45+84.6 ⇒ 129.6

प्रदेश लोक सेवा आयोग

बागमती प्रदेश

इन्जिनियरिङ सेवा, सिभिल समूह, बिल्डिङ एण्ड आर्किटेक्ट उपसमूह, छैटौं तह, इन्जिनियर पदको खुला प्रतियोगितात्मक लिखित परीक्षा-२०७९

परीक्षा मितिः २०७९/०२/१८

पत्रः द्वितीय
विषयः बिल्डिङ एण्ड आर्किटेक्ट सम्बन्धी

पूर्णाङ्कः १००
समयः ३ घण्टा

निम्न प्रश्नहरूको उत्तर Section अनुसार छुट्टाछुट्टै उत्तरपुस्तिकामा लेख्नु पर्नेछ अन्यथा उत्तरपुस्तिका 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 [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]

•समाप्त•

प्रदेश लोक सेवा आयोग

बागमती प्रदेश

इन्जिनियरिङ सेवा, सिभिल समूह, छैटौं तह, इन्जिनियर पदको खुला प्रतियोगितात्मक लिखित परीक्षा-२०७९

परीक्षा मितिः २०७९/०२/२१

पत्रः द्वितीय — पूर्णाङ्कः १००

विषयः जनरल इन्जिनियरिङ सम्बन्धी — समयः ३ घण्टा

*निम्न प्रश्नहरूको उत्तर **Section** अनुसार छुट्टाछुट्टै उत्तरपुस्तिकामा लेख्नु पर्नेछ, अन्यथा उत्तरपुस्तिका रद्द हुनेछ।*

Section - A [30 Marks]

1. What is the road classification as per Nepal Road standard? Describe different types of flexible pavement. [5+5]
2. Explain the various problems associated with construction of Hill roads in Nepal. What are the special considerations in Hill roads design? Write in brief. [5+5]
3. What is trail bridge? Describe in brief about types of trail bridge. Sketch the different components of a trail bridge. [1+4+5]

Section - B [20 Marks]

4. What are the current issues and problems to implement rural water supply and sanitation program in Nepal? How would you address the issues and problems as an Engineer? [10]
5. What factors affects the pressure in pipe lines of distribution system? What are the factors that need to be considered while designing such pipe lines? [10]

Section - C [30 Marks]

6. The Hydropower development in Nepal is taking its positive pace. How do you see the use and development of alternative energy technologies for sustainable future? Explain. [10]
7. What may be the objectives of river training? Brief the different methods of river trainings. [10]
8. Design an irrigation channel in alluvial soil according to Lacey's silt theory for the following data: [10]
   Full supply discharge=15cumecs
   Lacey's silt factor=1
   Side slopes of channel=1/2H:1V
   Assume the other parameters suitably if necessary

Section - D [20 Marks]

9. What are the present status and practices of building construction in Nepal? [10]
10. Write short notes on;
    a) Guiding principles of environmental impact assessment [5]
    b) Importance of social mobilization in local infrastructure development in Nepal. [5]

समाप्त

लोक सेवा आयोग

नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, बिल्डिङ एन्ड आर्किटेक्ट उपसमूह

राजपत्राकित तृतीय श्रेणी (प्राविधिक) को प्रतियोगितात्मक लिखित परीक्षा

२०७२/११/१७

समयः- ३ घण्टा

पत्र :- द्वितीय पत्र

पूर्णांक :- १००

विषय :- बिल्डिङ एन्ड आर्किटेक्टसम्बन्धी ।

निम्न प्रश्नहरूको उत्तर खण्ड (Section) अनुसार छुट्टाछुट्टै उत्तरपुस्तिकामा लेख्नुपर्नेछ अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

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 beat ... 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

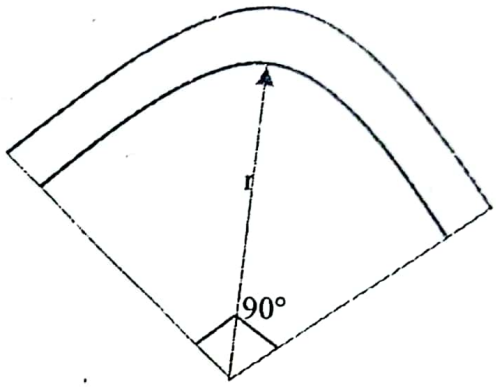
6. What are the different kinds of urban housing? Describe in detail about "site and services" (5)
7. What do you understand b y the term "land use planning" ? Write the importance of land planning in urban development which agencies are involving for urban development Nepal? (3 + 4)
8. What is a periodic 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 architectur... landmarks in Nepal.

The End

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

1. What are the main characteristics of hollow concrete blocks? Can this be used for load bearning walls of a building? What are the advantages and disadvantage?
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 90^0 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 Nepalgunj. Write step by step procedure you follow to design such a building.

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 m^3/sec.with silt factor=1.Assume trapezoidal section having side slopes ½:1
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"

लोक सेवा आयोग

नेपाल इन्जिनियरिङ् सेवा, सिभिल समूह, जनरल उपसमूह

राजपत्राङ्कित तृतीय श्रेणी (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा

२०७२/११/२२

समय- ३ घण्टा | पत्र :- द्वितीय पत्र | पूर्णाङ्क :- ३००

विषय :- जनरलसम्बन्धी

निम्न प्रश्नहरूको उत्तर खण्ड (Section) अनुसार छुट्टाछुट्टै उत्तरपुस्तिकामा लेख्नुपर्नेछ । अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

Section– A

1. 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
2. State importance of hill road drainage with examples. Show the surface drainage system for effective drainage of water with sketch. 10
3. 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

4. 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
5. Explain the treatment process of waste in detail with sketches. 10

Section– C

6. Maintain Principal Components of Hydroelectric Schemes. Explain in detail about forebay, penstocks and intake structures with sketch. 10
7. What do you mean by River training works? Describe various types of river training works and protection works. 10
8. 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

9. "New Technological Innovation has resulted a lot of benefit to the society". Justify this statement with appropriate examples. 10
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

पद पूर्ति समिति

थाहा नगरपालिका कार्यालय, दामन, मकवानपुर

इन्जिनियर/अधिकृतस्तर छैठौं 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 done in the selection of alignment for roads in high altitude mountainous region? (10)
2. Write short notes on: [5 + 5]
   A. Role of social mobilization in rural road development.
   B. Importance of maintence of roads.
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 different between renewable and non-renewable energy? Also write down advantages 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 earthquake? How could the code be made effective? [10]
8. Write short notes on: [5 + 5]
   A. Farmers managed irrigation system.
   B. Specific consideration in design of buildings in Nepal.
9. Briefly Explain the following: [5 + 5]
   A. Remedial measures of water logging.
   B. Indigenous technology in building designs.
10. Write short notes on: [5 +5]
    A. Initial Environment Examination.
    B. Labour based, Environment friendly and participatory Approach for local infrastructure development in Nepal.

लोक सेवा आयोग

नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, जनरल उपसमूह

राजपत्राङ्कित तृतीय श्रेणी (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा

२०७३/११/१६

समयः— ३ घण्टा

पूर्णाङ्कः— १००

पत्रः— द्वितीय

विषय :— जनरल

निम्न प्रश्नहरूको उत्तर Section अनुसार छुट्टाछुट्टै 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 trining 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

लोक सेवा आयोग

नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, स्यानिटरी उपसमूह

राजपत्राङ्कित तृतीय श्रेणी (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा

२०७३/११/१

समय:– ३ घण्टा

पूर्णाङ्क:– १००

पत्र:– द्वितीय

विषय :– स्यानिटरीसम्बन्धी

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

Section– A

1. a) State the permissible limits of iron, magnese and arsenic chemical constituent as per Nepal water quality standard, 2062. 3

   B) Briefly describe the treatment methods of iron, magnese and arsenic removal. 7

2. Explain the terms water demand, design period and populatiok growth rate. What factors affect the demand of water? (6 + 4) = 10

Section– B

3. Why is it necessary to use coagulants in sedimentation process ? Explain why JAR TEST is important? 10

4. Describe various types of pumps used in water supply? Describe 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 BoD and CoD. Describe the importance of BoD test in waste water treatment proces. (5+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

8. What are the impacts of the greenhouse effects on the urban environment? What are its causes? Discuss the mitigation measures of such impacts. (4+2+4) = 10

9. 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

10. 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 puts for the disposal of septic tank effluent. Take soil infiltration rate as 120 liters/m^2/day. (5+5) = 10.

The End

◆❖◆

लोक सेवा आयोग

नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, हाइवे उपसमूह

राजपत्राङ्कित तृतीय श्रेणी (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा

२०७३/११/२५

समयः— ३ घण्टा

पूर्णाङ्कः— १००

पत्रः— द्वितीय

विषय :— हाइवेसम्बन्धी

निम्न प्रश्नहरूको उत्तर Section अनुसार छुट्टाछुट्टै उत्तरपुस्तिकामा लेख्नुपर्नेछ, अन्यथा उत्तरपुस्तिका 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) Discus sthe 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 ... = 1.8 g/cm^3. The upper surface of the fill rises from the crest of the wall at an angle of 20° with the horizontal. Assume $\phi = 30°$ and $\delta = 20°$, determine the total active earth pressure. 10

The End

ललितपुर उपमहानगरपालिका कार्यालय पदपूर्ति समिति
इन्जिनियरिङ सेवा, अधिकृतस्तर छैठौं तह स्ट्रस्चरल इन्जिनियरिकङ पदको
खुला प्रतियोगितात्मक लिखित परीक्षा

समय : ३ घण्टा

मिति : २०७२/११/२९

द्वितीय पत्र

पूर्णांक : १००

विषय : स्ट्रक्चरल इन्जिनियरिङसम्बन्धी

Section 'A'

1. Differentiate between stiffness matrix and flexibility matrix methods. Draw influence line diagram for shear force at D. 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 as example? 10

Section 'B'

5. A) What do you mean by ...What are the steps of the Environmental... of building in Nepal? 5

   B) What are the provisons relating to the construction of building as per Local Government Act 20... ... and regulation 2056 ? 5
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... = 2.71, determine the saturated and dry nit weight of soil.

   b) A 5 m high retaining wall having angle of repose 30 degree, C = 5KN/m^2 and unit weight 17.5 KN/m^3. Determine the active pressure on the wall a) Before the formation of crack b) After the formation of crack. 10
9. Determine the ultimate moment capacity. By Limit State Method, of a rectangular concrete beam section of 300 mm width and 550 mm effective depth, with 3 numbers of 20 mm diameter Fe 415 steel 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-Polltlan 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 25×10^3 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 Neapal.
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 bette?

लोक सेवा आयोग

नेपाल इन्जिनियरिङ् सेवा, सिभिल समूह, स्यानिटरी उपसमूह

राजपत्राङ्कित तृतीय श्रेणी (प्राविधिक) प्रतियोगितात्मक लिखित परीक्षा

२०७२/११/१४

समय :- ३ घण्टा | पत्र: द्वितीय पत्र | पूर्णाङ्क :-१००

विषय : स्यानिटरी सम्बन्धी

निम्न प्रश्नहरूको उत्तर खण्ड (Section) अनुसार छुट्टाछुट्टै उत्तरपुस्तिकामा लेख्नुपर्नेछ अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

Section– A

1. 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
2. Describe the different types of living organisms found in natural water. Explain their effects on water quality. (6 + 4) =10

Section– B

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

Section – C

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

Section– D

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

लोक सेवा आयोग

नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, हाइवे उपसमूह

राजपत्राङ्कित तृतीय श्रेणी (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा

२०७२/११/८

समय :- ३ घण्टा | पत्र :- द्वितीय पत्र | पूर्णाङ्क:- १००

विषय : हाइवेसम्बन्धी

निम्न प्रत्येक खण्ड (Section) को प्रश्नहरूको उत्तर छुट्टाछुट्टै उत्तरपुस्तिकामा लेख्नु पर्नेछ अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

Section – A

1. 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)
2. 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 reacton time of 2.5 seconds, coefficient of friction of 0.7 and a brake efficiency of fifty percent. 10
3. 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

4. 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 equl 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
5. 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
6. 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

7. 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
8. 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

9. Mention about Rankine's earth pressure theory 10
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

Sanitary– 2071/11/4

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
12:00-1700	15
17:00-1900	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

   Discus 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 20^0c BOD of a sewage of sample whose 5 days 30oBOD is 110 mg/ltr. Assume the deoxygenation constant at 20^0,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 IEE/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 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?

लोक सेवा आयोग

राजपत्रांकित तृतीय श्रेणी, नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, हाइवे उपसमूहको प्रतियोगितात्मक लिखित परीक्षा

२०७०/११/११ गते

समय: - ३ घण्टा | पत्र:- द्वितीय | पूर्णांक :- १००

विषय : हाइवेसम्बन्धी ।

निम्न प्रश्नहरूको उत्तर खण्ड (Section) अनुसार छुट्टाछुट्टै उत्तर पुस्तिकामा लेख्नुहोस् ।

Section A

1. Explain the necessity of highway planning in Nepal. What are the uses of fact finding surveys? How are these used and interpreted? 10
2. The radius of a horizontal circular curve is 10 meters, the design speed is 50 kmph, and the design coefficient of lateral friction is 0.15. Calculate the super elevation if full lateral friction is called into play. 10
3. a) Define bio-engineering. Discuss its functions and limitations. 5
   b) Los Angles abrasion test. 5
4. Draw highway intersection in detail and show the traffic directions. 10
   a) Four legged intersections.
   b) Multi legged intersections
   c) Channelized intersections
   d) Three legged intersections

Section C

7. What do you understand by Pretensioning and Post tensioning in prestressed concrete bridges. Explain the special features of prestressed concrete. (2 + 2 + 6 = 10)
8. What are the different types of soil classification? Describe the soil classification by unified soil classifications system method. 10

Section D

9. Design a combined footing for two columns 32 cmx 32 cm carrying load of 60,000 kg and 40 cm carrying load of 80,000 kg. The column are spaced at 3.4 m centers and the bearing capacity of soil is 15 tones/m^2. Calculate the depth of the footing, reinforcement required at transverse section and cantilevers. 10
10. What are the different types of foundation for bridge ? Describe briefly when each of these types is used. 10.

लोक सेवा आयोग

राजपत्रांकित तृतीय श्रेणी, नेपाल इन्जिनियरिङ सेवा, सिद्धिल समूह, जनरल उपसमूहको प्रतियोगितात्मक लिखित परीक्षा

२०७०/११/९ गते

समय:- ३ घण्टा | पद :- द्वितीय | पूर्णांक :- १००

विषय : जनरलसम्बन्धी ।

निम्न प्रश्नहरूको उत्तर खण्ड (Section) अनुसार छुट्टाछुट्टै उत्तर पुस्तिकामा लेख्नुहोस् ।

Section A

1. What do you mean by transport plus concept? Which agency in Nepal is adopting this concept? Why this concept is important in Nepalese mountainous and hilly roads? Write down pros and cons of this concept. 10
2. Draw a typical cross section of road with all elements. Describe briefly about each element of cross section of road. 10
3. Differentiate the specific planning and design considerations for the suspension bridge from those for the suspended trial bridge. 10

Section B

4. List the various impurities present in surface water sources. What are their effects on human health? Describe the various components of water treatment plant generally used for purification of water from such sources. 10
5. Describe the causes of various water borne diseases transmitted into human body with their resources of transmission routes and preventive measures. 10

Section C

6. Mention the points to be considered topographically, geologically, hydrologic ally and economically at the planning, layout and design stage of a small hydropower project. 10
7. What is uplift? How can uplift be determined? Show this with a neat sketch of the cross section of a weir with two rows of sheer piles at the ends. Explain how will determine the uplift pressure at any point of the weir foundation. 10
8. Describe about the river training work. Give classification and types of river trainings work in Nepal. 10

Section D

$5 + 5 = 10$

9. Write short notes on:
   a) Indigenous technology in building construction.
   b) Urban planning needs in Nepal. 5
10. a) Explain the impacts of modern construction technology in the society.
    b) Explain the participatory approach in local infrastructure constructin at various stages of construction. 5

Building Technology– 2069 : Bhadra

1. What are the requirements of ventilation ? explain the moisture movement through building components.
   b) What do you understand by thermal performance of building components? explain the various methods of thermal insulation for exposed walls and roofs.
2. a) define foundation. Describe types of foundation with necessary sketches.
   b)What are the types of flooring? Explain the process of terrazzo finish floor.
3. a) draw and explain different components of timber collar beam roof with their sizes. Explain the different types of roof covering for pitched roof.
   b) explain the preparation of cement sand mortar(1:6).Differentiate between random rubble, coursed rubble and ashlar stone masonry with fig.
4. a) Define stair .illustrate the elements of staircase with fig.
   b)with the help of neat sketches, differentiate between solid and suspend ground floor.
5. a)how do you make a brick masonry buildings earthquake resistant? Explain with sketches various measures adopted.
   b) Illustrate components of the rooftop rain water harvesting system.

Irrigation– 2067 : Chaitra

1. Describe the cause food grain deficit in the country with highlight of functional management of irrigation system
2. Agency managed irrigation systems in Nepal are performing less efficiently .why are the main resons behind this? How can they be improved?
3. Describe the various types of head works and its main component and functions. Which types of head work is most suitable for the hilly and mountainous regions of Nepal. Give reasons.
4. Why canal lining is necessary in light soil? Describe in brief, the various types of lining is used in hills and terai of Nepal?
5. Write short notes on the following
   a. Hydraulic jump
   b) Launching apron
   c) Water logging
   d) Surface drainage
6. a)Write short notes on:
   i) Surface drainage and its application ii) Sub-surface drainage and its application
   iii) Drainage coefficient(D.C)
   b) determine the size at the outlet of a 6 hectare drainage system, if the D.C is 1cm and tile grade is 0.03%/. Assumes rigidity coefficient of the materials is 0.011.
7. What are the needs for controlling rivers in Nepal? list the summary of design procedure for river training works in the hills and plains of Nepal.
8. What is run-0ff ?what are the factors that affect run off from a catchment area? Describe the hydrological cycle in brief with neat sketch.
9. Given below are observed flows from a storm of 6 hours duration on a stream with a catchment area of 500km^2. Assumes the base flow to be zero .derive the ordinates of a 6 hour unit hydrograph.

Time hours	0	6	12	18	24	30	36	42	48	54	60	66	72
Observed flow m^3/s	0	100	250	200	150	100	70	50	35	25	15	5	0

10. What is aquifer? Describe the different types of wells and their classification .describe different types of wells for different types aquifer.

Sanitary– 2067 : Chaitra

Section-A

1. What are the different sources of water? What are the considerations to be taken in selecting the source of water.
2. Write short note on:
   a) Ph valuae b) Water demand c) Hydraulic garde line

Section-B

3. Calculate average water demand in litre per second (lps) for typical village with population of 1000. Find future average and design flow after 20 years. Define peak factor.
4. It is possible to have no reservoir for a gravity flow schme? why are elevated reservoirs provided in water supply systems? Explain briefly.
5. What are the main differences between the basic principles of design of sewers and water mains? explain the significance of minimum and maximum velocities of flow in the design of sewers.
6. Write down short notes on:
   a) B.O.D
   b) Ecological sanitation
   c) Inverted siphon
7. What is self-cleansing velocity? How it is obtained in case of sewers?
8. Describe the procedures laid down in the guidelines on the implementation and management of water supply project,2047 for the formation of water usrr's committee. also mention its duties and responsibilities.
9. Give the definition of environmemntal impact Assessment(EIA). Explain some of the major government rules and regulations for EIA
10. The role of the government agencies has been transformed to the role of a facilator from the provider of the system. How do you look at this statement in the context of sustainable development of water supply and sanitation sector?

General– 2067 : Chaltra

Section-A

1. Enumerate the various mean of transport. Describe the considerations that lead to selection of a particular type of transport.
2. In context of our difficult terrain and topography at one hand and economics situation at other, how could Trail bridge network in our hilly region could play effective role to alleviate transportation access, elaborated with normal.
3. What are the steps to considered during the preparation of a wearing course of a metaled highway

Section-B

4. Write down the different water borne diseases transmitted through polluted water. Explain their transmission routes and preventive measures.
5. Draw a flow chart of each component of a typical rural water supply system and explain the function of each component.

Section-C

6. In view of emerging crisis in energy sector, what are your suggestions in context of alternate energy system which ought to be developed in Nepal so that we do not depend solely on conventional system?
7. What are the reasons that farmers managed irrigation system in Nepal seems to be pragmatic as well as cost effective? How the coverage the coverage of irrigation be could widened In Nepal so that farmers could be benefited?
8. Explain the objectives of river training works. Explain briefly the different methods of river training works.

Section-D

9. What are the roles of National Building codes in Nepal? Hoe does the code address the problem of earthquake? How could the code be made effective?
10. Name the various steps/process involved in the 'Environmental impact assessment of a project and explain the function of each step/process.

Highway- 2066

1. a)How the roads are classified in Nepal? And which institutions are responsible for its development and maintenance?

   b) Within strategic road network how many highways and feeder roads are there?

2. a) Calculate the stopping sight distance for a road for which the design speed is 50 km ph. Assume that the roadway is level, the coefficient of friction between the road surface and tyres is 0.4 and the reaction time of the driver is 3 sec.

   b) What are the elements of highway cross section? Describe them with a sketch.

3. a) What are the different components of hill road drainage system? Make a sketch for a typical drainage system of hill road.

   b) Describe the difference between and tar. Explain the tests on bituminous materials: penetration test and viscocity test.

4. a) What are the object and scope of traffic engineering? Explain briefly.

   b) What are the different cause of traffic accidents? Discuss briefly .explain various measures that may be taken to prevent accidents.

5. a)what is the ESWL? Explain the concept in the determination of equivalent load.

   b) Distinguish between the full grouted and semi-grouted bituminous macadam.

6. a) Discuss in brief types and methods of maintenance road pavement.

   b) Write down the urgency and importance of highway maintenance. Classify the inspection procedures for the same.

7. What is the reason of providing reinforcement bars on the upper side of beam while designing cantilever beams? What is the purpose of designing double reinforced beams?

8. a) Discuss the various factors that affect the permeability of soil.

   b) What are the causes of slope failures?explain the use of bio-engineering in stabilizing slopes.

9. Write down the assumption of rankine's theory and derive the expression for active and passive pressures.

10. a) what types of foundations are used in bridge construction ? explain the each in brief

    b) how do determine the bearing capacity of soils? What are the factors influencing bearing capacity?

High Way- 2065

1. What are the technologiest available to determine best route location of highways?
2. a) what are the basic factors which influence the visible dimensions of a road ?
   b) what correction is required in horizontal curves to negotiate the speed and stability of vehicles?
3. It is argued that road that road construction in hills is one of the major causes of natural environmental degradation.examinine how the road construction project in hills effect the environment? What measures would you suggest to take up at various stages of the project for minimizing the environmental damages?
4. a) Explain the post card methods of O and D surveys. Discuss the advantage and disadvantage of this methods?
   b) how are the road intersection planned ? Enumerated the various traffic controls needed at an intersection.
5. What are flexible and rigid pavements? Describe the with sketch. Which types of pavements is suitable for hill roads in Nepal? Give reasons.
6. a) how planning for road maintenance operations are carried out?
   b) why is hydraulic analysis necessary for river bank and protection structures?
7. Draw a detail configuration of live load of IRC class A bridge loading for a design of a single lane R.C.C bridge
8. What is a veg etation structure? Describe with sketches vegeatative engineering techniques for slope stabilization
9. Coumpute the intensities of active and passive earth pressure at depth of 8 meteres in dry cohesionless sand an angle of internal friction of 30^0 and unit weight of $1.8t/m^3$ .what will be in tensities of active and passive earth pressures if the water level rises to the grund level? take saturates unit weight of sand as 2.2 t/m3.
10. What is the difference between pile and well foundation in bridges? Explain with sketches.

लोक सेवा आयोग

राजपत्रांकित तृतीय श्रेणी, नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, जनरल उपसमूहको शा.अ. स्तर, समावेशी प्रतियोगितात्मक लिखित परीक्षा

२०६५/१०/१५ गते

समय:- ३ घण्टा

पद :- द्वितीय

पूर्णांक :- १००

विषय : जनरलसम्बन्धी ।

निम्न प्रश्नहरूको उत्तर लेख्नुहोस् ।

Section A

1. Draw a sketch of a suspension bridge and indicate its components. 10
2. Calculate the stopping sight distance for following 3 cases on a highway for a design speed of 80kmph, Reaction time is 2 secs and friction coefficient is 0.4. 10
   a) When grade is 4% descending
   b) When grade is 3% ascending
   c) When road is flat.
3. Explain the use of bio-engineering in Hill roads and its advantages compared to other method. 10
4. Briefly explain the following: (4 + 3 + 3) 10
   a) Solid waste management
   b) Source of water supply, their selection and management.
   c) Sources of pollution for air, water and land
5. a) How the operation and maintenance of water supply and sewerage system can be improved? 5
   b) Community based water supply and sewerage systems are feasible and sustainable in Nepal. Justify this statement. 5
6. Write short notes on:
   a) Alternative Energy system in Nepal 5
   b) River diversion works 5
7. Explain the specific consideration to be provided for the design, operation and management of Hill irrigation system. 10
8. Write short notes on:
   a) Farmer managed irrigation system 5
   b) Flood control, its necessary and mitigation measures 5
9. Note the type of foundation employed in a building constructed recently in your area. List and explain briefly obvious reasons why this type of foundation was selected. 10
10. What do you mean by participatory approach in planning implementation maintenance and operation of local infrastructures ? Explain by giving examples. 10

लोक सेवा आयोग

राजपत्राकित तृतीय श्रेणी, नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, इरिगेशन उपसमूहको समावेशी प्रतियोगितात्मक लिखित परीक्षा

२०६४/१०/२३ गते

समय: – ३ घण्टा

पत्र:– द्वितीय

पूर्णांक :– १००

विषय: इरिगेशनसम्बन्धी ।

तिम्न प्रश्नहरूको उत्तर लेख्नुहोस् ।

1. a) What factors should be considered while formulating an irrigation scheme? 5

   b) What are the modes of irrigation? What are the advantages and disadvantages of each irrigation methods? 5

2. a) What do you understand by the Duty of water at the headwork's of an irrigation canal and at the outlet to the field? 5

   b) What measure would you suggest to improve "Duty" in an existing canal system? 5

3. What are the cross-drainage (C.D.) works required in an irrigation system? Define the salient features of each type of CD works? What should be the minimum foundation depth of aqueduct below river bed? State the formula used from the calculating of scour depth of CD structure. 10

4. a) What do you mean by Hydraulic Design Criteria of Cross Drainage Structures? Briefly mention Design procedure for Determining Uplift Pressures in a floor of hydraulic structures (Headwrks, CD structures, drops etc.) 7

   b) Write shourt note on: 3

   i) Scour Depth ii) Under Sluice

5. Define exit gradient. How is exit gradient represented? Describe how a structure fails if exit gradient is not balanced. 10

6. a) What are the main causes of soil erosion and landslide in context to hill and mountainous areas of Nepal? Briefly mention their remedial/mitigation measures. 4

   b) Mention cause of flood in terai and inner valley. What are the methods of river training works with flood control generally adopted in flood plain? Also mention best solution of river control in alluvial plain in the terai. 6

7. List the basic step by step logical design process for irrigation development of a medium scale irrigation project. 10

8. Answer the following questions:

   a) i) What is hydrological cycle and what is its importance?

   ii) What is meant by rain gauge and what is their use?

   iii) Explain intensity duration curves, infiltration and percolation.

   b) Enumerate the different methods of measuring discharge. How will you measure the discharge of (i) a river (ii) small stream (iii) a canal. 10

9. a) What are the advantages and disadvantages of ground water irrigation is compared to surface canal irrigation?

   b) A 30 cm diameter well penetrates 25-m, below the static water table. After 24 hours of pumping at 5400 liters per minute, the water level in a test well at 90.0 m is lowered by 0.53 m and well 30.0 m away, the drawdown is 1.11 m. Find out the transmissibility of the aquifer.

The End

लोक सेवा आयोग

राजपत्राङ्कित तृतीय श्रेणी, नेपाल इन्जिनियरिङ्ग सेवा, सिभिल समूह, स्यानिटरी

उपसमूहको समावेशी प्रतियोगितात्मक लिखित परीक्षा

२०६८/१०/१२ गते

समय: – ३ घण्टा

पत्र:– द्वितीय

पूर्णांक :– १००

विषय : स्यानिटरी सम्बन्धी ।

निम्न प्रश्नहरुको उत्तर लेख्नुहोस् ।

1. What do you understand by' inverted cone of depression and circle of influence in the well? Name the different method of tube well boring and indicate the conditions where each one is suitable. Sketch and explain geological condition which give rise to an artesian well. 10
2. Explain the procedure for site selection permanent intake in ace when the water leveling fluctuating to large extent during dry and wet season. 10
3. What are the different types of distribution service reservoir used in water supply project so Nepal? How its storage capacity is determined? Discuss in brief. 10
4. It is required to supply water to a population of 20000 (twenty thousand) at a per capita demand of 150 liters per day. The disinfectant used for chlorination is much beaching power is required annually at the water works if 0.3 pm of chlorine does is required. 10
5. Outline the importance of community participation for sustainability of the water supply project point out the challenges. 10
6. a) What is self-cleaning velocity and non-scouring velocity in a sewer? Why sewers are not designed to flow full? 4

   b) Design a sewer to serve a population of 36000; the daily per capita water supply allowance being 135 liters, of which 80% find its way into the sewer. The slope available for the sewer to be laid is 1 in 625 and the sewer should be designed to carry 4 times the dry weather flow when running full. What would be the velocity of flow in the sewer when running full? Assume n = 0.012 in Manning's formula? 6
7. Sewage Treatment Plant मध्ये Oxidation Ditch को फाइदाको बारेमा उल्लेख गर्नुहोस् । 10
8. Describe different stages in sludge digestion process briefly. What are the different factors affecting sludge digestion and how they are controlled ? Do you think sludge disposal by laboring in case of Nepal is appropriate and why? 10
9. Define eco-sanitation. What can you suggest socio-economically poor village people of disposal septic tank effluent, whereas they are facing with their hand-to-mouth problems? 10
10. a) Explain the role of CO_2 on green house effect. 5

    b) Why Initial Environmental Examination (IEE) is necessary for water supply project. 5

The End

लोक सेवा आयोग

राजपत्रांकित तृतीय श्रेणी, नेपाल इन्जिनिरिङ सेवा, सिभिल समूह, हाइवे उपसमूहको खुला प्रतियोगितात्मक लिखित परीक्षा

२०६४/११/६ गते

समय: - ३ घण्टा

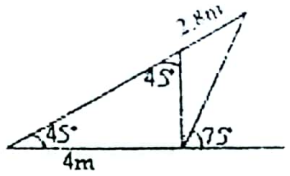
पत्र :- द्वितीय

पूर्णांक :- १००

विषय : हाइवे उपसमूह सम्बन्धी ।

निम्न प्रश्नहरूको उत्तर लेख्नुहोस् ।

1. A hill road has a section as shown in the figure. Calculate the quantity of earthwork in a length of one kilometer. 10



2. a) Describe with sketches the elements of highway cross sections.
   b) Why are transition curve provided in the horizontal alignment of a highway explain with sketch. (5 + 5)
3. a) What are the criteria that should fulfilled while designing subsurface drains? 4
   b) What are the various tests that are used for assessing the suitability of road aggretages. 3
4. a) What is a rotary intersection? What are the advantages and limitations of traffic rotary intersection ? 5
   b) What are main causes of traffic accidents in Kathmandu? What measures should be taken to mitigate them?
5. a) What are the functions of highway drainage? list the data necessary to glean before deciding on the drainage system for a road. 5
   b) A bituminous mix has been prepared with 10% asphalt by weight of mixture. Assuming the specific gravity of asphalt to be 1 and that of void less specimen of the mixture to be 2.3, calculate the effective specific gravity of the aggregate. 5
6. a) What are the categories of maintenance as defined by DOR? What is the scope of periodic maintenance for paved road. 4
   b) How is the depth of scour determined for the design of bridge foundations. ? 6
7. a) Derive on expression for active earth pressure on the vertical back face of a E.W supporting granular soil having horizontal surface. 6
   b) What is the effect of (a) depth (b) breadth and (c) ground water level on the bearing capacity of cohesive soils as per Terzaghi's formula? (1 + 1 + 2) 4
8. a) Explain soil as three phase system with a neat sketch. define the following terms and give their interrelationship with usual notations: water content, degree of saturation, porosity, void ratio and unit weight of water, solid and soils at different states. 5
9. Write short notes on: 3
   a) Mohr coulomb theory of shear strength. 3
   b) Primary and secondary consolidation 4
   c) Causes of slope movements and failures. 5
10. a) What are the foundation conditions under which mat foundation is preferred?
    b) What is pile group efficiency ? How is the bearing capacity of a pile group determined in cohesive soils? 5

The End

लोक सेवा आयोग

राजपत्राङ्कित तृतीय श्रेणी, नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, जनरल उपसमूहको खुला प्रतियोगितात्मक लिखित परीक्षा

२०६८/११/५ गते

समयः – ३ घण्टा

पत्र :- द्वितीय

विषय : जनरलसम्बन्धी ।

पूर्णांक :- १००

निम्न प्रश्नहरूको उत्तर लेख्नुहोस् ।

1. What are the design and construction problems of hill roads? What do you understand by obligatory points? What are the special considerations which need to be followed in the selection of alignments for roads in mountainous regions? 10
2. Describe briefly the methodology used in the construction of gravel roads. Differentiate between surfaced dressing treatment and otter seal construction. 10
3. The time for a clay layer to achieve 99% consolidation is 10 years. What time would be required to achieve 99% consolidation if the layer were twice a thick, five times more permeable and three times more compressible? 10
4. Explain why safe disposed of waste water is necessary. Provide comparison between separate and combined sewer system. 10
5. What are the various types of treatment of water to make it safe for drinking. Explain briefly the competent of slow sand filter. 10
6. a) Describe about the components of a micro hydro system with neat sketches. 5
7. Describe with sketches various types of river training works and protection works needed for rivers in the mountains and in the plains. 10
8. What are the different methods of irrigation? Briefly explain their function and suitability. 10
9. Explain why urban planning is necessary in Nepal. Describe the challenges being faced in this sector. 10
10. a) Describe about the sources of pollution in Nepal. How these sources can be controlled? 5
    b) How can you related the technology development with environment and society? 5

The End

Sanitary- 2063

1. How would you use shallow and deep tube wells for the water supply in the terai? Under what conditions each is used and why?
2. A village in mild western development region of Nepal has a design year population of 500per capita demand recommended for that particular villafe is 65 litre per day.the demand is tobe met by a continuos system of supply from a spring source with safe yield of 0.5 lps .the consumption pattern is

Time(hr.)	Consumption(%)
5-7	25
7-12	35
12-17	20
17-19	20
19-5	0

Is a balancing storage tank storage? Calculated its capacity if necessary

3. What is mean by treatment of water and why it is necessary what do you mean by flocculation?
4. Why aeration is used in water treatment plants? Is it more commonly used with ground water or surface water and why ? give reasons
5. Write short notes on
   a) Impounding reservoirs b) Break point chlorination c) Artesian well
6. What are the relative advantage and disadvantage of separate and combined sewer system?what are the design considerations for the two types of sewer systems?
7. Explain the aerobic and anaerobic decomposition of sewage
8. What is an oxidation pond? How does if function?what information (data) do you require for its design ?
9. Describe what do you know about the the physical, the chemical and the biological characteristics of sewage
10. a) What do you understand by greenhouse effect? What are its causes? How it can be mitigated?
    b)list in details the physical ,biological and socio-economic baseline information that have to be collected during EIA study of a water supply project.

OLD SUBJECTIVE QUESTIONS

General– 2062

1. Describe the cross drainage structures and sub-surface drainage.
2. How many cables are there in a suspension bridge? Describe function of each type. How is the load on the bridge transferred to the ground?
3. In any transportation planning exercise, what are the major technical considerations to be given attention to. In your objective view, why very often our planning exercise fail to address the main issues?
4. In context of scarcity of land fill sites, solid waste management has become difficult task in Kathmandu valley. What are your suggestions to reduce and recycle the wastes so that pressure on land fill site could be out down? Provide pragmatic solutions.
5. You are required to supply drinking water to some community in a hilly region. Describe the various steps you will take to achieve this in the context of Nepal.
6. What is difference between the renewable and non-renewable energy? Also write down the advantages and disadvantages of solar energy, bio-gas and hydropower.
7. If you were to design an irrigation system to be totally maintained and managed by local farmers after construction. What factors would you consider in deciding about line and unlined sections of canal? Give technical and economical reasons and discuss.
8. Design an irrigation canal of 15 m/s capacity, whose side slope coefficient and bed slope are 0.65 & 0.02% respectively with Manning's roughness coefficient of 0.023 so that its flow velocity could be lay in between non-silting and non-scouring value.
9. a) What are the common building construction materials used for construction of residential buildings? Describe one building material in details.

   b) Write short notes on (any two)

   i) water cement ratio of concrete mix.
   ii) mixing concrete
   iii) Bulking sand
   iv) Curing of concrete
10. As EIA National Guidelines now it is mandatory to conduct EIA for significant roads in Nepal. How does it help environmental as well as the road network? Give a critical analysis.

Irrigation- 2063

1. Write short note on the following
   a) Status of irrigation development in Nepal
   b) Crop water requirements calculation by penman methods
   c) Types of irrigation
2. Describe the factors to taken into the account while fixing the alligment of irrigation cannals
3. What are the basic difference between kennedy and Darcy theory. Which theory is used in the design of cannal systems in Nepal and why? For a channel to be regime briefly mention the condition that is to be adhered.
4. Describe the effect of construction of a weir in the river regime. What are the main causes of failure of weir on permeable foundation and their ramedies?

5. What do you mean by hydraulic jump and why it is necessary to be formed in hydraulic structures ? for a stable and well balanced jump which valued of the froud numbers should to get the anticipation result?(1)fr-1(2)fr-1 to 1.7 (3)fr
6. River fliowing through Nepal carries large qunantity of sediment load within permissible limits to control the flooding of agricultural land?
7. Do you think ground water irrigation is suitable for the cultivation of crops which required more water like paddy or sugarcane if not why?
8. Explain with the help of a neat sketch the hydrologic cycle in nature indicating its various phase and describe briefly basic hydrological data require for planning irrigation projects
9. a) define the hydrograph .draw a single peaked hydrograph and indicate is various components.
   b) what are the basic propositions of the unit hydrograph theory?
10. Ihow many types of aquifer exist below the ground surface and what is the main difference between them? Briefly drscribe the what types of well , shallow or deep is feasible in confined and unconfined aquifer?

Irrigation- 2066

1. What is the present status of irrigation development in Nepal?what are the factors to be considered in accelerating the development of 'round the year irrigation' in Nepal
2. Name the method of applying water in irrigation fields.how do you define small scale irrigation project in context of Nepal. Write dowm in the brief its scope in Nepal.
3. Define critical depth of flow in canal.

   Design a regime canal for a discharge of 15m3/sec with slit factor=1. Assumes a trapezoidal section having side slopes ½:1(H:V)
4. Derive the manning's equation for the a regime flow of a cannal design with consideration of the chezy's equation
5. Write down the shorts notes on:
   i. Hydraulic jump
   ii. Advantage of canal lining
   iii. Exist gradient
   iv. Cause of failure of weir on permeable foundation
   v. Water measuring devices used in water management

6. How serious is the problems of water logging in irrigated areas in Nepal? State the various drainage systems required in removing water logging in irrigation fields/
7. What is river training works? Describe briefly the different types of river training works and its usefulness in the various conditions
8. What effect you foresee on hydrological cycle due to climate change? Suggest the ways and means in mitigating climate change effects on irrigation projects.
9. What do you mean by: "peak flow"? What is the importance of having a correct peak flow estimation? State the different methods of peak flow estimation.
10. Describe the different methods for recharging ground water table preserving ecological balance in nature of the south Asian regions.

Highway–2067 : Chaitra

Section - A

1. a) Discuss the planning approach for highway construction and development in Nepal.
   b) Discuss the controlling factors that should be considered in the alignment of highways.
   c) How are roads classified in Nepal according to the provision made in NRS 2045?
2. a) What are the elements of cross-section of a highway? Make the sketches of typical cross section for:
   i) Embankment ii) Cutting ii) Urba
   b) What are the effects of centrifugal force acting on a vehicle moving on horizontal curve? How these effects are calculated?
3. a) What are the special points to be considered in the selection of alignments of hill road? Discuss
   b) Write short notes on
   i) Hair pin bend
   ii) Prevention of landslides in hills roads.
   c) How to manage drainage in hills roads? Discuss.

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