OF PROFESSIONAL ENGINEERS OF ONTARIO

PROFESSIONAL PRACTICE EXAMINATION – December 3, 2016

## PART “B” - Engineering Law and Professional Liability

This examination comes in two parts (**Part “A” and Part “B”**). Both parts must be completed in this sitting. You will be given a total of **180 minutes** to complete the examination.

Use the correct colour-coded Answer Book for each part, place in the correct envelope and **seal after completed**.

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All **four** questions constitute a complete paper for Part “B”. Each of the four questions is worth 25 marks.

**ASSOCIATION OF PROFESSIONAL ENGINEERS OF ONTARIO**  
**PROFESSIONAL PRACTICE EXAMINATION – December 3, 2016**  
**PART “B” - Engineering Law and Professional Liability**

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(25) 1. Briefly define and explain any five of the following:

- (i) The New York Convention
- (ii) Fraudulent misrepresentation
- (iii) The discoverability concept
- (iv) Parol evidence rule
- (v) Contra proferentem
- (vi) Vicarious liability
- (vii) A director's fiduciary duty
- (viii) Consideration

(25) 2. An Ontario municipality (the "Owner") decided to build a new "green" hospital that would implement environmentally focused, "green" practices in a broad number of areas including food, water use, waste handling, alternate energy, green building design, energy efficiency, and transportation in and around the hospital. To do so, the Owner had its prime consultant on the project prepare detailed drawings and specifications and invited competitive tenders from contractors for the construction of the new facility.

The Owner's prime consultant on the project prepared the Tender Documents to be given to contractors interested in bidding on the project. Each of the bidders was required to be prequalified and approved by the Owner for participation in the bidding. The Tender Documents included the Plans and Specifications, the Tendering Instructions which described the tendering procedure and other requirements to be followed by the bidders, the Tender Form to be completed by the bidders, the form of written Contract that the successful contractor would be required to sign after being awarded the contract, and a number of other documents.

According to the Tendering Instructions, each tender bid as submitted was to remain "firm and irrevocable and open for acceptance by the Owner for a period of 90 days following the last day for submitting tenders". The Tendering Instructions also provided that all bids were to be submitted in accordance with the instructions in the Owner's Tender Documents and that the Owner was not obligated to accept the lowest or any tender.

Tenders were submitted by five of the six bidders. All bids were submitted in accordance with the Owner's Tender Documents. The lowest bid was well within the Owner's budget.



Within the 90 days specified and before the Owner's prime consultant had made a recommendation to the Owner as to whom the contract should be awarded, the prime  
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consultant received a telephone call from a member of the Municipal Council who noted that the lowest bidder was not one of the bidders who were "local bidders" from within the Municipality. A meeting was subsequently convened between the prime consultant and the Municipal Council at which several Council members joined forces in strongly expressing their view that the contract should in fact be awarded to a local bidder. One of the Councillors emphasized that if one item that had been included in the specifications was deleted from the bids the result would be that the bid of the lowest "local contractor" would become the lowest bid overall and the Councillors' preference for awarding the contract to a "local contractor" could be satisfied.

There had been no reference in the Tendering Instructions to any preference being shown to local contractors.

How should the prime consultant deal with the political pressure being applied by the Council members?

If the contract is awarded to the lowest local bidder what potential liabilities in contract law may arise? If the prime consultant recommends to the Owner that the contract be awarded as the Councillors suggest what liabilities may arise for the prime consultant? Please provide your reasons and analysis.

(25)

3. A \$30,000,000 contract for the design, supply and installation of a cogeneration facility was entered into between a pulp and paper company ("Pulpco") and an industrial contractor. The cogeneration facility, the major components of which included a gas turbine, a heat recovery steam generator and a steam turbine, was to be designed and constructed to simultaneously generate both electricity and steam for use by Pulpco in its operations.

The contract provided that the electrical power generated by the cogeneration facility was not to be less than 25 megawatts. A liquidated damages provision was included in the contract specifying a pre-estimated amount payable by the contractor to Pulpco for each megawatt of electrical power generated less than the minimum 25 megawatts specified. Other provisions specified additional liquidated damages at prescribed rates relating to other matters under the contract, including any failure by the contractor to meet the required heat rates or to achieve completion of the facility for commercial use by a stipulated date. However, the contract also included a "maximum liability" provision that limited to \$5,000,000 the contractor's liability for all liquidated damages due to failure to achieve (i) the specified electrical power output, (ii) the guaranteed heat rate and (iii) the specified completion date. The contract clearly provided that under no circumstances was

the contractor to be liable for any other damages beyond the overall total of \$5,000,000 for

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liquidated damages. Pulpco's sole and exclusive remedy for damages under the contract was strictly limited to the total liquidated damages, up to the maximum of \$5,000,000. The contract specified that Pulpco was not entitled to make any other claim for damages, whether on account of any direct, indirect, special or consequential damages, howsoever caused.

Unfortunately the contractor's installation fell far short of the electrical power generation specifications (achieving less than 25% of the specified minimum megawatts) and the heat rate specifications provided in the contract. The contractor was paid \$27,000,000 before the problems were identified on startup and testing. Because of its very poor performance, the contractor also failed to meet the completion date by a very substantial margin. Applying the liquidated damages provisions, the contractor's overall liability for all liquidated damages under the contract totalled \$4,000,000. Ultimately Pulpco had to make arrangements through another contractor for new equipment items and parts to be ordered and installed in order to enable the cogeneration facility to meet the technical specifications, with the result that the total cost of the replacement equipment and parts reached an additional \$15,000,000 beyond the original contract price of \$30,000,000.

Explain and discuss what claim Pulpco could make against the contractor in the circumstances. In answering, explain the approach taken by Canadian courts with respect to contracts that limit liability and include a brief summary of the development of relevant case precedents.

(25)

4. An owner/developer (the "owner") entered into a contract with an architectural firm (the "architect") for design and contract administration services in connection with the construction of a ten storey commercial office building.

The building was designed to be entirely surrounded by a paved podium concrete deck used for parking and driving, and the design provided for a parking area below the deck. The podium deck was divided by construction joints and expansion joints placed to allow thermal expansion of the concrete as the temperature changed. The land on which the building was located sloped towards a river so the lower parking deck was designed to be partially open to the outside.

The architect engaged a structural engineering firm (the "engineer"), as the architect's subconsultant on the project. The engineering firm, in its agreement with the architect, accepted responsibility for all structural aspects of construction,

and also specifically acknowledged responsibility for the design of the paved podium concrete deck and the parking area below.

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Upon completion of the design and the tendering process, the owner entered into a contract for the construction of the project with an experienced contractor who had submitted the lowest bid.

Unfortunately, within two years following construction, a significant number of leaks occurred in the podium deck which resulted in water leaks in the lower parking garage.

The contract specifications had called for a specific rubberized membrane to be installed for the purpose of waterproofing the podium deck. However, during construction, at the suggestion of the roofing subcontractor and without the knowledge of the owner, another asphalt membrane product was substituted for the rubberized membrane product specified. Neither the engineer nor the architect objected to the substitution when it was suggested. The roofing subcontractor had suggested the substitute membrane because it was more readily available and would speed completion of construction. The design engineer and the architect took the position that they would rely on the subcontractor's recommendation.

During the investigation into the cause of the leaks, another structural engineering firm provided its opinion that the rubberized membrane as specified in the contract was a superior product to the substituted membrane; that the substituted membrane was brittle and could fracture or crack under certain circumstances, particularly on podium decks with expansion joints; that the winter temperatures had contributed to the breakdown of the substitute membrane as it became more brittle at colder temperatures; and that the substitute membrane should not have been used over expansion joints on a dynamic surface podium deck. The second engineering firm also expressed the opinion that the designers ought to have taken into account the non-static nature of the deck that featured these expansion joints and should not have accepted the substitute membrane.

Ultimately, to remedy the leaks, the substitute membrane had to be replaced by the rubberized membrane originally specified in the contract.

What potential liabilities in tort law arise in this case? In your answer, explain what principles of tort law are relevant and how each applies to the case.