

लोक सेवा आयोगले परीक्षामा सोधिएका विषयगत प्रश्नहरू

नेपाल विविध सेवा, सेवा राजपत्रादिकत तृतीय श्रेणी, कम्प्युटर इन्जिनियर (प्राविधिक) पदको
प्रतियोगितात्मक लिखित परीक्षा २०७९।१।२०

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: Technical Subject

तलका प्रश्नहरूको उत्तर Section अनुसार बोलाबोलै उत्तरपुस्तिकामा लेख्नुपर्नेछ अन्यथा उत्तरपुस्तिका रद्द हुनेछ।

Section-A

25 Marks

- What are the advantages of using UDP over TCP? Mention [5]
- Define synchronous counter. Explain its working principle by drawing its functional diagram. [2 + 8 = 10]
- How frequency division multiplexing is implemented in telephony? Briefly describe fundamentals of error detection and corrections. Describe performance evaluation of analogue and digital communication system SNR and BER. [5]

Section-B

25 Marks

- Explain the concept of starvation in relation to priority scheduling algorithm. With a suitable example, state the approach to overcome the problem of starvation. [5]
- Mention four features of Object-Oriented Programming (OOP) with example. [10]
- Describe about data mining, its importance and the importance of security management system in an organization. [10]

Section-C

20 Marks

- Elucidate the composite transformation for translation, scaling and rotation. Mention the working principles of Asymmetric Cryptography. [10]
- What is Artificial Intelligence (AI)? What is the difference between "Strong AI" and Weak AI"? [10]
- What are some of the misconceptions about AI? Make clear with explanation. [10]

Section-D

30 Marks

- Consider given table that represents the sales figures of some salesmen that work for a company. Let's assume that the following design is adopted so as to make it easier to retrieve the data in order to display it:

Sales Data				
sales-person	jan-sales	feb-sales	mar-sales	apr-sales
R.M. Manandhar	2456	2285	1143	2159
R. Ral	2665	2998	3100	3187
J. Karki	5781	4112	1954	2754
A. Gautam	2143	3124	2087	2694

At the first sight, the table may look that it violates 1NF. But it doesn't violate 1NF as there are no multi-valued attributes/columns here. However, this design has serious practical problems. In this context, solve the following questions.

[4 + 6 = 10]

- What practical problems would you face if you implemented this design? Explain.
- What would be the appropriate design for the given scenario? Describe with example how your proposed design is practically better.

10. Public works Department of Kathmandu Municipality office take care of the maintenance of all public roads that is within the municipality. The department has decided to develop a web-based system name 'Pothole Tracking and Repair System'.

The local residents can log onto the web-based application and report the severity and the location of the potholes. The report is assigned an identification Number and stored by location (street address), size of the pothole (in the scale of 1 to 10), and repair priority (determined by the pothole size). The concerned official at the each pothole and includes pothole location and, size, identification number of the repair team, number of team members, assigned equipment, repair duration, work in progress (hole status-NOT REPAIRED, IN PROCESS, COMPLETED), amount of filler materials, and cost of repair (derived as a function of number of team members, amount of filler materials, and duration of repair). Finally, a damage file is created to hold information about reported damage due to pothole and includes reporting resident's name, address, phone number, type of damage, and repair cost.

The department hires you as a system analyst to develop the 'Pothole Tracking and Repair System'. Create Entity-Relationship (E-R) diagram for modelling data and create Data Flow Diagram (DFD) at appropriate level data flow within the proposed system.

[10 + 10 = 20]

नेपाल राष्ट्र बैंक, प्राविधिक, सुचना प्रविधि, अधिकृत तृतीय, सहायक निर्देशक पदको खुला प्रतियोगितात्मक लिखित परीक्षा २०७९।०३।२८

समय: ३ घण्टा

पत्र: First

पूर्णाङ्क: १००

विषय: Information Technology - I
Section 'A': Subjective

- Differentiate between I/O programming and Memory Mapped I/O.
- What is asynchronous machine? Write down
- What are common operating system security threats?
- What are the differences between data mining and data warehouse?
- Differentiate between client/server model and peer-to-peer model.
- What are the differences between RPC and RMI?
- Explain the requirements of hash functions.
- Why are all big companies looking for CISA as Information System Auditor?
- Design a mod-5 synchronous up counter using JK flip flop.
- Explain about DDL, DML, DCL with examples in DBMS.
- Explain ISO layer with a suitable example.

Time: 2 hrs 30 mins

70 Marks

Key (A)

समय: ३ घण्टा

पूर्णाङ्क: १००

विषय: Current Developments in IT Sector and Emerging Technologies

Section 'A': Subjective

Time: 2 hrs 30 mins

70 Marks

- Explain any three IT risk associated with banking sector with their probable mitigation plan.
- Write down the mission, vision and objectives of information and communication technology policy.
- Differentiate between e-government and e-governance.
- What are the types of AI? Why is game theory important to AI?
- Explain the three cloud service models based on vendor offering and the customer needs and the responsibility of each according to the service contract.
- What is Virtual currency? What are the risks involved in using Virtual Currencies?
- What are the layers in OSI Reference Models? Describe each layer briefly.
- Explain FinTech, RegTech, SupTech and what they can do for supervisors.
- How does connect IPS help in electronic payment? Explain its working principle as well as role in providing seamless e-government services to the citizens.
- What are the types of Machine Learning? Explain Cloud Delivery Models. What should an individual be particularly attentive to when deciding to purchase virtual currencies?
- What is the purpose of socket? List any two types of socket. Differentiate between socket system call in connection oriented protocol and connectionless protocol. What are the possible impacts of cybercrime on economy and national security?

- Define Growth of functions. How do you measure it? Explain with appropriate examples. $1 + 4 = 5$
- Design a lexical analyzer generator and explain it.
- What is the purpose of the System Development Life Cycle (SDLC)?
- List the different types of system testing. Explain why we need Software Configuration Management (SCM).
- What is ERP? Explain its importance.
- Define projection in computer graphics. Briefly explain different types of projections.
- Write down the importance of inheritance in C++. Explain constructor and destructor call sequence in single and multiple inheritance in C++. How can we resolve ambiguity in multiple inheritance in C++?
- Compare object-oriented analysis and design with the structured analysis and design. Discuss different activities involved in each of the phases of the object-oriented development life cycle.

- Discuss the importance of software Quality Assurance (SQA) in brief. What are the types of software maintenance? Given some design principles for maintainability.

 $2 - 4 = 4 = 10$

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Key (A)

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: Information Technology - II
Section 'A': Subjective

Time: 2 hrs 30 mins

70 Marks

- How do you compare procedural and object oriented programming? Write down the limitations of procedural programming.
- Illustrate how binary search works.

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नेपाल राष्ट्र बैंक, प्राविधिक, सुचना प्रविधि, अधिकृत तृतीय, सहायक निर्देशक (IT/Cyber security) पदको खुला प्रतियोगितात्मक लिखित परीक्षा २०७९।०९।२६

Key (A)
समय: ३ घण्टा

पत्र: First

पूर्णाङ्क: १००

विषय: Information Technology-I

Section 'A': Subjective

Time: 2 hrs 30 mins

70 Marks

- Explain overlapped register window of RISC CPU with a required diagram. 5
- Illustrate the difference between D and T flip-flop with its characteristic equations. 5
- What do you mean by disk allocation and scheduling in an operating system? Describe Round robin scheduling algorithm. 3 + 2 = 5
- Explain ACID property of transaction in DBMS. 5
- Differentiate between client/server model and peer model. 5
- What do you understand by client server computing? Discuss about distributed object based communication "CORBA". 2 + 3 = 5
- Differentiate between Fintech and Suptech. What are the benefits of RegTech? 2 + 3 = 5
- What are the privileges and facilities entitled to Nepal Rastra Bank according to NRB, Act, 2058? 5
- Explain the differences among Short-term, Medium-term and Long-term scheduling with examples. 10
- Answer the following:
 (a) What are the steps involved in query processing? Explain the significance of materialized views. 5
 (b) Briefly describe two phase locking protocol for Concurrency Control. 5
- How does Border Gateway Protocol work? Explain IPv6 network migration methods. 4 + 6 = 10

नेपाल राष्ट्र बैंक, प्राविधिक, सुचना प्रविधि, अधिकृत तृतीय, सहायक निर्देशक (IT/Cyber security) पदको खुला प्रतियोगितात्मक लिखित परीक्षा २०७९।०९।२७

Key (A)
समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: Information Technology-I

Section 'A': Subjective

Time: 2 hrs 30 mins

70 Marks

- Differentiate between procedural and object-oriented programming. 5
- Explain the binary tree traversal techniques with examples. 5
- What is Push Down Automata (PDA)? List down three components of PDA. 5
- What does it mean by cohesion and coupling in object-oriented system design? Explain. 3 + 2 = 5
- Briefly explain various risk factor involved in software development. 2 + 3 = 5
- Explain the core components under Android application architecture. 5
- Write in brief about hierarchical modeling and its use in computer graphics. 5
- Provide a brief description of E-Government Life Cycle. 5
- Compare and contrast Service Oriented Architecture and Micro Service Architecture. 5
- Explain the various phases of Software Development Life Cycle (SDLC) in brief. 10
- Describe the existing eco-system of electronic payment system in Nepal. 10

नेपाल राष्ट्र बैंक, प्राविधिक, सुचना प्रविधि, अधिकृत तृतीय, सहायक निर्देशक (IT/Cyber security) पदको खुला प्रतियोगितात्मक लिखित परीक्षा २०७९।०९।२८

पत्र: Third
विषय: IT Security
Section 'A': Subjective

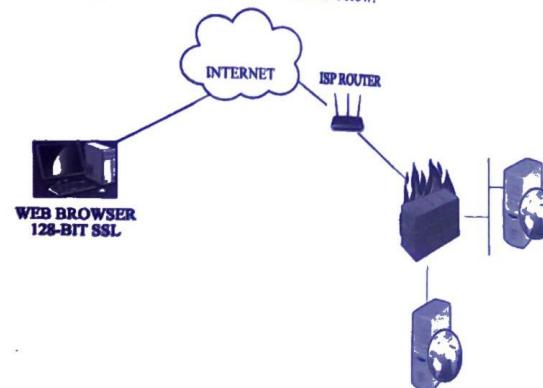
पूर्णाङ्क: १००

Time: 2 hrs 30 mins

70 Marks

- Define Instruction Detection System (IDS). Mention the types, characteristics and role of IDS in Network management and control. 3 + 2 = 5
- What are some common types of attacks that can be launched against a web application? 1 + 2 + 2 = 5
- Explain the difference between Firewall and VPN. 5
- Explain in detail the difference between Block Cipher and stream Cipher. 5
- What are the advantages and disadvantages of ethical hacking? 5
- Identify the difference between a vulnerability and an exploit. What are salted hashes? 5
- What steps would you perform in identifying IT/IS related risks in Risk Identification State of IS risk management? 3 + 2 = 5

ABC Technology environments is illustrated below.



Other attributes of ABC's technology environment include the following:

- Firewall is Cisco® Adaptive Security Appliances (ASA).
- Web server and application server are hosted on windows® Server® environments.
- Database server is Microsoft® SQL Server® 2014 hosted on a Windows Server.
- There are no configuration standards for operating systems or hosted services.
- Server builds are based on the initial install.
- Patches are implemented on a quarterly basis.

- No instruction detection system- (IDS)/ intrusion prevention system, (IPS) or security information and event management (SIEM) is implemented.
- No security assessment or penetration test has been undertaken for network infrastructure or the web application.
- The database server includes customer master information, customer transaction data, sales order data, inventory data, pricing information and sales leads.

Summary of Firewall Rules

Source	Destination	Services Allowed
Internet	Web/Application DMZ	Mail, HTTP, HTTPS, FTP, SSH
Internet	Database DMZ	None
Web/Application DMZ	Database DMZ	SQL Server, SSH, FTP

Based on the presented scenario, write down the key risks relevant to company ABC and the vulnerabilities that are present that may allow cyber threat events to occur.

5 + 5 = 10

10. Explain digital signature algorithm. Describe elliptical curve cryptography. 5 + 5 = 10
 11. What is information security policy? Explain how it can be beneficial for an organization. 10

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समय: ३ घण्टा

पत्र: Second

पूँजीदाक: १००

विषय: Information and Technology

Section-A

40 Marks

1. Briefly explain all phases of SDLC. How can the system development life cycle (SDLC) be used to analyze, plan and document systems changes in an organization? Explain with suitable examples. 8 + 12 = 20
 2. Answer of the following:
 a. Write an algorithm and a pseudo code as well as draw a flowchart to convert the length in feet to centimeter. It is given that one foot equals to 30.48 cm. 10 + 10 = 20
 b. What are the challenges with network layer design? Explain with appropriate examples.

Section-B

60 Marks

3. Answer of the following:
 a. In a computer instruction format, the instructions length is 11 bits and the size of an address field is 4 bits. The system architect has already designed six 2-address instructions and thirty 1-address instruction. How many 0-address instructions are still possible to accommodate for the instruction set architecture? 10 + 10 = 20
 b. Suppose a computer using direct mapped cache has 2^{32} words-addressable main memory and a cache of 1024 blocks, where each cache block contains 32 word. How many blocks of main memory are there to which cache block will the memory address 0XF0380161 maps? 10 + 10 = 20
 4. Answer the following:
 a. What do you mean by binary search? Explain it with suitable diagram and algorithm. 10 + 10 = 20
 b. Explain the use of Entity Relationship Diagram (ERD) with suitable examples. 10 + 10 = 20
 5. Answer the following:
 a. What are the basic feature of electronic transaction Act, 2063? Explain in brief. 10 + 10 = 20
 b. Why is digital signature required? How can you generate it? Explain with suitable examples.

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पत्र: Second

विषय: Information and Technology
Section 'A'

पूँजीदाक: 100

Briefly explain all phases of SDLC. How can the system development life cycle (SDLC) be used to analyze, plan and document system changes in an organization? Explain with suitable examples.

40 Marks

Answer the following:

- a. Write an algorithm and pseudo code as draw a flowchart to convert the length in feet to centimeter. It is given that one foot equal to 30.48 cm. 8 + 12 = 20
 b. What are the challenges with network layer design? Explain with appropriate examples. 10 + 10 = 20

Section 'B'

60 Marks

Answer the following:
 a. in a computer instruction format, the instruction length is 11 bits and the size of address field is 4 bits. The system architect has already six 2-address instructions and thirty 1-address instructions. How many 0-address instructions are still possible to accommodate for the instruction set architecture?

10 + 10 = 20

b. Suppose a computer using a direct mapped cache has 2^{32} words of word-addressable main memory and a cache of 1024 blocks, where each cache block contains 32 words. how many blocks of main memory are there and to which cache block will the memory address 0XF0380161 maps?

10 + 10 = 20

Answer the following:

- a. What do you mean by binary search? Explain it with suitable diagram and algorithm. 10 + 10 = 20
 b. Explain the use of Entity relationship Diagram (ERD) with suitable examples. 10 + 10 = 20

Answer the following:

- a. What are the basic feature of electronic transaction Act, 2063? Explain in brief. 10 + 10 = 20
 b. What is digital signature required? How can you generate it? Explain with suitable examples.

लोक सेवा आयोग, नेपाल टेलिकम (नेपाल दूरसंचार कम्पनी लिमिटेड), ग्राहिक, टेलिकम इन्जिनियरिङ, कम्प्युटर, साताँ, कम्प्युटर इन्जिनियर पदको खुला प्रतियोगितात्मक लिखित परीक्षा २०७९।०३।१०

पत्र: Second

विषय: Technical Subject

पूँजीदाक: 100

प्रत्येक Section को उत्तर द्वारा दिए गए उत्तरपत्रकाम लेख्यपत्रका अन्तर्गत उत्तरपत्रका रूपमा।
Subjective Time : 2 hrs 30 min [70 marks]

35 Marks

Section: 'B'

35 Marks

What is process synchronization and inter process communications? List out major two operations provided by inter process communication and explain them with examples. 2 + 3 = 5
 Explain the significance of Digital Signal Processing (DSP) in voice and image processing and communication. Defend the statement "Every modern electronic device has microprocessor." 6 + 4 = 10

6 + 4 = 10

Describe the various classes of IP addresses and classes addressing along with suitable examples. 6 + 4 = 10
 Briefly explain the working of the CSMA / CD protocol. 6 + 4 = 10
 Explain the expert systems and their need in an organization. 5 + 5 = 10

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Section 'A'

Describe the four basic data type with an example. Compare data abstraction with encapsulation in C++. With suitable example, explain the concept of class in C++. 5 Marks

What do you mean by schedule in the context of concurrent execution of transaction in RDBMS? 3 + 3 + 4 = 10

What is the sterilization schedule? Discuss the various types sterilization with the suitable example. 3 + 2 + 5 = 10

Explain how AJAX works. What are the applications of XML? 5 + 5 = 10

What are the significance of Software Maintenances? Differentiate between unit testing and integration testing. Explain why regression testing is critical during the software maintenance phase. 3 + 2 + 5 = 10

What are the statement of pumping lemma for regular languages. Explain how unrestricted grammar can be define as super set of CFG and Regular Grammar. Explain class P and NP problem with examples. 3 + 4 + 3 = 10

5. Define a transformer. Illustrate the different aspects of it with a diagram. 35 Marks
 $1 + 4 = 5$
6. Explain the feature of object oriented programming language that make it better than the structure programming language. Differentiate between multitasking and multiprocessing. 6 + 4 = 10
 $5 + 5 = 10$
7. Answer the following:
 a. Explain the integrity constraints with an example. 3 + 3 + 4 = 10
- b. Describe the 2PL concurrency control protocol. 5 + 5 = 10
8. Describe how dynamic PHP webpage are served from a HTTP web server. Describe the various types of security measures that can be secured web server from internal threats. 5 + 5 = 10

लोक सेवा आयोग, कृषि विकास बैंक लिमिटेड, प्रविधिक, छैठौं कम्प्यटर अधिकृत पदको खुला प्रतियोगितात्मक लिखित परीक्षा २०७९।०३।०५

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: सेवा सम्बन्धी

प्रत्येक Section को उत्तर छाल्न्है उत्तरपुस्तिकामा लेख्नुपर्नेछ। अन्यथा उत्तरपुस्तिका रद्द हुनेछ।

Section 'A'

1. Briefly explain about the basic computer Instructions. 5 Marks
2. Describe Minimum Spanning Tree with an example. 5 Marks
3. What is neutral network? Describe how Neural network works. 5 Marks
4. Explain Use case Diagram with suitable example. 5 Marks
5. "Pipelining is technique to speedup processing of a processor." justify this statement with a suitable examples. Explain about Cluster Configurations. 6 + 4 = 10
6. Differentiate between synchronous and asynchronous counter. Explain Ripple Counter with its truth table and timing diagram. 3 + 7 = 10
7. Describe spiral model with its advantage and disadvantage. What are the benefits and problem of software reuse? State the factors that need to be taken care while reusing software. 4 + 3 + 3 = 10

Section 'B'

50 Marks

2 + 3 = 5

5 + 5 = 10

5 + 5 = 10

6 + 4 = 10

3 + 7 = 10

3 + 7 = 10

4 + 3 + 3 = 10

50 Marks

2 + 4 + 4 = 10

10 + 10 = 20

10 + 10 = 20

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लोक सेवा आयोग, बीमा समिति, प्रशासन, अधिकृत तत्त्व, सहायक निर्देशक (सचना प्रविधि अधिकृत) पदको खुला प्रतियोगितात्मक लिखित परीक्षा २०७९।०३।२२

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: Information Technology-II

प्रत्येक Section को उत्तर छाल्न्है उत्तरपुस्तिकामा लेख्नुपर्नेछ। अन्यथा उत्तरपुस्तिका रद्द हुनेछ।

Section 'A'

1. Implement Exclusive OR gate by using NAND gates only. Implement the full adder using two half adders. Draw the circuit diagram the operands of edge triggered RS flip-flop. 3 + 3 + 4 = 10
2. What are the steps involved in an instruction cycle? Explain. Describe about the various type of interrupts in a microprocessor system. Highlight the importance of cache in a CPU. 4 + 3 + 3 = 10
3. Discuss the Operating System Functions and services in detail. 10
4. What are the features of IPv6? Explain about the Domain name Service. 5 + 5 = 10
5. What is Abstract Data Type? with appropriate examples, distinguish between Stacks and Queues. 4 + 6 = 10

50 Marks

पत्र: Second

पूर्णाङ्क: १००

विषय: Technology, Governance and Management

प्रत्येक Section को उत्तर छाल्न्है उत्तरपुस्तिकामा लेख्नुपर्नेछ। अन्यथा उत्तरपुस्तिका रद्द हुनेछ।

Section 'A'

Discuss the major misconception about information and the role they play in an organization. 50 Marks

What are the strength and weakness of humans as information processing? 5 + 5 = 10

How can Intrusion Detection system be the backbone of Information System? Justify along with its categories. 10

What do you understand by Software Estimation? Explain. Why do we need to do a software estimation? Describe about the COCOMO Model and Function Point analysis Model used for software cost estimation. 2 + 2 + 6 = 10

What are Secured Electronic Transaction (SET) Protocol? Describe how purpose request, payment authorization and payment capture are done in SET. 10

What is AI? Describe various component of AI in detail. 2 + 8 = 10

Section 'B'

50 Marks

"Integrity is greater than honesty in professional life". Do you agree with this statement? Justify. 5

Mention the importance of decision making process in management. 5

Discuss the concept and component of Human Resources Management. 5

Write in brief about the importance of insurance market supervision. 5

Enumerate the role of insurance in development of economy of Nepal. 5

What is the role of insurance mediators? Explain problems facing by the mediators and suggest solution to the problem. 2 + 3 = 5

What do you mean by frauds in insurance? Mention the type of insurance frauds and the provisions to curb the frauds as per insurance Act, 1992. 2 + 3 = 5

describe the role and functions of insurance board of Nepal. 5

It is widely used observed that the insurance claim of the policy-holder / insure does not take place in time. What are its barrier and how can these barrier be removed. 2 + 3 = 5

Write down the registration process of Insurer on the basis of insurance Act, 1992. 5

लोक सेवा अध्योग, कृषि विकास बैंक लिमिटेड, प्राविधिक, छैठौ, कम्प्युटर अधिकृत पदको खुला प्रतियोगितात्मक लिखित परीक्षा २०७९।१।२०

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: सेवा सम्बन्धी

प्रत्येक Section को उत्तर छाउँछै उत्तरपुस्तिकामा लेख्नुपर्नेछ । अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

Section 'A'

- Compare the Von Neumann and Harvard architectures of computers [5]
- What is the minimum spanning tree? Explain with an example. [3 + 2 = 5]
- What is net circuit diagram and truth table, describe how a basic SR-flip-flop works. [5]
- What is Data Flow Diagram (DFD)? Mention its uses. [2 + 3 = 5]
- Explain the type of parallel Processing. Also, describe how L1 and L2 CPU caches work together to increase CPU* performance. [5 + 5 = 10]
- Write about business application of Business Intelligence (BI). Discuss the working principle of Neural Network. [5 + 5 = 10]
- What is risk Management of software engineering? What are the strategies for the dealing with software risk? Explain briefly. [2 + 8 = 10]
- What are the main type of e-Business Model? Explain with examples. [2 + 3 = 5]
- Describe various types of electronic payment system that can be used in electronic commerce. [5]
- What is OLAP? Mention about OLAP Architecture. [1 + 4 = 5]
- Discuss on 'NRB IT Guidelines, 2012'. [5]
- What are the basic security vulnerabilities of SOAP Services? Also, describe how you can provide security against those vulnerabilities. [6 + 4 = 10]
- Answer the followings: [5 + 5 = 10]
 - What is E-R diagram? Mention its uses.
 - What are the recovery techniques used to recover from database crash? Explain.
- Describe the functions of each layer of the OSI model. Compare and contrast OSI with the TCP/IP model. [7 + 3 = 10]

नेपाल विविध सेवा, राजपत्रादिकृत तृतीय थ्रेणी, कम्प्युटर इन्जिनियर (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा २०७९।१।२०

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: Technical Subject

तलका प्रश्नहरूको उत्तर Section अनुसार बोलावेगले उत्तरपुस्तिकामा लेख्नुपर्नेछ अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

Section-A

- Define computer architecture and computer organization. How can we maintain a performance balance between processor and memory? [5]
- What is knowledge representation? How semantic network is used to represent knowledge? [5 + 5 = 10]
- Define and compare Datagram and Virtual circuit network with diagram. [5]
- For what reason should a software designer choose Object Oriented Programming over Structured Programming? [5]
- Explain the different phases involved in the waterfall life cycle. [10]
- Differentiate structured and object oriented programming. Describe polymorphism and inheritance with suitable example. [5 + 2.5 + 2.5 = 10]

- Section-C**
Describe how a man-in-the-middle attack may be performed on a Wi-Fi network and the consequences of such an attack. [10]
- What is AI? Describe various components of AI in detail. [2 × 8 = 16]

Section-D

- The life of people around the world have been affected by the COVID-19 pandemic for more than a year now. Various countries have been making use of the Information and Communication Technology (ICT) to fight against the challenges created due to pandemic. In this context, provide your view on how the potentials of ICT can be exploited to effectively deal with the direct and indirect challenges posed by the pandemic. [10]

Nepal government is striving to transform the governance to the digital governance. For this it has implemented various systems for the effective service delivery. You may take examples of Integrated Tax System at IR or the system of Transport Management Department or the system at Traffic Police Office and many more other system. Financial Comptroller General Office has Implemented Revenue Management Information System (RMIS) for the recording of the revenue collection and the system at various government offices have been connected to RMIS. You are aware that there are various Payment Service Operator (PSO) or Payment Service Providers (PSP) operating in the country. But people still have to line up in a queue either at the bank counter or at respected offices for the revenue payment of the services. Now, analyze and propose a better solution so that people will be able to pay the revenue online.

- Perform the technical, economic and operational feasibility analysis for the proposed system. [2 + 2 + 2]
- Draw a USE-CASE diagram and the sequence diagram for the proposed system. [4 + 4]
- Draw an ER diagram with the efficient database schema for the proposed system. [6]

नेपाल विविध सेवा, सेवा राजपत्रादिकृत तृतीय थ्रेणी, कम्प्युटर इन्जिनियर (प्राविधिक) पदको प्रतियोगितात्मक लिखित परीक्षा २०७९।१।२०

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: Technical Subject

तलका प्रश्नहरूको उत्तर Section अनुसार बोलावेगले उत्तरपुस्तिकामा लेख्नुपर्नेछ अन्यथा उत्तरपुस्तिका रद्द हुनेछ ।

Section-A

- Provide a comparison between Transmission Control Protocol (TCP) and User Data (UDP). [10]
- Suppose the network 200.168.10.0/24 is sub-netted to create 7 sub-networks. If 200.168.10.177 is assigned to a host computer. Determine the subnet mask, broadcast address, usable host range and in which subnet the given IP address falls. [10]
- What do you mean by pseudo random numbers? Explain Gap test. [10]

Section-B

- What do you mean by Deadlock? What are the necessary conditions for deadlock? [5 + 5 = 10]
- Briefly elaborate on the 'Design Queue' architecture. [10]
- Explain the terms Reengineering. [10]
- In objective-oriented programming. Explain the terms [10]
- What is functional dependency? [5]

6. Discuss various process scheduling algorithms. [10]

Section-C

7. (a) Write a short note on Learning' with respect to Artificial Intelligence. [5]

(b) Briefly discuss the pigeonhole principle in computation. [5]

8. What do you understand by cryptography? Explain in detail the Public Key Infrastructure (PKI). [3 + 7 = 10]

Section-D

9. Produce a brief concept note about how you plan to automate your organization attendance, payroll, registration etc. [10]

10. In a particular school, there are various departments. There are various instructors and are having direct employment from corresponding departments. Students are admitted to school and later they choose their subject study program offered through various departments. The instructors are assigned for particular subject teaching task. Each department has a HOD to sit in for semester end exams as a final evaluation process. Assuming with 'NQ' status students are NOT allowed for final exam. At least after 8 semesters of such final evaluations, students with clearance from department, including HOD approval, students become ready for graduation.

Now, answer the followings.

[5 + 10 + 5 = 20]

- (i) Prepare the list of processes and agents.

- (ii) Draw the DFO for graduation and associated process.

- (iii) Depict the relationship between instructor, HOD and Department.

नेपाल पुनर्जीवी कम्पनी लिमिटेड, सूचना प्रविधि इन्जिनियर, सातौं, उपप्रबन्धक (कम्प्यूटर)
पदको प्रतियोगितात्मक लिखित परीक्षा २०७८।१०।०२

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: सूचना प्रविधि सेवा सम्बन्धी

प्रत्येक Section को उत्तर छुट्टाछुट्टै उत्तरपुस्तिकामा लेख्नुपर्नेछ। अन्यथा उत्तरपुस्तिका रद्द हुनेछ।

50 Marks

1. Briefly describe the structure of a compiler with a block diagram showing stages of compiler. [5]
2. In computer architecture, there are different ways of addressing the location of an operand in an instruction which are called as Addressing mode. Explain Direct Addressing mode and indirect Addressing mode with a suitable example. [5 + 5 = 10]
3. What is a regular grammar? Explain with an example the method of converting a regular grammar into an equivalent Finite Automata. [10]
4. What is projection in computer Graphics? Mentions its types. What do you understand by hidden surface removal? Explain the different types of hidden surface detection algorithm. [5 + 5 = 10]
5. Briefly describe the Turing Test that had been proposed to test intelligence of machines. Suppose you need to design a program with AI and natural language processing capabilities and try to pass the Turing Test. What would be the architecture of such an intelligent program? Propose the different steps/stages that need to be implemented from accepting natural language question from a human to processing and understanding the questions to generating appropriate response in human understandable form. [3 + 6 + 6 = 15]

Section-B

50 Marks

6. What is operating amplifier? What are its uses? [2 + 3 = 5]
7. Describe key additional features of IPv6 compared to IPv4. Explain the main challenges to implement IPv6 in the existing IPv4 network setup. [5 + 5 = 10]
8. Describe the various states of a process in an operating system along with a state transition diagram. Briefly describe how virtual memory management can be implemented using page tables. [5 + 5 = 10]

9. Answer the following: [5 + 5 = 10]
- What are the major characteristics of IT Policy of Nepal, 2072?
 - Describe about the fundamentals of error detection and correction in electronics communications.
10. With the rapid development of ICTs and the rise electronic commerce through the facilitation of online payment systems, how do you think organizations can preserve the security and confidentiality of a user in Nepal? Do you think the private IT companies and IT employees of public organizations of Nepal follow the professional ethics and practices? Explain with critical incidents. [7 + 8 = 15]

**कृषि विकास बैंक लिमिटेक, प्राविधिक, छैटाँ, कम्प्युटर अधिकृत पदको खुला प्रतियोगितात्मक
लिखित परीक्षा २०७८।०९।०५**

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: सेवा सम्बन्धी

प्रत्येक Section को उत्तर हुँदै हुँदै उत्तरपुस्तिकामा लेख्नुपर्नेछ। अन्यथा उत्तरपुस्तिका रद्द हुनेछ।

Section-A

50 Marks

Briefly explain about the Basic Computer Instructions. [5]

Describe Minimum Spanning Tree with an example. [5]

What is a Neural Network? Describe how a Neural Network works. [2 + 3 = 5]

Explain Use Case Diagram with a suitable example. [5]

"Pipelining is a technique to speedup processing of a processor?" Justify this statement with a suitable example. Explain about Cluster Configurations. [6 + 4 = 10]

Differentiate between synchronous and asynchronous counter. Explain Ripple Counter with its truth table and timing diagram. [3 + 7 = 10]

Describe spiral model with its advantage and disadvantage. What are the benefits and problems of software reuse? State the factors that need to be taken care while reusing software. [4 + 3 + 3 = 10]

Section-B

50 Marks

8. What is cryptography? Describe Asymmetric Key cryptography in brief. [5]

9. Describe Credit Card based electronic payment system. [5]

10. What are the essential infrastructure and services required to operate an e-business? Explain. [5]

11. What are the characteristics of Online Analytical Processing (OLAP)? Describe. [5]

12. What is a weak entity set? How is a weak entity set associated with strong entity set in ER diagram? Explain with a suitable example. Differentiate between DDL, DML and DCL. [2 + 4 + 4 = 10]

13. Compare and contrast TCP/IP Protocol Suite with OSI Reference Model. [10]

14. Write a short note on 'Nepal Rastra Bank IT Policy and Guidelines, 2012.' [10]

**लोक सेवा आयोग, नेपाल प्रहरी इन्जिनियरिङ (सूचना प्रविधि / कम्प्युटर), प्राविधिक प्रहरी
निरीक्षक पदको खुला प्रतियोगितात्मक लिखित परीक्षा २०७८।०९।०९**

पत्र: Second

विषय: क

Section - A

20 Marks

5 + 5

Answer the following:

i) Explain the difference between RISC and CISC architecture.

ii) Explain the difference between 'Stack' and 'Queue'.

Describe data type and operators used in objective-oriented programming. Explain the terms 'Encapsulation' and Inheritance'. 10

Section - B**10 Marks**

3. What are the methods and technique that can be used for requirement analysis? Suppose that you need to design a secure web-based information system for the Nepal police Headquarters to maintain the records of all crime reports in Kathmandu Valley and their status. List the major functional and non-functional requirements such a system may have.

 $4 + 6 = 10$ **Section - C****10 Marks**

4. What are the different popular schemas that are being used in building data warehouse? Explain any three type with appropriate sample to clarify the differences among these schemas.

10

Section - D**10 Marks**

5. Answer the following:

 $5 + 5 = 10$

- IPv6 proposition was to replace IPv4 and even after long time, still IPv4 is in use. Explain the difference and various reason of there existence.
- What is RIP used? What are the versions of RIPv and their differences?

**नेपाल विविध सेवा, सेवा राजपत्राङ्कित तृतीय श्रेणी, कम्प्युटर इन्जिनियर (प्राविधिक) पदको
प्रतियोगितात्मक लिखित परीक्षा २०७७।१।०६**

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: Technical Subject

तलका प्रश्नहरूको उत्तर Section अनुसार बोलाबोलै उत्तरपुस्तिकामा लेख्नुपर्नेछ अन्यथा उत्तरपुस्तिका रद्द हुनेछ।

Section-A

- Define combinational and sequential logic circuits with diagram. Compare them. [5 + 5 = 10]
- What is the function of DMA address register? What are the various addressing modes present in 8086? [2 + 3 = 5]
- Explain full adder with symbol, circuit diagram and truth table. Differentiate between SNR and BER. [6 + 4 = 10]

Section-B

- What are the advantages of Digital Modulation over Analog Modulation? Explain. [5]
- What is cost estimation? How cost can be estimated using COCOMO model? Write down the steps for function point analysis to determine the size of a software project. [1 + 4 + 5 = 10]
- Explain different types of linear data structures with examples and working principles. [10]

Section-C

- Define GIS and explain its components. [10]
- (a) Explain Turing machine in brief.
(b) Explain the importance of compiler. Explain Lexical analysis and its use in compiler design. [2 + 2 + 2 = 6]

Section-D

- Consider you are hired as team member to develop SRS document for developing MIS of any government organization. Develop sample SRS document analyzing all requirements. [10]
- (a) In Nepal, We have different ID Nos. like citizenship No., Driving License No., Voter solve all types of identification problems. Explain your vision. [10]
- (b) The Government of Nepal intends to open a single window service delivery for any type of work required in districts like land registration, citizenship distribution, birth/death/marriage registration, water/electricity/telephone bill payments etc. For that do the following: [5 + 5 = 10]
 - Draw a work flow diagram stating the functions of each organization involved.
 - Draw an E-R diagram of the proposed system.

**लोक सेवा आयोग, नेपाल टेलिकम, साताँ, टेलिकम इन्जिनियर (कम्प्युटर) पदको
प्रतियोगितात्मक लिखित परीक्षा २०७५।०५।२५**

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: Specialized Subject

Section : 'A'

Time: 1 hour 35 minutes

40 Marks

Short Answer

- Derive the generalize equation of stable factor 'S' for transistor.
- Write about the digital filtering in brief.
- State the communication and distributive property of Boolean algebra.
- Write about the interrupt derive I/O service.
- Write about the memory elements as VLSI system components.
- What is an RPC? State three ways in which they are different than local procedure calls.
- Write in brief about database security.
- What is Java Virtual machine? State.
- How client server transactions are processed? Explain.
- What are different web security mechanisms? Explain briefly.

Section 'B':

Long Answer

30 Marks

- What is TCP/IP? Explain the layers of TCP.IP.
- Explain the functions of operation system.
- Describe the importance of Software Engineering. What steps should be taken under the process of developing a software system? State

$3 + 7 = 10$

10

10

**नेपाल विविध सेवा, राजपत्राद्विकत तृतीय श्रेणी, कम्प्युटर इन्जिनियर (प्राविधिक) पदको
प्रतियोगितात्मक लिखित परीक्षा २०७२।१।२६**

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: कम्प्युटर इन्जिनियरिङ सम्बन्धी

निम्न प्रश्नहरूको उत्तर Section अनुसार छुट्टाछुट्टै उत्तरप्रस्तिकामा लेख्नुपर्नेछ, अन्यथा उत्तरप्रस्तिका रद्द हुनेछ।

Section-A

24 Marks

- Differentiate between Network layer and Transport layer. [5]
- Explain the associative mapping and set associative mapping [5]
- Given the two binary number $X = 1010100$ and $Y = 1000011$, perform the subtraction
 - $x-y$
 - $y-x$ using 1's complements
[4]
- Differentiate between large signal amplifier and small signal amplifier. [5]
- Explain the performance evaluation of analog and digital communication system. [5]

Section-B

26 Marks

- Explain the following concepts of object oriented programming in detail with an example. [5]
 - Data abstraction
 - Inheritance
 - Polymorphism
 - Objects
- Explain, why linear data structure is necessary? Given suitable example. [5]
- What are the important parameters while design a software for a particular use? [6]
- Differentiate between Hash based indexing and Tree based indexing. [5]
- Explain Round Robin scheduling. [5]

Section-C**20 Marks**

6. (a) Explain the automated reasoning in artificial intelligence. [3]
 (b) What are the major differences between Top-down Parsing and Bottom-up Parsing? [4]
 (c) Compare Gouraud rendering technique with phong shading method. [3]
7. (a) Why optimization is considered as one of the important aspect of any compiler design? [5]
 (b) What are the key steps in simulation study? [5]

Section-D

8. "Nepal can develop with the proper application of the information and communication Technology (ICT)", justify this statement. [10]

9. Suppose you are developing a system to automate the Exam Management System for public Service Commission, PSC has to decide and publish "manage applicant form" "take examination", and publish result" for different services (like computer engineer, administrative officers, doctors,). The system has to facilitate all process which includes registration and enrolment of applicants, examination procedure, result processing and result publication.

- (i) Perform a requirement analysis with necessary assumption wherever necessary'. [6]
 (ii) What is the possible ER-Diagram for this system? [10]
 (iii) What could be the limitation of the system and other non-technical requirement for successful implementation? [4]

राजपत्राङ्कित तृतीय श्रेणी, विविध सेवा, कम्प्युटर इन्जिनियर पदको प्रतियोगितात्मक लिखित

परीक्षा २०७०।१।२।०९

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: कम्प्युटर इन्जिनियरिङ सम्बन्धी

निम्न प्रश्नहरूको उत्तर खण्ड Section अनुसार हुँदैछु उत्तर पुस्तकामा लेख्नुहोस्।

Section-A

1. (a) Compare breadth-first and depth-first search algorithms in term of space and time complexity. [5]
 (b) Explain polymorphism with suitable example. [5]
2. (a) What is the difference between transistor and transformer? [5]
 (b) Discuss on error detection schemes in brief. [5]

Section-B

3. (a) Differentiate between the operating characteristics of a Raster Scan System and LCD display technologies. [3]
 (b) What are the Karnaugh Maps? How are they used to simplify and manipulate Boolean expression? Briefly explain with an example. [4]
4. (a) What do you mean by process maturity in the software engineering? Explain it with suitable practical example. [2 + 4 = 6]
 (b) Design a two bits synchronous counter along with logic diagram and explanation. [4]
5. (a) What is Moore' Law and Briefly explain its relevancy in current situation. [4]
 (b) Describe few application of Computer Graphics in real world. [3]
 (c) Describe briefly Natural language Processing Techniques. [3]

Section-C

6. (a) What do you know about Lexical analyzer? Explain with example. [5]
- (b) Define e-commerce and different types of e-commerce used in Nepal. [5]
7. (a) (i) What is service oriented architecture? Why these technologies are suitable for government scale software system? [2.5]
- (ii) Discuss hosted model of software licensing along with its benefits and limitations. [2.5]
- (b) Write short notes on: [2 × 2.5 = 5]
 - (i) Computer Firewall
 - (ii) DDL and DML in database concept.

Section-D

8. Write down the important of data center in the context of Nepal for effective e-government implementation. [10]
9. Ministry of General Administration (MOGA) intends to build a Personal Information System (PIS) to manage information of all civil servants across the country. The system is assessable from other ministries, departments and offices. The system would have details regarding employee, service record, transfer, promotion, punishments, salary scale and grades, and generates different reports required for ministries top get an idea of Human resource usage. The system is expected to be very flexible, scalable, stable and secure.
 - (a) Draw a top level diagram that depicts system as a whole including software, hardware, data resource and networking technologies. List out different hardware and software with brief specification that is required to develop and operate such system. [5]
 - (b) Draw Level-1 DFD for the system.
 - (c) Draw a Gantt chart that would describe the project of software implementation. [5]
 - (d) What are different security measures that should be in place to make system secure in terms of hardware, database, network and software. [5]

**राजपत्राङ्कित तृतीय श्रेणी, विविध सेवा, कम्प्युटर अधिकृत पदको प्रतियोगितात्मक लिखित
परीक्षा २०६६।१।१।८**

समय: १ घण्टा ३० मिनेट।

पत्र: Second

पूर्णाङ्क: ५०

विषय: कम्प्युटर सम्बन्धी

निम्न प्रश्नहरूको उत्तर खण्ड Section अनुसार छुट्टाछुट्टै उत्तर पुस्तिकामा लेख्नुहोस्।

Section-A

1. Draw a graph and illustrate how depth-first search and breadth-first search differ. [10]
2. Write a program using C++ to create a payroll system of any organization. Use functions for updating, displaying and deleting the record of given payroll system. [10]

Section-B

3. Illustrate with examples, how do you proceed to fully automate the document from system in a typical government office. [10]
- (b) Design a two bits synchronous counter along with logic diagram and explanation. [4]

Section-C

What do you mean by normalization of database? Normalize any relational database using 3NF and write differences between BCNF and 3NF. [10]

Section-D

Write about the role of controller (Digital certifying authority) as mentioned in Electronic Transaction Act of Nepal. [10]

**राजपत्रादिकत तृतीय श्रेणी, विविध सेवा, कम्प्युटर इन्जिनियर पदको खुला प्रतियोगितात्मक
लिखित परीक्षा २०८२।५।३।**

समय: ३ घण्टा

पत्र: Second

पूर्णाङ्क: १००

विषय: कम्प्युटर इन्जिनियरिंग सम्बन्धी

Answer the following questions:

1. (a) Explain the working principle of sliding window protocol. [5]
 (b) What do you understand by ADT "Explain with a suitable example reference" [5]
2. (a) Define the term Hashing write down the basic algorithm of hashing and the hashing table. [4]
 (b) Make a comparative study of RISC and CTSC architecture in terms of cost and overall throughput. [3]
 (c) Design a four bit down counter. [3]
3. (a) Explain the different methods of implementing a project on a system. [3]
 (b) Why do we need crash recovery in DBMS? Explain. [3]
 (c) Describe the difference between short-term medium-term and long-term scheduling. [4]
4. (a) Explain the relationship between prototyping. JAD an RAD. [3]
 (b) State and prove the pigeonhole principle. [4]
 (c) What do you understand by Deadlocks in Distributed Database system? How can it be prevented? [3]
5. (a) Compare between assembler and compiler. [4]
 (b) Discuss the phases of compiler. [6]
6. (a) Describe use of coupling capacitors and bypass capacitors. [2]
 (b) Draw a diagram of full wave rectifier and its input and output wave forms. [3]
7. Discuss the demerits of RDBMS. [10]
8. Write an essay on "Digital divide in the developing countries". What specific steps would you suggest for reducing "digital divide" in Nepal? [5 + 5 = 10]
9. A college library management system has different types of user, such as, students, staff, teachers. Each user-type has different book transaction privileges. User can only view the list of available books that is, users cannot access to the any type of data manipulation. The process of book transaction, the number of days and the fine-rate is all managed by the library administrator only.
 - (i) For the system described above draw the ERD, context diagram and level – 1 DFD. [9]
 - (ii) Design the normalized database for the library management system mentioned above. [5]
 - (iii) Analyse the cost benefit in the design of the system. Also determine the total data volume required for the system. [6]

