



## सोक सेवा भाष्य

नेपाल इन्जिनियरिङ सोसाइटी, सिभिल समूह, बिल्डिङ एंड आर्किटेक्चर उपायुक्त  
राजपत्राक्ति तृतीय धेरणी (प्राविधिक) को प्रतियोगितात्मक निर्माण परीक्षा

२०७२/११/१७

समय:- ३ घण्टा

पत्र :- द्वितीय पत्र

पृष्ठांक :- ३००

विषय :- बिल्डिङ एन्ड आर्किटेक्चर सम्बन्धी।

निम्न प्रश्नहरूको उत्तर खण्ड (Section) अनुसार छुटाउँदै उत्तरपृष्ठिकामा सेल्युपर्नेछ अन्यथा उत्तरपृष्ठिका रह र्नेछ।

### Section A

1. Define shoring and describe it's types with neat and clean sketches. (3 + 7)
2. Draw a typical wall section of an earthquake resistant single storey building with load bearing walls.
3. Write briefly the bonds in brickwork and describe English bond with sketches of alternate layers and isometric view.

### Section B

4. Describe singly reinforced section and doubly reinforced section of concrete structure particular for RCC beam section. State the main use of both sections and exemplify of both sections with sketches emphasizing on earthquake resistant need. (3 + 3 + 4)
5. Define Hook's law. Calculate shear force and bending moment of the simply supported beam ... with span 4 m (c/c) and a point load of 10 kN at the centre of the span. Also draw the shear force and bending moment diagram.

### Section C

6. What are the different kinds of urban housing? Describe in detail about "site and services" (5)
7. What do you understand by the term "land use planning"? Write the importance of land planning in urban development which agencies are involving for urban development Nepal? (3 + 4)
8. What is a periodic plan of a municipality? How can municipality play its roles in ... development of Nepal?

### Section D

9. Write on vernacular architecture of Nepal in general and Kathmandu in particular.
10. What do you understand by traditional architecture in Nepal? Illustrate three architectural landmarks in Nepal.

*The End*



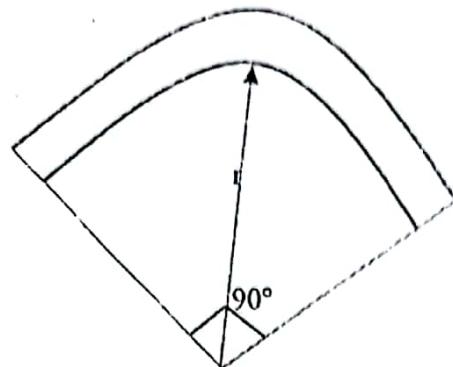
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**Subject: Nepal Food Corporation, Civil**  
**(Building and architect): 2071/6/28**

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1. What are the main characteristics of hollow concrete blocks? Can this be used for load bearing walls of a building? What are the advantages and disadvantages?
2. a) Describe with sketch common water proofing problems of a building in Nepal and their remedial measures taken.
3. a) An arch of 2.5m span subtends an angle of  $90^\circ$  at the center. The thickness of arch is 30 cm and thickness of wall is also 30cm. Calculate the quantity of arch masonry work.
- 4.



- b) what do you mean by a "kingstone"
5. what do you know about roof truss? With sketch give the types, and properties of truss used in Nepal .what types of loads are considered in designing roof truss?
6. What is the principle of earthquake design of buildings? is it practical and normal to design a building earthquake proof?
7. a) Describe with sketch design steps of a foundation footings of a building structure.  
b) Name types of footings of common buildings as practiced in Nepal
8. a) Describe the present and past practices in building construction in different zones of Nepal  
b ) Drawing a plan and vertical section of a storage building constructed in jumla showing all elements and details.
9. What are the general ethics of architects in professional practice? Illustrate the provisions being followed internationally and that included in Nepal acts.
10. Explain the environmental issues in urban and rural development of our country and how those should be dealt with while designing a storage building of Nepal food corporation.
11. You are assigned to design a storage building for Nepal Food Corporation in Nepalganj. Write step by step procedure you follow to design such a building.



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## Irrigation- 2071/11/16

### Section-A

1. What do you understand by crop-water requirement? Explain various factors affecting crop-water requirement.
2. Name various type of irrigation methods. Describe in brief the advantage and disadvantage of each methods.

### Section-B

3. a) write manning's uniform flow equation used for canal design.
- b) Design a regime channel (using lacey's equation) for a discharge of  $30 \text{ m}^3/\text{sec}$ . with silt factor=1. Assume trapezoidal section having side slopes 1:1
4. What is meant by scour? What precautions do you take against it in weir design? Explain.
5. write short notes on:
  - a) exit gradient
  - b) Hydraulic jump.
  - c) Retrogression.
  - d) Water measuring devices used in water management.

### Section-C

6. What are various stages of river? Why river training is necessary? Describe briefly the different methods of river training methods adopted in Nepal.  
What is the purpose of providing a spur in river training in Nepal?
7. What is water logging? What are its effects? Explain various methods of reclamation of water logged areas?

### Section-D

8. Define confine and unconfined aquifer. If an artesian well produces 250 litre per minute with a drawdown of 3m in the pumping well, what will be the discharge with 4m drawdown?
9. The following stream flow records are obtained from a gauging station.

Time (Hr.)	0	12	24	36	48	60	72	84	96
Q(cumec)	5	8	20	50	30	20	10	6	5

Determine volume of flood run off, base flow, surface run off and peak flood.

10. Define "infiltration" of rain water and "infiltration capacity" of the area. Describe the factors affecting "Infiltration capacity"



सोक सेवा आयोग  
 नेपाल इन्जिनियरिंग सेवा, रिपब्लिक समूह, जनरल उपसमूह  
 राजपत्राद्वितीय श्रेणी (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा  
 २०७२/११/२२

समय- ३ घण्टा

पत्र :- द्वितीय पत्र  
 विषय :- जनरलसम्बन्धी

पूर्णाङ्क :- ३००

निम्न प्रश्नहरूको उत्तर खण्ड (Section) अनुसार छुटाएँ उत्तरपुस्तिकामा लेजपर्नेछ । अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

### Section-A

- Explain the specific consideration for the feasibility study report stage of a road project in hill regions in the comparison of terai (plane) one. 10
- State importance of hill road drainage with examples. Show the surface drainage system for effective drainage of water with sketch. 10
- How many types of cables are there in suspension bridge? Describe the function of each type. How is the load on the bridge transferred to the ground? Illustrate with simple sketches. 10

### Section-B

- What is meant by onsite sanitation system? Design a septic tank for 200 users, rate of water supply 45 liters/capita/day, detention period 24 hours and cleaning of sludge as per 5 years. 10
- Explain the treatment process of waste in detail with sketches. 10

### Section-C

- Maintain Principal Components of Hydroelectric Schemes. Explain in detail about forebay, penstocks and intake structures with sketch. 10
- What do you mean by River training works? Describe various types of river training works and protection works. 10
- Explain the specific considerations for planning, layout and design of the headworks in hill regions as compared to those in the terai (plane) region. 10

### Section-D

- "New Technological Innovation has resulted a lot of benefit to the society". Justify this statement with appropriate examples. 10
- Describe the different construction technologies that can be used in the construction of low cost housing for urban poors. Mention indigenous technology to be adopted in building design and construction. 10



The End

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पद पूर्ति समिति

थाहा नगरपालिका कार्यालय, दामन, मकवानपुर

इन्जिनियर/अधिकृतस्तर छेठौं तह, इन्जि सेवा, सिभिल समूह, जनरल उप-समूह

समय : ३ घण्टा

दोस्रो पत्र : जनरलसम्बन्धी

पूर्णांक : १००

1. What are the design and construction problems of hill roads? What special considerations need to be done in the selection of alignment for roads in high altitude mountainous region? (10)
2. Write short notes on:
  - A. Role of social mobilization in rural road development.
  - B. Importance of maintenance of roads.(5 + 5)
3. What do you understand by water hammer? Explain different types of surge tanks with scheme drawings. (10)
4. Has technology brought changes in education and employment opportunity of Nepal? Discuss. (10)
5. What is the difference between renewable and non-renewable energy? Also write down advantages of solar energy, bio-gas and hydropower. (10)
6. Describe various types of river training and protection works. (10)
7. What are the roles of National Building Codes in Nepal? How does the code address the problem of earthquake? How could the code be made effective? (10)
8. Write short notes on:
  - A. Farmers managed irrigation system.
  - B. Specific consideration in design of buildings in Nepal.(5 + 5)
9. Briefly Explain the following:
  - A. Remedial measures of water logging.
  - B. Indigenous technology in building designs.(5 + 5)
10. Write short notes on:
  - A. Initial Environment Examination.
  - B. Labour based, Environment friendly and participatory Approach for local infrastructure development in Nepal.(5 + 5)





## लोक सेवा आयोग

नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, जनरल उपसमूह  
राजपत्राङ्कित तृतीय श्रेणी (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा

२०७३/११/१६

समय:— ३ घण्टा

पूर्णाङ्कः— १००

पत्रः— द्वितीय

विषय :— जनरल

निम्न प्रश्नहरूको उत्तर Section अनुसार छुटाछुटै उत्तरपुस्तिकामा लेख्नुपर्नेछ, अन्यथा उत्तरपुस्तिका रद्द हुनेछ।

### Section—A

1. What are the types of highway curve? Why transition curve and reverse curve are necessary in highway? (4 + 3 + 3) = 10
2. What is bioengineering? What does bioengineering do? (5+5) = 10
3. What are the importance of highway drainage? How to manage surface drainage from the road? (5+5) = 10

### Section—B

4. What are the various factors considered in design of sewers? Explain the different types of sewerage system? (5+5) = 10
5. Differentiate intake, collection chamber and Break Pressure Tank in a water supply system. (3+ 3 + 4) = 10

### Section—C

6. a) Briefly describe an ogee spillway. 5
- b) What is meant by pore water pressure and what is its significance in the design of earthen dams? 5
7. Explain with neat sketches the different types of river training works? Explain groynes in details? 5
8. Introduce the sprinkler method of irrigation and its suitability in Nepal. What are the factors to be considered in selecting canal alignment? (5+5) = 10

### Section—D

9. Explain in brief the indigenous technology and construction materials adopted in design and construction of buildings in mountain, hill and terai regions of Nepal. 10
10. What are the sources of air pollution ? Mention the control methods of air pollution. (4+ 6) = 10

**The End**



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ପ୍ରାଚୀ କିମ୍ବା କିମ୍ବା କିମ୍ବା, ନିରାଜ ପତ୍ର, ନିରାଜ ପତ୍ର  
ପାତା ଶିଖିବା କିମ୍ବା (ପାତାକି), ପାତା ପାତାକି, ନିରାଜ ପତ୍ର

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### *Spuria* - *infrasubstratum*

विन प्राप्ति की जो सेवा अपने बाह्य विद्युत उपकरणों पर लगती है, वह सर्वसम्मानीय है।

### Section A

1. a) State the permissible limits of iron, manganese and sulphate contained in potable water quality standard, 2012.  
 b) Briefly describe the treatment methods of iron, manganese and sulphate removal.

2. Explain the terms water demand, design period and population growth rate. What factors affect the demand of water? (6 x 8 = 48)

## **Section - B**

- 3 Why is it necessary to use coagulants in sedimentation process? Explain why  $MgCl_2$  is important. 10

4 Describe various types of pumps used in water supply? Discuss how you select the capacity of pump? 10

### **Section-C**

5. Describe self purification process of a stream. Briefly explain all the waste water treatment methods, which employ this principle. (10)

6. Define the term BioD and ColD. Describe the importance of BioD test in waste water treatment process. (3+5) = 10

7. What do you understand by the biological treatment of sewage? What is the principle of biological treatment? (5 + 5) = 10

## Section-D

- Section B**

Q. What are the impacts of the greenhouse effects on the urban environment? What are its causes? Discuss the mitigation measures of such impacts. (2+2+6) = 10

Q. What is the underlying principle of farming user's committee in rural water supply systems? Describe the risks of operating W/S system by user's committee? 10

Q. Design a septic tank for a family of 10 users having a per capita sewage contribution of 80 liters/day. Assume that sludge is cleaned from the septic tank once in 3 years. Also design soak pits for the disposal of septic tank effluent. Take soil infiltration rate as 120 liters/m<sup>2</sup>/day. (5+5) = 10

The End



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**लोक सेवा आयोग**  
**नेपाल इन्जिनियरिङ सेवा, मिभिल समूह, हाइवे उपराम्भ**  
**एजपत्राक्षित तुलीय श्रेणी (प्राधिपिक) पदको प्रतियोगितात्मक लिखित परीक्षा**

२०७३/११/२५

समय:— ३ घण्टा

पूँजी:— १००

पत्र:— द्वितीय

विषय:— हाइवेसम्बन्धी

निम्न प्रश्नहरूको उत्तर Section अनुसार छाउछाउँ उत्तरपुरितकामा लेख्नुपर्नेछ, अन्यथा उत्तरपुरितका रद्द हुनेछ।

**Section-A**

1. a) List and explain the various factors influencing the alignment of roads in Nepal. 6  
b) Describe the methods of classifying roads. 4
2. a) Describe the detail reasons for providing of curves with their types in highway constructions. 5  
b) Calculate the maximum permissible speed on a horizontal curve of radius 125 meter of a highway designed for a speed 65 KM/hr, if the super elevation is 7%. 5
3. a) Explain the significance of hill roads in the national development of Nepal. 5  
b) Describe in detail about the main steps of the design of surface drain. 5

**Section-B**

4. Explain the term traffic volume. Briefly discuss the various traffic studies. (5 + 5) = 10
5. Discuss briefly importance of highway maintenance. What are the various types of failures in flexible pavement of hill road of Nepal? Explain the causes. (5+5) = 10
6. a) Discuss the essential difference between flexible and rigid pavement with the consideration of load distribution over the sub grade. 4

**Section-C**

7. a) List and describe the factors in influencing the location of a bridge. 5  
b) What are different types of bridges appropriate and available in Nepal? 5
8. Derive the expression of active and passive pressure of a clay whose shear strength may be expressed by Coulomb's law. 10

$$S = C + (\sigma_n - i) \tan \phi$$

**Section-D**

9. a) Discuss the situation, where pile foundation is preferred than other type of foundations ? 4  
b) Differentiate the function of driven pile (Precast) from that of bored pile (cast-in-situ) and also describe their advantage/disadvantages. 6
10. A vertical retaining wall 10 meter height supports a cohesionless fill with  $\gamma = 1.8 \text{ g/cm}^3$ . The upper surface of the fill rises from the crest of the wall at an angle of  $20^\circ$  with the horizontal. Assume  $\phi = 30^\circ$  and  $\delta = 20^\circ$ , determine the total active earth pressure. 10

The End



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प्राचीक : ३००

Family : *Leptotrichidae* (Gasterosteidae)

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1. Differentiate between stiffness matrix and flexibility matrix methods. Draw influence line diagram for shear force at B).  $4 + 6 = 10$   
*Figure*

2. What are concrete admixture? Briefly explain about use of prestress concrete.  $4 + 6 = 10$

3. What are the main components of analysis of item rates. Give an example of analysis of an item rate. 10

4. What is Quality Assurance plan? Explain it with an example? 10

Section 33

5. a) What do you mean by ... What are the steps of the Environmental... of building in Nepal? 5  
 b) What are the provisions relating to the construction of building as per Local Government Act  
 5  
 c) ... and regulation 2056 ?

6. ... defect in temper Design circular ... column ... meter long for axial load for ... N. 2 + 8 = 10

7. In recent Gorkha earthquake, significant number of temples and monumental structures were severely damaged in Kathmandu Valley. As a structural engineer of LSMC, what would be your recommendation to improve the seismic strength of such temples and structures to prevent damages in future earthquake? Shall modern construction materials permitted to be used in repair and restoration of such structures? 7 + 3 = 10

8. a) For a saturated soil, given  $w = 40\%$  and  $G_{soil} = 2.71$ , determine the saturated and dry unit weight of soil.  
 b) A 5 m high retaining wall having angle of repose 30 degree,  $C = 5\text{KN/m}^2$  and unit weight 17.5  
 $\text{kN/m}^3$ . Determine the active pressure on the wall a) Before the formation of crack b) After the  
 formation of crack. 10

9. Calculate the ultimate moment capacity, By Limit State Method, of a rectangular concrete beam  
 section of 399 mm width and 559 mm effective depth, with 3 numbers of 20 mm diameter Fe 415  
 bars as tension reinforcement. Take M 20 as the grade of the concrete and 25 mm clear cover.  
 10

10. Illustrate with sketches about the various classes of live loads used in design of vehicular bridge.  
 What other loads in addition to live load is essential to be considered while designing superstructure  
 of Reinforced Concrete Bridges? 8 + 2 = 10

The End



## Kathmandu Metro-Politan City

Civil Engineer : 2071/11/08



Answer all the questions

[10 × 10=100]

### Section - A

1. The radius of a horizontal curve is 80 m. The design speed is 45 kmph and design coefficient of lateral friction is 0.15. Determine the super elevation required if full lateral friction is assumed to develop and coefficient of friction needed if no super elevation is provided.
2. How is implementation of bolsters help to stabilize the unstable slope? Describe with appropriate sketches the steps of implementation of bolster for purpose of stabilization of degraded slopes.
3. State the basic differences between the suspension and suspended bridges. How are the roads transferred into foundation in a typical suspension bridge? Show all important elements of suspension bridge in a neat sketch.
- 4.

### Section - B

5. In the treatment of  $25 \times 10^3$  m/day of water, the amount of chlorine used is 15 Kg/day. The residual chlorine after 10 min contact is 0.2 mg/ltr. Determine chlorine demand in mg/ltr.
6. Describe the various steps involved in "Detailed Feasibility Study and Engineering Design" of an urban water supply system and explain importance of each steps.
7. Describe the various types of sewerage system. A sewerage system having a radius of 70 cm is laid with a gradient of 1 in 500. What will be the velocity of flow and discharge through the sewer when running one half full? Assume N=0.012 in Manning's formula.

### Section - C

8. Describe the various renewable and non-renewable source of energy used for Nepal.
9. Describe the factors, which should be considered in the construction of Hill irrigation canals. Also list the environmental aspects of hill irrigation.

### Section - D

10. Discuss about roles of construction materials and technology on strength of buildings. What are the local and modern construction materials and their implications in cost of buildings in Nepal?
11. Discuss the present state of urban environment of Kathmandu valley. How do you think this situation can be made better?



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लोक सेवा जायोग  
नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, स्पानिटरी उपसमूह  
राजपत्राङ्कित तृतीय भेणी (प्राविधिक) प्रतियोगितात्मक निखित परीक्षा  
२०७२ ११/१४

समय :- ३ घण्टा

पत्र: द्वितीय पत्र

पूर्णाङ्क :- १००

विषय : स्पानिटरी सम्बन्धी

निम्न प्रश्नहरूको उत्तर छण्ड (Section) अनुसार छुआछुई उत्तरपुस्तिकामा लेल्यपनेछ अत्यथा उत्तरपुस्तिका रद्द हुनेछ।

### Section-A

- Discuss the merits and demerits of river water source (Melamchi Khola) and ground water source (in Kathmandu valley) for water supply scheme in Kathmandu. 10
- Describe the different types of living organisms found in natural water. Explain their effects on water quality.  $(6 + 4) = 10$

### Section-B

- Write short notes on:  $(4 + 2.5) = 10$ 
  - Infiltration gallery
  - OMIT
  - Hydrolic grade line
  - Break pressure tank
- Differentiate between slow sand filter and rapid sand filter. Write down their merits and demerits.  $(4 + 6) = 10$

### Section-C

- What do you understand by self purification of streams? Explain the various factors affecting self purification.  $(4 + 6) = 10$
- Classify the sedimentation tanks. How can we increase the settling efficiency of particles? 10
- What are preliminary and secondary treatment process? Describe the working principle of activated sludge processes. 10

### Section-D

- Why are community mobilization and participation important? Define special role of women participation in WSP. 10
- a) What are different onsite sanitation systems practiced in Nepal? 4  
b) Describe the principles and benefits of Ecological Sanitation. 6
- Elaborate pour-flush toilet and VIP toilet with neat Sketches.  $(5 + 5) = 10$



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समय :- ३ घण्टा

पत्र :- द्वितीय पत्र

पूर्णाङ्क :- १००

विषय : हाइवेराम्बन्धी

निम्न प्रत्येक खण्ड (Section) को प्रश्नहरूको उत्तर छाप्नुपर्याप्त उत्तरप्रसिद्धिकामा लेख्नु गर्नेछ अन्यथा उत्तरप्रसिद्धिका रद्द हुनेछ।

### Section – A

- What are the various systems of classification of roads? Briefly outline the classification based on location and function. Discuss in details the provision made in Nepal Road Standards (NRS) with respect to functional classification of Road Network of Nepal. (3 + 2 + 5)
- Calculate the minimum sight distance required to avoid a head on collision of two cars approaching from the opposite direction, if both cars are at a speed of 90 km/hr. Assume a total perception and break reaction time of 2.5 seconds, coefficient of friction of 0.7 and a brake efficiency of fifty percent. 10
- Explain: Why design, construction and maintenance of hill road of Nepal need special consideration ? What are the special points to be considered in the alignment of hill road? (5 + 5) = 10

### Section – B

- Define Traffic Engineering. A vehicle of weight 2 tonnes skids through a distance equal to 50 meter before colliding with another parked vehicle of weight 1 tonne. After collision, both the vehicles skid through a distance equal to 15 meters before stopping. If the weight of both vehicles are equal, compute the initial speed of moving vehicle. Take coefficient of friction as 0.4. 10
- a) Define tack coat, seal coat and priming. 3  
b) Discuss the types of seal coat and process of their application. 4  
c) State in brief the classification of road maintenance activities in Nepal. 3
- Describe the construction procedure for single or double bituminous surface dressing widely used in Nepal by DoR. What do you know about cutback bitumen and bitumen emulsion? (6 + 4) = 10

### Section – C

- a) What are the main types of foundation used for bridges? 5  
b) Describe in detail about underpinning with an aim to stabilize foundations of a bridge? 5
- a) Suggest methods for improving bearing capacity of weak soil for making foundation. 5  
b) Describe in brief the field methods of exploration of soil strata and survey for the construction of foundation of a bridge. 5

### Section – D

- Mention about Rankine's earth pressure theory 10
- Explain the well sinking operation during bridge construction. How to avoid 'tilt and shifts' and measures to correct "tilt and shifts"? 10

*The End*



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Section-A

1. What do you mean by aquifers? What are its types? Derive an expression for obtaining discharge from a confined aquifer.
2. What are the principal sources of water pollution? Explain their effects on the quality of water.

Section-B

3. A village of Nepal with design year population of 500 has water demand of 65 liters/capita/day. The demand is to be met by a continuous system of supply from a spring source with a safe yield of 0.3 IPs. The consumption pattern of the village is as follows:  
Is a balancing reservoir necessary? Calculate the its capacity if necessary.

Time(hr)	Consumption pattern (%)
5:00-7:00	25
7:00-12:00	35
12:00-17:00	15
17:00-19:00	20
19:00-5:00	5

4. Sketch typical layout of water supply schemes in  
i) Hilly zone of Nepal.                           ii) Tarai zone of Nepal  
Discuss in what cases you design following structures in water supply projects  
i) Sedimentary tank                               ii) Filtration unit                           iii) Aeration chamber

Section-C

5. Calculate the 5 day's 20°C BOD of a sewage of sample whose 5 days 30oBOD is 110 mg/ltr.  
Assume the deoxygenation constant at 20°C,  $K_{20} = 0.1$
6. What are the different types of sewerage system? What are their advantage and disadvantage?
7. Suggest which one is best suited for Kathmandu valley and why?  
Also list the logic behind your selection of the particular type of treatment.

Section-D

8. What do you understand by community participation in water and sanitation sector? Why user's committee is necessary in implementation, operation and maintenance of water supply and sanitation projects. What are the critical features of community management in water and sanitation sector?
9. a) Discuss in briefly how global warming is affecting water supply sector in nepal and what will be the proper remedial measures?  
b) As per environment protection Act/Environment protection Regulation of Government of Nepal discuss in the brief the criteria for conducting EIE/EIA for development projects.
10. Design a septic tank for a hotel of any school where 125 residential students are regularly living that school. Also design the soil absorption system for the disposal of the septic tank effluent the percolation rate as 20 minutes per cm.





## Highway- 2071/11/9

### Section-A

1. Explain the advantage and disadvantage of road transport. Explain the factors that affects the factors that affect the selection of highway alignment.
2. The radius of a horizontal highway curve is 450 m, super-elevation provided is 1 in 15 and the width of pavements curve is 7.5. if the rate of change of centrifugal acceleration is not to exceed  $0.45 \text{ m/sec}^2$  and the rate of introduction of supper elevation (about the inner edge of pavement) is not to exceed 1:150, design the length of horizontal transition curve for a design speed of 100km.ph.
3. Explain in detail the special points that must be considered in the alignment of hill road of Nepal.

### Section-B

4. a) What are the general requirements of traffic control devices?  
b) What are traffic islands? c) Briefly describe various types of traffics islands.
5. a) What is EAL or ESA? Describe its significance in design of road pavements.  
b) What are the various methods of design of road pavements?
6. Why road maintenance is necessary? Describe different type of road maintenance. Explain the maintenance of the bituminous pavement.

### Section-C

7. a)what are the different types of landslide ? Describe them briefly.  
b) How can slope stability improved by plants?
8. a) What is tunneling? Briefly describe ventilation and lighting requirements for tunnels.  
b) if you are given an opportunity to select an idle bridge site, what do you consider? And, why?

### Section-D

9. Define active and passive earth pressure in soil. Derive an expression for active and passive earth pressure by Rankine's method.
10. a ) Describe briefly the design procedure of a mat foundation using conventional method of design.  
b) How do you determine linear water way for a bridge to be constructed in an alluvial plain? What will happen if the linear water way is not sufficient?



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लोक सेवा आयोग  
नेपाल विद्युत प्राधिकरण, प्राविधिक, सिभिल, पौची, सुपरमाइजर पदको खुला प्रतियोगितालाक  
लिखित परीक्षा  
२०८०।०१।२३

पत्र : द्वितीय  
समय : २ घण्टा ३० मिनेट

मूल्य : ५००

विषय : सेवा रामबन्धी

प्रत्येक Section को उत्तर छुटाएँ उत्तरपुस्तिकागम लेख्नुपर्नेछ । अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

**Section : "A"**

50 Marks

1. How do you balance the traverse using compass rule? Discuss. 5
2. What are the main ingredients of cement? Describe their functions briefly. 1+4=5
3. What are shear force and bending moment diagram? Explain relationship between them. 2+3=5
4. List out major differences between pipe flow and open channel flow. 5
5. Enumerate at least three situations in which a doubly reinforced beam becomes necessary. 5
6. Explain the factors that affect the strength of concrete. 5
7. Define soil compaction. Why is it necessary? Explain briefly the various methods of compaction of soil with neat sketches. 1+2+7=10
8. Describe balanced section, under reinforced section and over reinforced section with diagram. Write moment of resistance formula for under reinforced and over reinforced sections and also explain the features of both sections. 4+2+4=10

**Section : "B"**

50 Marks

9. Explain the purpose of analysis of rates for civil works in hydropower project. 5
10. How can causalities and damages to the manpower at hydropower construction sites be minimized? Explain briefly. 5
11. What factors do you consider while selecting a route for an overhead power transmission line? 5
12. Describe the possible types of power losses in distribution system in Nepal. 5
13. Answer the followings: (4+2)+4=10
  - a) Describe one method of determination of the safe bearing capacity of soil at site. What will be the difference in the applicability of the result if the soil is (i) clay (ii) sand?
  - b) What type of foundation would you propose for a multi-storied office building in black cotton soil? Discuss with your opinion.
14. Prepare the followings: 5+5=10
  - a) Quantities of material required of 12mm thick (1:6) cement plastering per 10m<sup>2</sup> in brick wall.
  - b) Rate analysis of plain cement concrete (1:3:4). Assume suitable rates of materials and labor.
15. What is an elementary profile of a gravity dam? Discuss various types of spillways with neat sketches and justifications of applications and use. 3+7=10

- The End -

लोक सेवा आयोग  
नेपाल विद्युत प्राधिकरण, प्राविधिक, सिमिल, सिमिल, सातौ, इन्जिनियर पदको खुला प्रतियोगितालम्क  
लिखित परीक्षा  
२०८०/०९/१६

पद : इंजीनियर  
संख्या : ३ पट्टा

पूर्णाङ्ग : १००

विषय : सेवा सम्बन्धी  
प्रत्येक Section को उत्तर पूछाएँ उत्तरात्मक रूपमा देखिए।

50 Marks

Section : "A"

1. What is the flow duration curve and its significance? What factors influence the flow duration curve and how do you calculate the flow duration curve?  $3+3+4=10$
2. What are the considerations to be made in selecting the type of dam and the site where it is to be constructed?  $5+5=10$
3. How does the specific speed differ from the real speed of a turbine? Write the basic working principles of a Francis turbine used in a hydropower plant.  $5+5=10$
4. Answer the followings:  
 a) Describe merits and demerits of run-off river and storage hydropower schemes in the context of Nepal.  
 b) Describe why storage hydropower plants are less popular in Nepal.
5. What is the concept of integrated water resource management? Why is it needed in the context of Nepal? Explain.  $5+5=10$

Section : "B"

50 Marks

6. Describe total station equipments. What are the uses and importance of total station equipments?  $4+6=10$
7. What are the factors which affect the physical properties of steel? Briefly discuss the various forms of steel available in the market for construction purposes?  $3+7=10$
8. Describe a concept of pre-stressed reinforced concrete structures. What are the merits and demerits of pre-stressed reinforced concrete structures?  $5+5=10$
9. Describe the purpose, types and importance of specification.  $2+4+4=10$
10. Write short notes on:  
 a) Drawing Scales  
 b) Orthographic Projection

$\frac{1}{50}$   $\rightarrow$  General Sp.  
 $\frac{1}{500}$   $\rightarrow$  detailed  
 $\frac{1}{5000}$   $\rightarrow$  Standard

-The End-

Structural Steel  $\rightarrow$  Length of 100' & 200'  
100' Steel  
Mild Steel  
Tensile Steel  
.....

## एपेक्स एजुकेशनल एकेडमी

द्वारा संचालित, नेपाल इंजिनियरिङ सेवा सिमिल समूह अन्तर्गतका जनरल, हाइवे, हाइड्रोपावर, इरिगेशन, स्थानिटरी र एयरपोर्ट उपसमूहहरुको राजपत्रावित तृतीय श्रेणीका, सिमिल इन्जिनियर पदहरुको खुला प्रतियोगितात्मक लिखित साप्ताहिक नमूना परीक्षा-२०७९

समय: ३ घण्टा  
पत्र: द्वितीय

२०७९-०९-३०

पूर्णाङ्क : १००  
उत्तीर्णाङ्क : ४०

### Section A

- What are the different types of failure in bolted connection? Write design specification for bolted connection. [10]
- Comment on the statement. "The net bearing capacity of a shallow foundation in clayey soil is unaffected by the position of water table, whereas in sandy soil, it is very much affected". What is the basis for classifying foundations into shallow and deep? Briefly explain the situations in which different types of shallow foundations are adopted. [3+7]
- Liquid limit (LL) and plastic limit (PL) tests were carried out on a soil sample as per Indian Standard method. The values were 60% and 36% respectively for LL and PL. What is the type of soil based on the above test data as per Indian Standard Classification System? Justify your answer. [10]

### Section B

- Calculate the bed width for an irrigation channel to carry a discharge of 5 cumec. Side slopes of the channel are 1/2 horizontal to 1 vertical. Assume critical velocity ratio as 0.8. Take first trial depth of flow as 1m. The channel has a bed slope of 0. 2 m per kilometer. Using Kutter's equation  $V = C\sqrt{RS}$ , check the depth. The value of C for the given conditions is computed as 30. V is the mean velocity of flow in m/sec, and R is the hydraulic mean radius in meter. State the factors on which the value of C will depend. [10]
- What is hydrologic cycle? Write the equation that is used to quantity water going through various individual paths of the cycle. Give a neat diagram too. [5]
- Explain the various cause of failure of earthen embankment dam? What do you understand by "Middle third rule" in the design of concrete gravity dam? Describe with necessary derivation? [10]

### Section C

- Explain camber. What are the objectives of camber? Discuss the factors on which amount of camber to be provided depends. Specify the NRS recommended ranges of camber for different types of pavement surface. [ 10]
- What are the problems in construction of highway embankments over weak foundation soils? How are the various problems dealt with? [10]
- What are the functions of a hanger? What are its two types? [5]

### Section D

- Explain various steps involved in the treatment of sewage resulting in clean water.[10]
- What do you mean by per capita demand? How it is estimated. List in detail the physical, biological and social-economic baseline information that have to be collected during EIA study of water supply project? [5+5]

# एपेक्स एजुकेशनल एकेडमी

द्वारा संचालित

नेपाल इन्जिनियरिङ सेवा सिभिल समूह अन्तर्गतका जनरल, हाइवे, हाइड्रोपावर, इरिगेशन, स्यानिटरी र एयरपोर्ट उपसमूहहरुको  
राजपत्राङ्कित तृतीय श्रेणीका, सिभिल इन्जिनियर पदहरुको खुला प्रतियोगितात्मक लिखित साप्ताहिक नमूना परीक्षा-२०७९

समय: ३ घण्टा  
पत्र: द्वितीय

२०७९-०९-२३

पूँजी: १००  
उत्तराङ्क: ४०

1. Describe the design steps of singly reinforced beam and doubly reinforced beam? [10]
2. Described the factor affecting permeability of soil. What is specification of compaction, how compaction quality is achieved by contractor in road? [10]
3. What are the assumption of coulomb's wedge theory? Describe coulomb's wedge theory of earth pressure. [10]

## Section B

1. What is water hammer? how can you design fore way? Describe flow duration curve. [10]
2. What is flood frequency analysis? List out the different types of method for it. [5]
3. Define energy dissipating structure? explain different types of such structure used in our country. [10]

## Section C

1. Calculate the safe overtaking sight distance for a design speed of 96 kmph. Assume all other data suitability. [10]
2. Differentiate flexible and rigid pavement. What are different methods of designing flexible and rigid pavement. Explain design procedure of CBR. [10]
3. What are the factors that govern the dimensions of runway? and how is the runway orientation decided? [5]

## Section D

1. Explain the construction and design of septic tank with a neat sketch. [10]
2. List out typical component of water supply system. Describe biological test conducted as per Nepal standard of drinking water supply. [10]

२४४

# एपेक्स एजुकेशनल ऐकेडमी

द्वारा संचालित

नेपाल इंजिनियरिङ सेवा सिभिल समूह अन्तर्गतका जनरल, हाइवे, हाइड्रोपावर, इरिगेशन, स्यानिटरी र एयरपोर्ट उपसमूहहरुको  
राजपत्राहित तृतीय श्रेणीका, सिभिल इंजिनियर पदहरुको खुला प्रतियोगितात्मक लिखित साप्ताहिक नमूना परीक्षा-२०७९

लक्ष्य: ३ घण्टा

पक्ष: द्वितीय

२०७९-०९-२३

पूर्णाङ्क : १००

उत्तीर्णाङ्क : ४०

## Section A

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२३६

# एपेक्स एजुकेशनल एकेडमी

द्वारा संचालित

नेपाल इंजिनियरिङ सेवा सिमिल समूह अन्तर्गतका जनरल, हाइवे, हाइड्रोपावर, इरिगेशन, स्यानिटरी र एयरपोर्ट उपसमूहहरूको राजपत्राद्वित तृतीय श्रेणीका,  
सिमिल इंजिनियर पदहरूको खुला प्रतियोगितात्मक लिखित साप्ताहिक नमूना परीक्षा-२०७९

समय: ३ घण्टा

पत्र: द्वितीय

२०७९-०९-१६

पूर्णाङ्क : १००

उत्तीर्णाङ्क : ४०

## Section A

- Describe various types of bridge. How would you select appropriate types of bridge? Define span, Length, Economic span of a bridge. [10]
- Explain and discuss the use of Liquidity Index, Activity number, Thixotropy and Sensitivity of soil. [10]
- The soil profile in a particular site consists of 7 m thick sandy layer overlain by a layer of clay. The water table is at 1 m below the ground surface. Above the water table, the sand is saturated with capillary moisture. The dry unit weight of sand is 17 kN/m<sup>3</sup> and its saturated unit weight is 20 kN/m<sup>3</sup>. Plot the total stress, neutral stress and effective stress with depth up to a depth of 7m. [10]

## Section B

- The following are the ordinates for a flood Hydrograph resulting from an Isolated storm of 6 hours duration:

Time(hr)	ordinates of Flood	0	12	24	36	48	60	72	84	96
Hydrograph (cumec)		5	15	40	80	60	50	25	15	5

- Determine the ordinates of 1 cm-6 hr unit hydrograph if the catchment area is 450 sq. km [10]
- Derive Bernoulli's equation? Give example of Bernoulli's application. [5]
  - Name the method of applying water in irrigation fields. How do you define small irrigation project in context of Nepal.  
Write down in the brief its scope in Nepal?[10]

## Section C

- What are element of cross section of highway? Show typical cross section. What are the effect of centrifugal force acting on vehicle moving on horizontal curve? How these effect are calculated. [ 10]
- What are general requirement of traffic control devices? Define island and describe various types of island? [10]
- What are objective of designing aircraft pavements? What is mean by runway saturations? [5]

## Section D

- Differentiate between community participation and community management. Explain how village maintenance worker is trained in community water supply system.[10]
- What do you understand by BOD? What are its significance? Describe the procedure for its determination for a polluted water such as water from Bagmati river?[10]

# एपेक्स एजुकेशनल ऐकेडमी

द्वारा संचालित

नेपाल इंजिनियरिङ सेवा सिभिल समूह अन्तर्गतका जनरल, हाइवे, हाइड्रोपावर, इरिगेशन, स्यानिटरी र एयरपोर्ट उपसमूहहरुको  
राजपत्राङ्कित तृतीय श्रेणीका, सिभिल इंजिनियर पदहरुको खुला प्रतियोगितात्मक लिखित साप्ताहिक नमूना परीक्षा-२०७९

समय: ३ घण्टा

पत्र: द्वितीय

२०७९-०९-०९

पूर्णाङ्क : १००  
उत्तीर्णाङ्क : ४०

## Section A

1. Describe the method of distribution of live loads on longitudinal beams. [10]
2. What are the assumptions that are generally made in analysis of the stability of slope? Discuss the method for checking the stability of infinite slope in cohesive soil. [10]
3. What are the assumptions of terzaghi's bearing capacity theory? Discuss the effect of water table on the bearing capacity of the soil. [10]

## Section B

1. Discuss the current hydropower situation of Nepal and Hydropower potential of Nepal? What are the different types of hydropower projects? [10]
2. What are differences between laminar and turbulent flow in pipe? [5]
3. What is meant by "regime channel"? Why an artificial earthen channel constructed in an alluvium soil has to designed in regime condition? [10]

## Section C

1. Design the rate of super elevation for a horizontal highway curve of radius 500 m and speed 100 kmph. [10]
2. What are the various types of parking facilities designed for traffic needs? Compare kerb parking with off street parking? [10]
3. Write short notes on a) turning radius of taxiway b) holding apron. [5]

## Section D

1. Describe the theory of settlement? Explain different types of sedimentation tank with figure [10]
2. What do you mean by sewage sickness? Describe the method of sludge disposal. [10]



# एपेक्स एजुकेशनल एकेडेमी

द्वारा संचालित

नेपाल इंजिनियरिङ सेवा सिभिल समूह अन्तर्गतका जनरल, हाइवे, हाइड्रोपावर, इरिगेशन, स्यानिटरी र एयरपोर्ट उपसमूहहरुको राजपत्राद्वारा तृतीय श्रेणीका,  
सिभिल इंजिनियर पदहरुको खुला प्रतियोगितात्मक लिखित साप्ताहिक नमूना परीक्षा-२०७९

समय: ३ घण्टा

पत्र: द्वितीय

२०७९-०९-०२

पूर्णाङ्क: १००  
उत्तीर्णाङ्क: ४०

## Section A

- What are the mandatory rule of thumb in RCC building without masonry infill? [10]
- What is unconfined compression test? Sketch the apparatus used. What is advantage over a triaxial test? [10]
- Describe the capillarity –permeability test? Why the values of the coefficient of permeability obtained from this test differ from those obtained from other tests? [10]

## Section B

- Define earthen dam. What are different types of earthen dam? Explain method of earthen embankment construction? [10]
- What is rating curve? What are the uses of rating curve? [5]
- Discuss the main cause of failure of weirs founded on pervious foundation. Also discuss the important theories which have been put forward for designing such weirs to avoid there failure due to above causes. [10]

## Section C

- Why are overtaking zones provided? What is the basis of deciding its length? Draw a neat sketch and show the signs to be installed and their position? [10]
- What do you understand by frost action? Discuss the effects and factors on which the intensity of frost action depends. Suggest measures to prevent or reduce the adverse effects [10]
- Explain why the top of a hill is more suitable site for locating an airport than a valley site. [5]

## Section D

- Design a septic tank for 15 users. The sewage flow is 80 lpcd. Assume sludge is cleaned from septic tank in once in a 2 years. If percolation rate is 25 min/cm design a drain field to dispose effluent. If soak pit is used what will be the dimension of soak pit. Assume ground water table is below 4.5m [10]
- Explain the concept of environmental impact assessment in development projects. [10]

५४४

# एपेक्स एजुकेशनल ऐकेडमी

द्वारा संचालित

नेपाल इन्जिनियरिङ सेवा सिभिल समूह अन्तर्गतका जनरल, हाइवे, हाइड्रोपावर, इरिगेशन, स्यानिटरी र एयरपोर्ट उपसमूहहरुको राजपत्राङ्कित तृतीय श्रेणीका,  
सिभिल इन्जिनियर पदहरुको खुला प्रतियोगितात्मक लिखित साप्ताहिक नमूना परीक्षा-२०७९

समय: ३ घण्टा

पत्र: द्वितीय

२०७९-०८-२४

पूर्णाङ्क: १००

उत्तीर्णाङ्क: ४०

## Section A

- What are characteristics of ideal bridge? What are general requirements of design of box culvert? [10]
- What is soil suction? How is it measured? What are the factors that affect the soil suctions? [10]
- What are different types of settlements which can occurs in foundation? How are these estimated? [10]

## Section B

- What do you mean by specific energy? What are the features of specific energy diagram? [5]
- Define pressure and non-pressure tunnel. What are the design aspect of tunneling? Write down the different method of tunneling? [10]
- A watercourse is designed to irrigate an area of 960 ha of rice. The transplantation of rice takes 15 days and during this the total depth of water required is 40 cm. Find the duty of irrigation water on the field if there is an effective rainfall of 12 cm. Also, find the duty and discharge at the head of the watercourse assuming losses of water as 20% in the watercourse. [10]

## Section C

- Discuss the effect of shape of camber. Enumerate the factors governing the width of carriage way. State NRS-2070 Specifications for bus lays bys? [ 10 ]
- Explain the procedure of orienting the runway. [5]
- Discuss the importance of hill road drainage. With aid of neat sketches ,show the surface drainage system for effective drainage and disposal of water.[10]

## Section D

- What do you mean by reservoir? List out the types of reservoir. What are the advantage and disadvantage of different types of distribution system? [10]
- Explain government rules and regulations and procedures for EIA? [10]

२५६

# एपेक्स एजुकेशनल ऐकेडमी

द्वारा संचालित

नेपाल इन्जिनियरिङ सेवा सिभिल समूह अन्तर्गतका जनरल, हाइवे, हाइड्रोपावर, इरिगेशन, स्यानिटरी र एयरपोर्ट उपसमूहहरुको राजपत्राङ्कित तृतीय श्रेणीका,  
सिभिल इन्जिनियर पदहरुको खुला प्रतियोगितात्मक लिखित साप्ताहिक नमूना परीक्षा-२०७९

समय: ३ घण्टा

पत्र: द्वितीय

२०७९-०८-२४

पूर्णाङ्क : १००

उत्तीर्णाङ्क : ४०

## Section A

- What are characteristics of ideal bridge? What are general requirements of design of box culvert? [10]
- What is soil suction? How is it measured? What are the factors that affect the soil suctions? [10]
- What are different types of settlements which can occurs in foundation? How are these estimated? [10]

## Section B

- What do you mean by specific energy? What are the features of specific energy diagram? [5]
- Define pressure and non-pressure tunnel. What are the design aspect of tunneling? Write down the different method of tunneling? [10]
- A watercourse is designed to irrigate an area of 960 ha of rice. The transplantation of rice takes 15 days and during this the total depth of water required is 40 cm. Find the duty of irrigation water on the field if there is an effective rainfall of 12 cm. Also, find the duty and discharge at the head of the watercourse assuming losses of water as 20% in the watercourse. [10]

## Section C

- Discuss the effect of shape of camber. Enumerate the factors governing the width of carriage way. State NRS-2070 Specifications for bus lays bys? [ 10 ]
- Explain the procedure of orienting the runway. [5]
- Discuss the importance of hill road drainage. With aid of neat sketches ,show the surface drainage system for effective drainage and disposal of water.[10]

## Section D

- What do you mean by reservoir? List out the types of reservoir. What are the advantage and disadvantage of different types of distribution system? [10]
- Explain government rules and regulations and procedures for EIA? [10]

४४४

## एपेक्स एजुकेशनल एकेडेमी

दाग बचावन

नेपाल ट्राईब्यूनियरिंग मेता विभिन्न विषय अलगोंका जबरन, ताइवे, टाइपोग्राफ, ट्रायोग्राफ, स्प्राइटरी र एकार्गोट उपकरणहरूको गतिपथाका गतिगत विविध खेतीका, **सिंभवन** इन्वेन्योर प्रदर्शनको बाटा प्राप्तिप्राप्ति वाचाकीक नमूना परीक्षा-२०७९.

ममष: १ पट्टा ५० मिनेट

पद: द्वितीय

२०७९-०३-२६

पृष्ठा : ४४

उत्तीर्णाङ्क : १८

### Section C

1. Draw neat sketch of a typical aerodrome, showing taxiways, apron and holding bays? Describe in brief function of these components. [ 5 ]
2. Explain post card methods of O and D Surveys? Discuss the advantage and disadvantage of this method. Enumerate the various traffic controls needed at intersection. [ 10 ]
3. A national Highway passing through rolling terrain in heavy rain fall area has a horizontal curve of radius 500 m. Design the length of transition curve assuming suitable data.[ 10 ]

### Section D

1. Why high content of iron and manganese is objectionable in drinking water? Describe the various methods of iron and manganese removal from water. [ 10 ]
2. With the help of neat sketch, explain the activated sludge process. What are its advantage and disadvantages? [ 10 ]

तात्पुरता

## एपेक्स एजुकेशनल एकेडेमी

दाग बचावन

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ममष: १ पट्टा ५० मिनेट

पद: द्वितीय

२०७९-०३-२६

पृष्ठा : ४४

उत्तीर्णाङ्क : १८

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सिभिल इंजिनियर पदहरुको खुला प्रतियोगितात्मक लिखित साप्ताहिक नमूना परीक्षा-२०७९

समय: ३ घण्टा

पत्र: द्वितीय

२०७९-०८-१७

पूर्णाङ्क : १००

उत्तीर्णाङ्क : ४०

## Section A

- Explain the essential requirements of steel and concrete for pre stressed concrete. What are the advantages of pre stressed concrete over reinforced concrete? [10]
- The values of liquid limit, plastic limit and shrinkage limit of a soil were reported as below:

$$W_L = 60\%; \quad W_p = 30\%; \quad W_s = 20\%$$

If a sample of this soil at liquid limit has a volume of 40 cc and its volume measured at shrinkage limit was 23.5 cc, determine the specific gravity of the solids. What is its shrinkage ratio and volumetric shrinkage? [10]

- When is the dilatancy correction not applied to the N-value in a standard penetration test and why? For which geotechnical/ application does the static cone penetration test have distinct advantage over any other field tests? Why? [5+5]

## Section B

- What are the function of surge tank? What are the advantage of differential surge tanks over simple and restricted orifice surge tanks? [5+5]
- Give the characteristics of different formations in which groundwater exists. [5]
- Define, duty, delta and base period of a crop and express the relationship connecting them. Explain briefly with the help of a diagram the concept of 'frequency of irrigation'. [10]

## Section C

- The length of a runway under standard condition is 1620 m. The airport is to be provided at elevation of 270 m above the mean sea level. The airport reference temperature is  $32.90^{\circ}\text{C}$ . If the runway is to be constructed with an effective gradient of 0.2 %, determine the corrected runway length? [ 10 ]
- Briefly explain the objectives of traffic planning and administration. [5]
- Specify the material required for WBM roads. What are the uses and limitation of this types of road. [10]

## Section D

- Explain the phenomenon of "negative head" In filter. Why it should be avoided? How it is avoided in filter operation. Draw the sketch of SSF and RSF. [10]
- Describe the principle and process of anaerobic stabilization of sludge. What are the factors that influence the sludge digestion [10]

# ४५वाँ एजुकेशनल ऐकेडमी

द्वारा संचालित

नेपाल इंजिनियरिङ सेवा सिभिल समूह अन्तर्गतका जनरल, हाइवे, हाइड्रोपावर, इरिगेशन, स्यानिटरी र एयरपोर्ट उपसमूहहरुको राजपत्राद्वित तृतीय श्रेणीका,  
सिभिल इंजिनियर पदहरुको खुला प्रतियोगितात्मक लिखित साप्ताहिक नमूना परीक्षा-२०७९

समय: ३ घण्टा

पत्र: द्वितीय

२०७९-०८-१०

पूर्णाङ्क : १००

उत्तीर्णाङ्क : ४०

## Section A

- State the assumption made for designing riveted connection in steel. What is the principle of designing of a splice in a steel member subjected to an axial tensile force? Explain with help of neat sketch. [10]
- Work out theoretical maximum dry density for a soil sample having specific gravity of 2.7 and OMC 16%. Also explain the difference in OMC values in case of proctor test and modified proctor test for cohesive soil and granular soils .[10]
- If you are in-charge of sub soil exploration of important structures, how would you decide the depth of exploration? List out the factors you will consider and their importance. [10]

## Section B

- What are the assumptions and limitation of unit hydrograph? List out the use of unit hydrograph [10]
- Explain different types of methods of irrigation with their suitability, advantages, disadvantages. [10]
- What is the difference between the economical section and hydraulic efficient channel section? [5]

## Section C

- Explain requirement of airport pavement? [ 5 ]
- Explain different vehicular characteristics which affect the road design. [10]
- What are the various requirement of an ideal highway alignment of road? Explain with sketch the various factors controlling the alignment of road.[10]

## Section D

- For a town with a population of 2 lakhs, a water supply scheme is to be designed. The maximum daily demand may be assumed as 200 liter/capita/day. The storage reservoir is situated 5 km away from the town Assuming loss of head from source to town as 10 m and coefficient of friction for the pipe material as 0.012, recommend the size of supply main 50% of daily demand has to be pumped in 8 hours for the proposed scheme. [10]
- What are different zones of pollution in river stream? Explain the importance of re-oxygenation, deoxygenation and oxygen deficit in problems of stream sanitation. [10]

## लोक सेवा आयोग

राजपत्रांकित तृतीय श्रेणी, इञ्जनियरिङ सेवा, सिभिल समूह, एयरपोर्ट उपसमूहको  
प्रतियोगितात्मक लिखित परीक्षा

२०७२।३।१६

समय:- ३ घण्टा ।

पूर्णाङ्क:- १००

पत्र:- द्वितीय ।

विषय:- सेवा सम्बन्धी ।

निम्न प्रश्नहरूको उत्तर लेखनहोस (Answer the following questions)

प्रत्येक संज्ञ (Section) को उत्तर बोला बोलै उत्तरप्रस्तिकामा लेख्नुपर्नेछ । अन्यथा उत्तरप्रस्तिका रह हुनेछ ।

### Section-A

1. Describe the factors affecting traffic growth for airport planning purpose. Explain the difference between 'top down' and 'bottom up' approaches of forecasting principles. Describe the application of wind-rose diagram. (7+3)=10
2. Discuss in brief the environmental impacts commonly associated with airport projects. 10
3. Discuss in brief, the various features of aerodrome that should be evaluated for developing alternate system plan? What are the major evaluation criteria for selecting the best among the alternate system plan? (6+4)=10

### Section-B

4. Briefly explain the declared distances of a runway. Also explain the procedure to determine the actual runway length required at a particular site. 10
5. Write down the function of taxiway & apron and its types. Explain in detail about the three segment method of determining rapid exit taxiway's location. 10

### Section-C

6. Write down the typical layout of airport drainage system. Explain the sub-surface drainage methods. 10
7. Briefly describe the ACN-PCN method of classifying bearing strength of a pavement. 10
8. What are the general points to be observed in grading of an airport? Point out what informations are obtained from mass haul diagram. 10

### Section-D

9. What is an Aerodrome Certification? Explain the aerodrome certification procedures as per ICAO. 10
10. Briefly highlight the concept of Safety management System (SMS) and also mention the four components of the framework of Safety Management System of State Safety Programme (SSP) with a brief description of elements of any one of the components. 10

**Civil Aviation Authority of Nepal  
Technical Service, Civil Engineering Group,  
Level 7 (Senior Officer)  
Open Competition , 2070**

Time : 2 hour

**Short Questions (4 × 5)= 20**

1. What are an Aerodrome Certification and its process in Nepal? Explain briefly.
2. What do you mean by the terms Clearway and Runway End Safety Area (RESA)? Clearly define.
3. What are the major steps in site evaluation and selection process for the STOL Airport as per ICAO norms?
4. What is the Project Management? Describe various phases of project management?

**Long Questions (2 × 20)= 40**

1. If Civil Aviation Authority Nepal (CAAN) appointed you as pavement engineer for the design of Runway of Pokhara Regional International Airport in which CAAN instructed you to consider the design aircraft as B757 or equivalent. How can you start your assigned works and what type of tests are you recommended for the design the pavement? Describe briefly.
2. At least eight factors should be considered when analyzing potential sites for helicopters. What are these factors? Please brief any two.

विषय : प्रशासन तथा व्यवस्थापन

**छोटो छोटो उत्तर दिने प्रश्नहरु (४×५=२०)**

१. संगठनात्मक व्यवहार भनेको के हो ? संगठनात्मक व्यवहारका नविनतम मान्यताहरु के के हुन ?
२. सार्वजनिक प्रशासन भनेको के हो ? सार्वजनिक प्रशासनका विशेषताहरुमध्ये कुनै पाँचबटा विशेषताहरु उल्लेख गर्नुहोस ।
३. व्यवस्थापन बृद्धना प्रणालीको अर्थ स्पष्ट गर्दै संगठनमा यसको कुनै तीनबटा महत्वहरु लेख्नुहोस ।
४. नेपालको चालू त्रिवर्णीय योजनाका प्राथमिकताहरु के के हुन ?

**समस्यामूलक प्रश्न (१×२०=२०)**

१. नेपाल सरकारको राष्ट्रिय हवाई नीतिमा हवाई यातायात पूर्वाधार विकाशका सम्बन्धमा भएका व्यवस्थाहरु उल्लेख गर्दै ती व्यवस्थाको कार्यान्वयन पक्षमा देखिएका समस्याहरु र त्यसका समाधानका विषयमा धन्दा गर्नुहोस ।

UNIT

**Civil Aviation Authority of Nepal  
Technical Service Civil Engineering Group  
Senior Officer, Level - 7  
Open Competition Exam 2072**

Time : 3 hours  
Full Marks : 100

विषय: सेवा सम्बन्धी

**Long Questions (2×20=40)**

1. If Civil Aviation Authority of Nepal (CAAN) appointed you as pavement engineer for review the design report of Runway of XYZ International Airport submitted by International consultant which is going construction immediately after finalization of design. CAAN instructed you to check the runway which should be operated by B747 aircraft or equivalent (ICAO Code 4E). How can you start your assigned works and what types of element are you considered? Describe briefly.
2. Make a survey team for detailed survey of the STOL airfield proposed in remote area of the country and make a list that is necessary to carry out the said survey. Also explain the problems that may encounter in carrying out the detailed survey in remote area.

**Short Questions (6×10=60)**

1. Describe briefly about runway, taxiway and apron with necessary sketch.
2. Describe the basic steps to be considered for the airport site selection?
3. What is the project Management? Describe various phases of project management.
4. What are the factors most strongly influence required runway length?
5. What are the facilities that may be required for the planning and design of the terminal building?
6. What is pavement evaluation and why is it necessary. Explain briefly the pavement evaluation process. Describe the meaning of PCN 80/R/B/W/T.

लोक सेवा आयोग  
नेपाल नागरिक उद्ययन प्राधिकरण, प्राविधिक सेवा, सिभिल इन्जिनियरिङ समूह, वरिष्ठ सहायक  
पाँचौ तह (५) को खुला प्रतियोगितात्मक लिखित परीक्षा  
२०७३।५।१८  
विषय : सेवा सम्बन्धी

समय : १घण्टा

All Questions are compulsory

पूर्णाङ्क : ५०

### Long question (1x10=10)

- Find out the actual length of the runway required if the aeroplane reference field length for landing and take-off under standard atmospheric conditions at sea level are 2000 m and 1700 m respectively. The elevation of the airport site is 200 m above sea level and the airport reference temperature is 22°C. Effective runway gradient may be taken as 0.5%?

### Short questions (4x5=20)

- What are the factors determining the rate of the particular item of work?
- List the activities of tender process in sequential order.
- What are the advantages of RCC structure?
- Define aerodrome. Mention the importance of Aerodrome Reference Point (ARP) for the identification of Obstacles within or around the aerodrome

लोक सेवा आयोग  
नेपाल नागरिक उद्योग प्राधिकरण, प्राविधिक, सिभिल इंजिनियरिङ, साती, घरिष्ठ अधिकृत पदको  
आन्तरिक तथा खुला प्रतियोगितात्मक लिखित परीक्षा

२०७९।०४।२६

पत्र : द्वितीय  
संख्या : ३ घण्टा

पृष्ठांतः ५००

विषय: सेवा सम्बन्धी

प्रत्येक Section को उत्तर छुटाएँ हुन्ने उत्तरपुरितकामा लेख्नुपर्नेछ । अन्यथा उत्तरपुरितका रद्द हुनेछ ।

**Section "A"**

**50 Marks**

1. Briefly describe the effect of frost on pavement thickness and their consideration in pavement design. 5
2. What are the objectives and functions of International Civil Aviation Organization (ICAO)? 5
3. Describe briefly all the components of Aerodrome with neat sketches. 7+3=10
4. Design a rectangular beam for flexure to resist a bending moment equal to 100 KNm using M<sub>25</sub> mix and Fe 415 grade steel. 10
5. The length of Runway under standard condition is 1550m. The elevation of Airport is 72m. Its reference temperature is 32°c. If the Runway is to be constructed with an effective gradient of 0.20%, determine the corrected runway length. 10
6. What is Terminal area? What facilities are provided in Terminal buildings? Briefly describe the 'Centralized' and 'Decentralized' concept of Terminal building planning. 3+3+4=10

**Section "B"**

**50 Marks**

7. How does the subsurface drainage work? Explain with sketches. 5
8. Briefly describe Atterberg limits in consistency of soil. 5
9. Rain water drainage is a very important task during design of Air field pavements. Write down the steps for the design of longitudinal drain of a parallel taxiway to drain off the surface water. 10
10. What is pavement evaluation? Explain in brief the various tests to verify the structural strength of pavement. 10
11. Explain the construction process of Asphalt concrete airport pavement specifying the necessary materials, their quality control tests and necessary equipments. 3+2+3+2=10
12. Differentiate between Plane surveying and Geodetic surveying? What are the uses of Tacheometric Surveying? Introduce Total Station and its advantages in Survey. 3+3+4=10

- The End -

# लोक सेवा आयोग

नेपाल इंजिनियरिङ सेवा, सिमिल समूह, जनरल/हाइवे/हाइड्रोपावर/स्यानिटरी/इरिगेशन उपसमूह,  
राजपत्राङ्कित तृतीय श्रेणी (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा  
**206=192/95**

समय :- 3 घण्टा

पत्र :- Second

विषय:- Technical Subject

पूर्णाङ्क :- 900

लेखका प्रश्नहरुको उत्तर Section अनुसार बेगलाबेगले उत्तरप्रसिद्धिकामा लेख्नुपर्नेछ अन्यथा उत्तरप्रसिद्धिका रद्द हुनेछ।

## Section -A

1. List out the rule of thumbs for RCC Buildings without masonry infill. (5)
2. Write short notes on factors affecting coefficient of permeability. (5)
3. Illustrate the types of slope failures with suitable sketches. A vertical cut is made in a clay deposit.  
[consider:  $c=30 \text{ KN/m}^2$ ,  $\phi = 0$ ,  $r = 16 \text{ KN/m}^3$   $F_c = 1.00$  and  $S_n = 0.261$ ] (5+5=10)
4. List out and discuss the loads, forces and stresses which are to be considered in the designing of a road bridge. (10)

## Section-B

5. List out the points to consider for locating a reservoir site of a hydropower project. (5)
6. What are common formulae used to calculate velocity of fluid in open channel? Explain manning's formulae with its uses. (10)
7. What are the common criteria for selecting the type of dam for a particular site condition? What are the advantages and disadvantages of selecting rock-filled dam? (10)

## Section-C

8. What are the different causes of traffic accidents? Explain various measures that may be adopted to prevent accidents. (2+3=5)
9. What are the types of bituminous pavements? Explain briefly. Also mention the tests that are carried out in laboratory and field for the quality control of bitumen mixes. (10)
10. Describe briefly the history of civil aviation in Nepal. Point out the factors considering in the selection of airport location. List out the factors considered in the design of runways. (3+3+4=10)

## Section-D

11. A water supply company has to purify the turbid water for a city whose daily demand is 200000 liters. Design a suitable plain sedimentation tank fitted with mechanical sludge remover. Assume the velocity of flow in the tank as 20 cm/minute and the detention time as 10 hours. (10)
12. Describe the sewage treatment process with a typical lay out of sewage treatment plant. (5+5=10)

~ The End ~

## प्रदेश लोक सेवा आयोग

बागमती प्रदेश

इन्जिनियरिङ सेवा, सिभित समूह, बिल्ड एण्ड आर्किटेक्ट उपसमूह, थैटौ रह, इन्जिनियर पदको  
खुला प्रतियोगितात्मक सिखित परीक्षा-२०७९

परीक्षा मिति: २०७९/०२/१८

पत्र: द्वितीय

विषय: बिल्ड एण्ड आर्किटेक्ट सम्बन्धी

पूर्णाङ्क: १००

समय: ३ घण्टा

निम्न प्रश्नहरूको उत्तर Section अनुसार छुटाउँदै उत्तरप्रस्तिकामा लेख्नु पर्नेछ अन्यथा उत्तरप्रस्तिका रद्द हुनेछ।

### Section - A

[30 Marks]

1. Why do we need building code? Describe the hierarchy of building code as per Nepal National Building code. [3+7]

2. Explain about effective development control system in construction field in the case of municipalities of Nepal. [10]

3. List out the different steps involved in RCC non-load bearing building construction with brief introduction. [5+5]

### Section - B

4:30

[20 Marks]

4. Define the shallow foundation. What are its types? Describe about the mat foundation. [2+2+6]

5. Explain about requirements and main features for Earthquake Resistance as per NBC 105, 2077 seismic design of building in Nepal. [10]

### Section - C

[30 Marks]

6. Describe the types of land development that is commonly applied in Nepal. Under what legislation the land development schemes can be implemented? Describe briefly salient feature of a land pooling scheme. [4+2+4]

7. Describe about planning legislation, in the context of federal structure of Nepal. [10]

8. Are conservation of heritage sites being done in a proper way in Nepal? What are the various issues that are required to be addressed for conservation of our heritage sites? Describe in brief. [4+6]

### Section - D

[20 Marks]

9. State briefly the main problems in standardization of government building in Nepal. [10]

10. Define ethics. What are the ethics of architects in professional practices? [10]

## प्रदेश स्तरक सेवा आयोग

### चागामी प्रदेश

हिमालयीय रेखा, शिखिन चन्दू, सैटी तर, हिमालय चरको सुला प्रशिक्षणितात्मक लिखित परीक्षा-२०७५  
परीक्षा नम्बर: १३३/१२/३१

मूल्य: १००

समय: ३ घण्टा

प्रभाग: इंजीनियरिंग

विषय: अन्तर्राष्ट्रीय हिमालयीय चरको सुला प्रशिक्षणितात्मक लिखित परीक्षा

मिति विवरण: अन्तर्राष्ट्रीय हिमालयीय चरको सुला प्रशिक्षणितात्मक लिखित परीक्षा

### Section - A [30 Marks]

- Explain the field construction procedures of earthen roads and use of equipments. [10]
- What are the different types of structures suitable in hill roads of Nepal? Briefly describe some of the special features of hill road drainage system. [5+5]
- What are the various types of surveys and investigations required in connection with a road project? Describe briefly. [10]

### Section - B [20 Marks]

- What are the requirements of wholesome water? Briefly introduce different types of water treatments practiced in Nepal. [3+7]
- (a) Briefly explain the design principles for the Septic Tank. [5]  
(b) What do you mean by sanitary land fill site (SLFS) and how it is different from traditional method of solid waste disposal? [5]

### Section - C [30 Marks]

- Describe the status of hydropower and other energy uses in Nepal. Do you think solar energy can be a good alternative in Nepal to overcome the problem of energy crisis? Justify your opinion. [5+5]
- Describe discharge measurement methods of rivers or streams. How to apply the measured data in canal design? [10]
- What do you mean by River Training? Briefly introduce the types of river training appropriate to hilly and plain areas of Bagmati Province? [10]

### Section - D [20 Marks]

- What are the different factors to be considered for the design and construction of an energy efficient, safe, economical and earthquake resistant building in Nepal? [10]
- Why do development plans fail in Nepal to achieve the desired targets? What are the advantages of participatory planning process? [5+5]

भिन्न प्रश्नहरूको उत्तर Section अनुसार उत्तराङ्क उत्तरप्रतिकामा सेक्युरिटी अन्तर्था उत्तरप्रतिका राख बनेछ ।

### Section - A

1. Describe advantages and disadvantages of prefabricated building construction. Discuss why this construction technique is not widely used in Nepal? 5+5=10
2. Draw plan, elevation and section of a typical wooden window in wooden frame showing jamb details, MS grill, Glass and Jali shutters. 10
3. Describe in brief the significance of National Building Code in Nepal. What is the status of NBC implementation? What are the challenges in NBC implementation? 4+3+3=10

### Section - B

4. Describe briefly the failure mechanism of masonry structures on earthquake with sketches. 5
5. What are the basic requirements for earthquake resistant building construction? Explain in detail with the help of sketches. 5
6. Mention the design steps for RC column with bi-axial bending and axial compression. Write the steps for eccentric RC footing design. 5+5=10

### Section - C

7. What is a physical and Environmental Development Plan of a municipality? How is it drafted and finalized? 10
8. Mention the major features of building byelaws prevalent in Kathmandu Metropolitan City. How these features are incorporated in the periodic plans and planning legislations? 5+5=10
9. The Constitution of Nepal has provisioned the right to appropriate housing to every citizen. To address this fundamental right of people, government has initiated different housing programs. Describe in brief about these housing programs and their effectiveness to address the need of people. 10

### Section - D

10. Describe the principle of architectural design of buildings for hot climates. Explain with the help of sketches. 5
11. Mention the major features of Shikhara, Stupa and Pagoda styles of ancient Nepalese architecture. 5
12. What are the characteristic of Patan Darbar Square? Sketch in details. 5+5=10

««The End»»

लोक सेवा आयोग  
नेपाल टेलिकम (नेपाल दूरसंचार कम्पनी लिमिटेड), प्राविधिक, टेलिकम इन्जिनियरिङ, सिगिल, साती,  
इन्जिनियर पदको खुला प्रतियोगितात्त्वक लिखित परीक्षा  
२०७९/०३/०९

पत्र : हिन्दी  
समय : ३ पट्टा

पूर्णाङ्क : १००

**विषय : Technical Subject**

प्रत्येक Section को उत्तर धुडाएँ हुए उत्तरपुरितकामा लेख्नुपर्नेछ । अन्यथा उत्तरपुरितका रद्द हुनेछ ।

Subjective

Time : 2 hrs 30 min  
70 Marks

Section : "B"

35 Marks

1. What do you mean by Procurement Plan? What information should it give? 2+3=5
2. Describe in detail how mix design is carried out in order to meet the strength requirement of concrete. 10
3. Explain about different types of cost estimates prepared for infrastructure projects highlighting their merits and demerits. 10
4. What are the uses of contour map? Outline the major characteristic of contour. 3+7=10

Section : "C"

*(Signature)*  $\frac{f_{ck}}{f_{ck} + f_{ctk}} = \frac{6}{6+10} = \frac{6}{16} = 0.375$  35 Marks

5. What are the factors that you need to consider when selecting a site for a building from stability considerations? 5
6. Introduce occupational health and safety (OHS) in construction projects. How is it incorporated in bid documents and construction contracts? Discuss in line with OHS policy of Nepal. 4+6=10
7. Define Laminar and Turbulent flow. What is Hydraulic jump and why is it important? Explain. 5+5=10
8. Answer the following:
  - a) What are the different methods of producing electricity? Explain with examples.
  - b) What types of information technology do you use as an engineer on a regular basis? How might your life be different if this technology were not available to you?

- The End -

# लोक सेवा आयोग

स्थानीय तह अन्तर्गत प्रायिकिकतार्फ इंजिनियरिङ सेवा, सिभिल रामूह, ढैठी तह,  
इंजिनियर पदको प्रतियोगितात्मक लिखित परीक्षा

समय :- ३ घण्टा

पत्र: द्वितीय

पूर्णाङ्क :- १००

विषय:- जनरल इंजिनियरिङ

मिन प्रश्नहरूको उत्तर संष्ठ (Section) अनुसार छुटाएँ उत्तरप्रसिद्धिका लेख्नुपर्नाह. अन्यथा उत्तरप्रसिद्धि राख्नुपर्नाह। परीक्षामा योगाइल वा यस्तै सञ्चार उपकरणहरू प्रयोग गर्न पाइने छन्।

## खण्ड (Section) - A

1. Mention different types of road pavements. Explain how you would design an appropriate pavement for a hill road. 3+7=10
2. Write down some methods of Bio-engineering practices along hill side of Nepal. 10
3. (a) What are the various criteria that should be fulfilled while designing sub-surface drains? 5  
(b) What are the various tests that are used for assessing the suitability of road aggregates? 5

## खण्ड (Section) - B

4. (a) What are the different types of distribution service reservoir used in water supply project in Nepal? How its storage capacity is determined? 5  
(b) What is self-clearing velocity and non-scouring velocity in a sewer? Why sewers are not designed to full flow? 5
5. Write down short note on:
  - (a) Sources of solid waste 3
  - (b) Design features of septic tank 3
  - (c) Various types of joints used in pipes 4

## खण्ड (Section) - C

6. Why river training is necessary? Describe the various methods of river control. 10
7. (a) What is berm? Why is it provided in the canal? 2+2=4  
(b) Draw sketches to show the section of canal.
  - i) Partly in cutting and partly in filling 2
  - ii) Wholly in cutting 2
  - iii) Wholly in filling 2
8. (a) What types of alternative energy systems are feasible in Nepal? 5  
(b) Explain with the help of a neat sketch the hydrological cycle. 5

## खण्ड (Section) - D

9. Differentiate Environmental Impact Assessment (EIA) with Initial Environmental Examination (IEE). 10
10. Explain with neat sketches the method of setting out of a school building in a municipal area. 10

« The End »

समय:- ३ घण्टा

लोक सेवा आयोग  
नेपाल इंजिनियरिङ सेवा, सिमिल समूह, विभिन्न उपसमूह  
राजपत्राङ्गित तृतीय श्रेणी प्राविधिक पदको प्रतियोगितात्मक लिखित परीक्षा  
२०६६।१२।।

पत्रः- द्वितीय

विषयः- Technical Subject

पूर्णाङ्कः- १००

तलका प्रश्नहरूको उत्तर Section अनुसार छुटाएँ उत्तरप्रसिकामा लेख्नुपर्नेछ, अन्यथा उत्तरप्रसिका र छुटेछ।

### Section - A

1. Briefly describe the requirements of earthquake resistant building construction.
2. Define soil compaction and consolidation. What are the factors affecting soil compaction?
3. What are different factors to be considered in designing foundation for buildings? Explain about different types of foundations used in commercial buildings?
4. a) What do you mean by economical span length of a bridge? Explain.  
b) What types of loads are required to be considered while designing a road bridge?  
c) Describe the classification of steelbridge with their suitability to use considering the span length.

3

### Section - B

$$S = \frac{1340}{\text{[Value]}}$$

- (\*) 5. The slope of channel in alluvium is  $S=1$  in 5000; Lacey's silt factor = 0.9 and channel side slope = 0.5:1; find the channel section and maximum discharge which can be allowed to flow in it.
6. Describe different methods of surface irrigation with their advantages and disadvantages.
7. What is simulation technique and how is it different from optimization? List two typical examples where simulation is used in water resources studies.

5

10

10

### Section - C

8. Draw a neat sketch of a typical aerodrome, showing taxiways, aprons and holding bays. Describe in brief the functions of these components.
9. What are the controlling factors for the selection of road alignment and write note on alignment selection criteria for a hill road.
10. List the various geometric elements to be considered in highway design. Calculate the stopping sight distances on a graded highway for a design speed of 90 kmph. Reaction time is 2 secs and value of  $\mu$  is 0.35.
- a) When grade is 3% descending.  
b) When grade is 3% ascending  
c) When road is flat i.e. zero grade

5

10

4+6=10

### Section - D

11. Explain the concept of environmental impact assessment in development projects.
12. What is activated sludge processes? Why BOD treatment for domestic waste water is important to discharge in natural water ways.

10

10

««The End»»

6. What are the different characteristics of the sewage? Differentiate between aerobic and anaerobic decomposition.
7. Write down the different methods applied for the sewage sampling with their suitability.
8. Write short notes on:
  - a. Biochemical Oxidation Demand (BOD)
  - b. Chemical Oxidation Demand (COD)
  - c. Dissolved Oxygen (DO)
  - d. pH-value
  - e. Chlorine Demand
9. If  $BOD_5$  at  $20^\circ C$  is  $110 \text{ mg/l}$ , find  $BOD(11)$  at  $28^\circ C$ .
10. Write short notes on:
  - a. Self-cleaning velocity
  - b. Flow velocity
  - c. Design period
  - d. Estimation of quantity of sanitary sewage
- 11.

14. What are the different types of layout of water supply system? For the city like Kathmandu valley, which type of water supply system is best among all? Explain your answer with suitable reasons.
15. Write short notes on methods that are used for the analysis of pipe networks.
16. Explain the operation of water supply system. Describe how maintenance works plays key role for the optimization of water supply system.
17. Differentiate between maintenance and rehabilitation.

## Sanitary Engineering

1. What are the different methods of system of sanitation? Explain them on brief with their pros and cons. Also mention the best system of sanitation in the context of Nepal.
2. Describe the sewage treatment process with a typical layout of sewage treatment plant. (Psc 2078)
3. What is activated sludge processes? Why BOD treatment for domestic waste water is important to discharge in natural water ways.(Psc 2076)
4. What are the major factors affecting the quantity of sanitary sewage? Write down the characteristics of the sanitary sewage.
5. How will you determine the quantity of sanitary sewage and storm water?

Number of cows= 150

Number of buffaloes= 500

Number of chickens= 7500

Annual population growth rate= 0.8%

Number of day scholar in school= 450

number of boarders in school= 90

Number of health post= 2

Number of tea stall= 5

Now calculate the total water demand for the design year.

8. What is intake? What are the main factors that affect the site selection of intake works? Also differentiate between river reservoir and spring intake.
9. What are the various types of hand pumps including suction hand pump, submersible hand pumps?
10. A water supply company has to purify the turbid water for a city whose daily demand is 200000 liters. Design a suitable plain sedimentation tank fitted with mechanical sludge remover. Assume the velocity of flow in the tank as 20 cm/minute and the detention time as 10 hours. (Psc 2078)
11. What are the different steps involved on water treatment process? Explain on brief.
12. What are the different types of reservoirs used on water supply scheme? Also describe about the methods that are used for the estimation of capacity of reservoir.
13. What are the different types of water supply system? Explain them with their suitability. And also differentiate between pumping system and gravity system.

# **PUBLIC HEALTH PROBABLE QUESTIONS**

## **Water Supply**

1. Write short notes on potable, contaminated and wholesome water. Also describe the typical components of water supply scheme on Nepal.
2. What are the different sources of water? Also mention the factors affecting selection of water sources for water supply system.
3. What do you mean by recharge of ground water? How can ground water recovery technique may fulfill the current scarcity of water in valleys like Kathmandu to some extent. Explain this.
4. What are the types of sources of water pollution? Write down the effects of pollution of surface and sub surface water.
5. Describe about the different types of water demands? Write down the different methods of population forecasting.
6. Describe about the variation in demand of water. Also enlist the factors affecting the demand of water.
7. During survey, data collected for a water supply project in the village of Chapakot Municipality, Syangja district is as follows:

Survey year= 2017

Base period= 3 years

Design period= 20 years

Population= 1000

9. Write down the factors affecting the selection of site for any type of airports. Also write down the survey to be conducted for site selection.
10. What do you mean by Regional airports and how is it different in comparison to other type of airports?
11. What are the types of airport planning? Also describe Airport Master Plan.
12. For which purpose the terminal buildings are built across airports? What do you mean by declared distances? Describe LDA, TORA, ASDA, TODA, Stop way and Clear way.
13. List down the objectives and functions of airport drainage system. How will you estimate the total run off of the airport site?

## AIRPORT PROBABLE QUESTIONS

1. Draw a neat sketch of a typical aerodrome, showing taxiways, aprons and holding bays. Describe in brief the functions of these components. (2076 Psc)
2. Describe briefly the history of civil aviation in Nepal, Point out the factors considering in the selection of airport location. List out the factors considered in the design of runways. (2078 Psc)
3. What do you mean by STOL PORT. Mention its importance in the context of countries like Nepal
4. What are the steps to fix out the center line of a runway? Also write short notes on wind rose diagram.
5. Describe about the different types of airports. Write down the role of International Civil Aviation Organization (ICAO).
6. What can Civil Aviation Authority of Nepal(CAAN) can do for the improvement of air transportation in Nepal? Also mention its functions.
7. Calculate the runway length for the following given conditions.  
Runway length required for sea level=2000 m  
Aerodrome Elevation=1900 m  
Aerodrome Reference Temperature= $38^{\circ}\text{C}$   
Runway slope=1.5%
8. Write short notes on:
  - a. Airside development
  - b. Landside development
  - c. Airport planning
  - d. Land use planning
  - e. Aircraft Classification Number(ACN)
  - f. Pavement Classification Number(PCN)
  - g. Heliport
  - h. Aerodrome reference code
  - i. Apron parking methods

# प्रदेश लोक सेवा आयोग

प्रदेश नं. १, विराटनगर

स्थानीय साकारी सेवा अन्तर्गत प्रायिपिक तर्फे इन्जिनियरिंग सेवा, सिमिल समूह, अधिकृतस्तर छैटों तह, इन्जिनियर पदको प्रथम  
चरणको खुला प्रतियोगितात्मक लिखित परीक्षा

समय:- ३ पट्टा

पत्र:- द्वितीय

मिति:- २०७९/०४/१४

पूर्णाङ्क:- १००

विषय:- जनरल सिमिल इन्जिनियरिंग सम्बन्धी।

सबै प्रश्नहरू अनिवार्य छन्। प्रश्नहरूको उत्तर खण्ड (Section) अनुसार बोलाबोले उत्तरप्रस्तावना लेख्नुपर्नेछ अन्यथा उत्तरप्रस्तावका रद्द हुनेछ।

## (Section A) - 30 Marks

- What is bio-engineering? What are the best practices in bio-engineering along the hill road side? What are the advantages of bio-engineering along the road? [2+5+3]
- Discuss the factors deciding the alignment of roads. Explain the special consideration for alignment of hill roads. [5+5]
- Discuss the differences between flexible and rigid pavements. Explain different factors affecting design of flexible pavement. [4+6]

## (Section B) - 20 Marks

- With the help of flow diagram, describe water treatment process in brief. [2+8]
- A village has designed year demand of water 25000 liters/day. The demand is met by a continuous system of supply from a spring source with measured of 0.45 Lps. The water consumption pattern of village is as follows.

Time (Hours)	5-7	7-12	12-17	17-19	19-5
Consumptions %	25	35	15	25	0

- Determine the balancing reservoir capacity for the village by using above data.
- Describe the problems and solution associated with Gravity and pumping gravity combined water supply systems in Nepal? [6+4]

## (Section C) - 30 Marks

- Discuss the major energy sources at present. Which is the most useful alternative source of energy for Nepal? Explain in brief. [7+3]
- What is the difference between agency managed and farmer managed irrigation system? Write down the procedure for design of an irrigation canal having parameters: Discharge, Maximum permissible velocity, Manning's coefficient, Bed slope and the side slope. [3+7]
- Describe about the water induced disaster problems and suggestion for its minimization. Explain on the River training classification, types, necessity and objectives. [10]

## (Section D) - 20 Marks

- The role of local construction materials is very important in construction works. How the quality standards in terms of production and application can be improved to meet the engineering and architectural requirements? Explain in brief. [10]
- What is social mobilization? What are the steps of social mobilization in local infrastructure development and utilization? Why it is important for local infrastructure development and utilization? [2+4+4]

<<The End>>

# एपेक्स एजुकेशनल ऐकेडमी

द्वारा संचालित

नेपाल इंजिनियरिङ सेवा सिभिल समूह अन्तर्गतका जनरल, हाइवे, हाइड्रोपावर, इरिगेशन, स्यानिटरी र एयरपोर्ट उपसमूहहरुको राजपत्राङ्गित तृतीय श्रेणीका, सिभिल इंजिनियर पदहरुको खुला प्रतियोगितात्मक साप्ताहिक नमूना परीक्षा-२०७९

समय: १ घण्टा ३० मिनेट

पत्र: द्वितीय

पूर्णाङ्क : ५०

उत्तीर्णाङ्क : २०

२०७९-०४-१४

## Section A

1. Describe with sketches the different types of failure of bolted connection. Write down the design step of bolted connection. [10]
2. Define permeability of soil. What are the factors affecting permeability of soil? How do you determine coefficient of permeability in field? [10]
3. What is the difference between pile and well foundation in bridges? Explain with sketches. [10]

## Section B

1. What are the factors should consider for selection of type of dam? Describe different types of dam. [10]
2. What are limitations of Kennedy's theory? Design an irrigation channel to carry 50 cumec of discharge. The channel is to be laid at a slope of 1 in 4000. The critical velocity ratio for the soil is 1.1. use kutter's rugosity coefficient as 0.023. [10]

१२३४

# लोक सेवा आयोग

नेपाल इंजिनियरिङ सेवा, सिर्पिल समूह, जनरल/हाइवे/हाइड्रोपावर/स्थानिटरी/इरिगेशन उपसमूह,  
राजपत्राङ्कित तृतीय श्रेणी (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा  
**206-192/95**

समय :- ३ घण्टा

पत्र :- Second

विषय:- Technical Subject

पूर्णाङ्क :- १००

उत्तरका प्रश्नहरुको उत्तर Section अनुसार बोलावेएले उत्तरप्रसिद्धिकामा लेख्नुपर्नेछ अन्यथा उत्तरप्रसिद्धिका रद्द हुनेछ ।

## Section -A

1. List out the rule of thumbs for RCC Buildings without masonry infill. (5)
2. Write short notes on factors affecting coefficient of permeability. (5)
3. Illustrate the types of slope failures with suitable sketches. A vertical cut is made in a clay deposit.  
[consider:  $c=30 \text{ KN/m}^2$ ,  $\phi = 0$ ,  $r = 16 \text{ KN/m}^3$   $F_c = 1.00$  and  $S_n = 0.261$ ] (5+5=10)
4. List out and discuss the loads, forces and stresses which are to be considered in the designing of a road bridge. (10)

## Section-B

5. List out the points to consider for locating a reservoir site of a hydropower project. (5)
6. What are common formulae used to calculate velocity of fluid in open channel? Explain manning's formulae with its uses. (10)
7. What are the common criteria for selecting the type of dam for a particular site condition? What are the advantages and disadvantages of selecting rock-filled dam? (10)

## Section-C

8. What are the different causes of traffic accidents? Explain various measures that may be adopted to prevent accidents. (2+3=5)
9. What are the types of bituminous pavements? Explain briefly. Also mention the tests that are carried out in laboratory and field for the quality control of bitumen mixes. (10)
10. Describe briefly the history of civil aviation in Nepal. Point out the factors considering in the selection of airport location. List out the factors considered in the design of runways. (3+3+4=10)

## Section-D

11. A water supply company has to purify the turbid water for a city whose daily demand is 200000 liters. Design a suitable plain sedimentation tank fitted with mechanical sludge remover. Assume the velocity of flow in the tank as 20 cm/minute and the detention time as 10 hours. (10)
12. Describe the sewage treatment process with a typical lay out of sewage treatment plant. (5+5=10)

~ The End ~