CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech. CSE **Session: 2021-22**

Semester: VIth **Max. Time: 3 Hours**

Course Title: Data Warehousing and Data Mining **Max. Marks: 70**

Course Code: BT CS 604 A

Instructions:

1. Question no. 1 has seven parts and students are required to answer all seven parts. Each part carries two Marks.

2. Question no. 2 to 5 have three parts and student arerequired to answer any two parts of each question. Each part carries seven marks.

Q 1. (2X7=14)

a) What is data warehouse? How is it different from DBMS?

b) What is Associative Classification?

c) What is the objective of Clustering?

d) How effective are Bayesian Classification?

e) Compare and Contrast between OLTP and OLAP.

f) Design Fact constellation table with suitable example.

g) Explain support vector machines.

Q 2. (2X7=14)

a) What is data warehouse? Explain three tier architecture of data warehouse.

b) Discuss the database architecture for parallel processing.

OR

a) Discuss the data warehouse schemes for decision support.

b) Differentiate between OLTP and OLSP.

Q3. (2X7=14)

a) Describe the various phases in knowledge discovery with a neat diagram.

b) Discuss the various issues encountered in data mining.

OR

a) What is data processing and why is it required? Also explain the various stages of data preprocessing with example.

Q 4. (2X7=14)

a) What is Apriori Algorithm? State the principle.

b) What is Association analysis? Explain the association rule, support and confidence.

OR

c) Explain the strategies used in frequent item set generation.

d) Construct a FP tree for the following dataset.

TID	1	2	3	4	5	6	7	8	9	10
Item	{a, b}	{b, c, d}	{a, c, d, c}	{a, d, e}	{a, b, c}	{a, b, c, b}	{a}	{a, b, c}	{a, b, d}	{b, c, e}

Q 5. (2X7=14)

a) Explain how decision tree induction algorithm works with example. List and explain the different characteristics of decision tree induction with example.

b) What are the key issues in hierarchical clustering? Explain.

OR

a) Why naive Bayesian Classification called naive. Briefly outline the major ideas of naive Bayesian Classification. Explain Naive Bayes Classification.

b) What is cluster analysis? Describe the different types of clustering techniques with example.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Computer Science & Engineering
Course Code: BT ECO507A **Max Time:** 3 Hrs
Course Title: Economics **Max Marks:** 70

Instructions:

Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).

Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 (2*7 = 14)

a) Define Production Possibility curve?
b) Define the Law of Demand?
c) Define the term Consumer surplus?
d) What are factors of production?
e) Write an example of opportunity cost?
f) Mention the names of various markets?
g) Write down the objectives of World trade organization (WTO)?

PART –II

Q. No.2 State the Economic laws and their nature and explain the circular flow of income in four sector model of economy with suitable graphs? (14 marks)

OR

Q. No.2 Define the term utility and its importance? Explain the Law of equi-marginal utility with suitable example? (14 marks)

Q. No.3 Define price elasticity of demand and explain all the factors that influence the price elasticity of demand? (14 marks)

OR

Q. No 3 Define indifference curve and its assumptions and also explain the various properties of indifference curve with suitable graphs? (14 marks)

Q. No.4 Differentiate between Fixed cost and variable cost and Explain the law of returns to scale using a graph? (14 marks)

OR

Q. No .4 What are internal and external economies of scale? Differentiate between implicit and explicit cost and discuss why the short run average cost curve is U-shaped? (14 marks)

Q. No.5 Explain the meaning of gross domestic product (GDP) and gross national product (GNP), and also differentiate them? (14 marks)

OR

Q. No.5 Define Law of supply and Explain the effect of change in demand and supply on prices with suitable examples and graphs? (14 marks)

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Computer Science & Engineering

Course Code: BT CS 601A **Max Time:3 hour**
Course Title: Principle of Operating System **Max Marks:70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 [2X7=14]

a. Explain the need of the Operating System.
b. What is the difference between preemptive and non-preemptive scheduling?
c. Briefly explain the counting semaphores.
d. Define the term Waiting time and Turnaround time in reference to scheduling algorithms.
e. Explain (i) Repositioning and (ii) Truncating operations on the file.
f. Explain the term deadlock in brief.
g. Differentiate between Protection and Security.

PART –II

Q. No.2

a. A computer system can be categorized roughly according to (i) Single-Processor Systems, (ii) Multiprocessor Systems, and (iii) Clustered Systems. Discuss all the three in detail. Also, write the advantages of each. [2+4+4]
b. Discuss the following operating systems (i) Time-sharing and (ii) distributed. [4]

OR

a. What is the process? Explain about various fields of Process Control Block. [2+8]
b. Explain the I/O operation in detail. [4]

Q. No.3

a. What is a Critical Section problem? Give the conditions that a solution to the critical section problem must satisfy. [2+4]
b. What is the solution to Dining Philosophers problem? Discuss the Dining philosopher's problem [3+5]

OR

c. Consider the following set of processes, with the length of the CPU burst time given in milliseconds:

Process	Burst Time	Priority
P_1	2	2
P_2	1	1
P_3	8	4
P_4	4	2
P_5	5	3

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5, all at time 0.

i. Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non-preemptive priority (a larger priority number implies a higher priority), and RR (quantum = 2).

ii. What is the turnaround time of each process for each of the scheduling algorithms?

iii. What is the waiting time of each process for each of these scheduling algorithms? iv. Which of the algorithms results in the minimum average waiting time (overall processes)?

[14]

Q. No.4

a. Three major methods of allocating secondary storage space are in wide use: contiguous, linked, and indexed. Describe each of the methods in detail with examples. Also, discuss the advantages and disadvantages of each method. [14]

OR

b. The selection of directory-allocation and directory-management algorithms significantly affects the efficiency, performance, and reliability of the file system. In this respect discuss the different methods of implementing a directory.

[10]

c. Discuss Linked List-based approach for free-space management. Also, write the advantages and disadvantages of this approach. [4]

Q. No.5

a. Discuss the attacks that are divided into three groups related to the three goals of security-confidentiality, integrity, and availability

[14]

OR

b. The major security problem for operating systems is user authentication. Discuss all the aspects of authentication with respect to Passwords, Password Vulnerabilities, Securing Passwords, One-Time Passwords, and Biometrics.

[14]

Central University of Haryana
EVEN Semester Term End Examinations June 2022
B.Tech. Programmes
Branch: Computer Science & Engineering (Semester-4th)

Course code: BT AUD 308A
Course Title: Environmental Sciences

Max Time: 3 Hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (each sub Question carries two marks)
Question number 2 (two) to 5 (five) carries 14 marks each with internal choice.

PART-I

Q.No.1

(a) Define desertification and give its causes?
(b) Define biomagnifications and give its impact on organisms?
(c) Give short note on genetic diversity?
(d) Give the impact of carbon monoxide (CO) on human health?
(e) Write short note on Itai-Itai disease?
(f) Define solar cells and give their applications?
(g) What is biogas? Give its importance?

PART-II

Q. No.2 Explain the scope and multidisciplinary nature of environmental science?
OR
Q. No. 2 Explain the various causes of deforestation and discuss the consequences of deforestation with case study?

PART-III

Q. No.3 Define biodiversity and discuss its values and threats?
OR
Q. No.3 Draw and explain the pyramid of number, biomass and energy in grassland and forest ecosystem with example?

PART-IV

Q.No.4 Define & classify the solid waste and explain its various management techniques?
OR
Q. No. Define water pollution. Explain its sources and discuss its impacts on the ecosystem with case study?

PART-V

Q.No.5 What is population growth? Explain the various factors which influence the population Size and give its impact on environment?
OR
Q.No.5 Enumerate the observation required during the study of grassland and lake ecosystem?

Central University of Haryana
ODD Semester Term End Examination June 2022
Program: B. Tech.
Branch: CSE (6th sem.)

Course Code: BT CS 603A
Course Title: Software Engineering

Max Time: 3 Hours
Max Marks: 70

Instructions:
Question Number **1** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2 (two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) What is mean by Software Engineering Paradigm?

(b) What are the non-functional requirements of software?

(c) Differentiate between Cohesion and Coupling.

(d) What is Mutation Testing? Explain.

(e) What is the role of lines of code project size estimation?

(f) What is Use case Diagram? Explain its various components.

(g) List the Difference between Verification and Validation.

PART –II

Q. No.2 (a) Explain the various phases encompassed in RAD Model. (7)

(b) Explain the challenges faced in software engineering. (7)

OR

Q. No.2 (a) What is the use of software development process model? Explain. (7)

(b)What is requirement engineering in softwares? Explain in details. (7)

Q. No.3 (a) Explain 4+1 architectural view model in detail. (7)

(b) What is risk management. Why is it important in softwares? (7)

OR

Q. No 3 (a) Suppose that a project was estimated to be 1000 KLOC. Calculate the effort and development time for each of the three modes: Organic, Semi-detached and embedded. (7)

(b) With a neat diagram, explain the waterfall model of software development process. (7)

Q. No.4 (a) Explain COCOMO model in detail. (7)

(b) What is OO development? Explain object-oriented themes briefly. (7)

OR

Q. No .4 (a) What is SQA? Explain its various activities. (7)

(b) What are the software metrics and measurements? Explain. (7)

Q. No.5 (a) What is UML? Draw a collaboration diagram of online shopping system and explain. (7)

(b) Discuss the different types of CASE tools with example. (7)

OR

Q. No.5 (a) Differentiate between black-box and white-box testing. (7)

(b) What is reliability? How reliability is estimated? Explain various software reliability estimation metrics. (7)

Central University of Haryana
ODD Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Computer Science & Engineering

Course Code: BT CS 402 **Max Time:** 3 Hrs.
Course Title: Object Oriented Programming in C++
Max Marks:

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 (7x2 marks=14marks)

(a) What is an friend function? Give an example to support your answer.
(b) Define function overriding? Compare it with function overloading?
(c) Define Data hiding? Explain how it is achieved in C++?
(d) Write the significance of pure virtual functions in C++?
(e) What is a function template? Explain its syntax and semantics?
(f) Differentiate between multilevel and multiple inheritance.
(g) Write a program to demonstrate the deep copy using a copy constructor.

PART –II

Q. No.2

a) What is a inline function? Discuss its pros and cons with respective to normal member functions? (7 marks)
b) What is Function overloading? Write a program to show the alternative solution to the default argument. (7 marks)

OR

Q. No.2

a) Write a C++ program to generate Fibonacci series using **recursion** with member function.
Example: Output of Fib(8) is 0, 1, 1, 2, 3, 5, 8, 13 (6 marks)
b) What are the main features of Object-oriented programming? Briefly explain each of them. Also explain its significance. (8 marks)

Q. No.3

a) What are classes? Create a class with the following data members?
Name of the class: *Employee*
Data members: *name, emp_id, designation, department*
Member functions: set_details() and get_details() to set and display Employee details respectively? (7 marks)
b) Create a class InterestCalculator that stores *principal_amount, rate_of_interest, period.* Write the member function to calculate Simple Interest and Compound Interest. (7 marks)

OR

Q. No.3

a) Create a class BankAccount that contains data members like *name, phone, email, account_number, type_of_account, balance*. Write a program to create two ways to create object based on the rules given below:

i) Simple Saving Account with ZERO balance (arguments: *name, phone, email, account_number, type_of_account*)
ii) Premium Saving Account with minimum balance of Rs. 5000 (arguments: *name, phone, email, account_number, type_of_account, balance*) (6 marks)

b) What is a static data member? Write a program to count the instances of a class. (8 marks)

Q. No.4 Create two classes *InternalAwards* & *ExternalAwards* where both the classes derived the properties from the base class *Student*. Write a C++ program illustrating the overloading Addition(+) operator to add both the marks to get the final awards?

Name of the base class: *Student*
Data members: name, roll_number, branch, year
Name of the base class: *InternalAwards*
Data members: sessional_marks, attendance_marks, assignment_marks
Name of the base class: *ExternalAwards*
Data members: final_exam_marks
Note: Addition of Internal awards & External awards must be calculated for the same student. (14 marks)

OR

Q. No.4

a) What is inheritance? How does it enable code reusability, explain with an example? (7 marks)

b) Create classes Time1 that represent 12 hours clock(AM/PM) and Time2 that represent 24 hours clock. Write the code to convert the Time1 object to Time2 object and vice-versa (t1=t2;) (7 marks)

Q. No.5

a) What is a Templates Class? Write a C++ program illustrating Templates Class? (7 marks)

b) Write about IOS format functions with suitable examples? (7 marks)

OR

Q. No.5

a) Discuss formatted and unformatted IO operations in detail. (7 marks)

b) Briefly explain classes for file stream operations in C ++? (7 marks)

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch:Computer Science & Engineering

Course Code:BT CS 633 **Max Time:3 hours**
Course Title:Distributed Systems **Max Marks:70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries a total of 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 [2 X 7=14]

a. Explain distributed systems and distributed computing.
b. Name all the criteria in terms of logical distribution that a distributed system must satisfy.
c. Name the different types of RPC failures.
d. Explain the problem in a distributed system that occurs due to no global agreement on time.
e. Briefly write about the different design and implementation issues of distributed shared memory?
f. Explain Strict consistency model.
g. Discuss Unstructured and Structured Files.

PART –II

Q. No.2

a. What are the major issues of designing a distributed system? [4]
b. Why is scalability and transparency an important feature in the design of a distributed system? [4]
c. What is RPC (Remote procedure call)? Explain how the sender and the receiver processes interact when a RPC is made. [2+4]

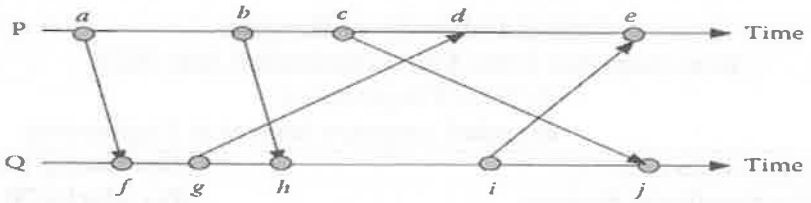
OR

a. Explain the differences between Distributed Operating system, Network Operating system, and Distributed System in detail. [6]
b. Explain the following RPC issues in detail (i) dynamic binding and (ii) failure. [3+5]

Q. No.3

a. Describe the algorithm which synchronizes the logical clock.

b. Calculate the logical clock values of the events a – j in Figure below.



A sample communication between processes P and Q.

c. Explain the limitation of the logical clock and discuss the corresponding solution which is used to overcome the limitation.

[5+5+4]

OR

a. Discuss the three main problems that have been studied in the area of physical clock synchronization.
b. Explain the Berkeley algorithm. Use an example to show it's working. [4+10]

Q. No.4

a. A system uses the pre-emption method for deadlock prevention. Suppose the system currently has five transactions T1 , T2, T3, T4 and T5, their timestamp values being t1, t2, t3, t4 and t5 respectively (t1 > t2 > t3 > t4 > t5). Explain what happen if :
   i. The system uses the wait-die scheme and T2 requests for a resource held by T5.
   ii. The system uses the wait-die scheme and T4 requests for a resource held by T1.
   iii. The system uses the wait-wound scheme and T3 requests for a resource held by T4.
   iv. The system uses the wait-wound scheme and T5 requests for a resource held by T2.

b. Discuss the factors influencing block size selection in case of Granularity issues of Distributed shared memory.

[10+4]

OR

a. Differentiate among safe, unsafe, and deadlock states. Assume that in a system there is a total of 10 units of a resource for which four processes P_1 P_2, P_3, and P_4 are competing. Suppose the maximum units of the resource required by P_1 P_2, P_3, and P_4 are 3, 6,5, and 4, respectively, and they are currently holding 2, 1, 3, and 2 units of the resource, respectively. Find out whether the current state of the system is safe or unsafe. If it is safe, enumerate all the safe sequences. [14]

Q. No.5

a. Explain different semantics of file sharing in the context of Distributed File System. Also, discuss the problems related to each semantics. [14]

OR

a. What are the properties that the transaction system guarantees
b. What are the different types of distributed transactions?
c. Discuss Two Phase Commit (2PC) protocol in detail

[4+2+8]

Central University of Haryana
Even Semester Term End Examination June 2022 (Reappear)
B. Tech. Programmes
Branch: Computer Science and Engineering

Course Code: BT MT 301
Course Title: Mathematics-3

Max Time: 3 Hours
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1:
(a)Determine whether the function ids functionally dependent or not.

$$u = sinx + siny; v = \sin(x+y)$$

(b) If $f(x) = \begin{cases} \frac{\pi}{2}, & 0 < x < \pi \\ 0, & x > \pi \end{cases}$, Find $B(\omega)$?

(c) Show that $\lim_{x\to 0}\lim_{y\to 0} f(x,y) \neq \lim_{y\to 0}\lim_{x\to 0} f(x,y)$, if $f(x,y) = \frac{x-y}{x+y}$.

(d) Find the general solution of the differential equation $\frac{dy}{dx} = e^{x+y}$?

(e) Find the general solution of the differential equation $(D^2 - 2)y = 1$.

(f) Compute the function $f(f), if\ \ F(s) = \frac{3s+4}{(s^2+9)}$?

(g) Find the Laplace transform of $\delta(t-a)$?

PART –II

Q. No.2: a) Find the general solution of the differential equation:

$$(D^2 - 1)y = x\ sinx + x^2e^x$$

b) Solve the differential equation $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 5y = x^2\sin(logx)$

OR

Q. No.2: a) Solve the differential equation

$$(1+x)^2y'' + (1+x)y' - y = \ln(x+1)^2 + x - 1$$

b) Solve the differential equation by the method of variation of parameters:

$$(D^2 - 2D + 2)y = e^x tanx$$

Q. No.3: a) Find the maximum and minimum distance from the origin to the curve:

$$3x^2 + 4xy + 6y^2 = 140$$

b) Expand $cosx\ cosy$ in the powers of x ad y up to fourth degree term.

OR

Q. No 3: a) Examine the continuity of the function

$$f(x,y) = \frac{x^2}{\sqrt{x^2+y^2}}, for\ (x \neq 0, y \neq 0)$$
$$= 3, \qquad for\ (x = 0, y = 0)$$

b) Using the Leibnitz's rule evaluate the definite integral $\int_0^1 x^m(logx)^n dx$

Q. No 4: a) Find the Laplace transform of the function $\begin{cases} g(t) = 0, & 0 < t < 5 \\ = t-3, & t > 5 \end{cases}$

b) Solve the differential equation using Laplace transform:

$$y'' + 2y' + 5y = e^{-t}, \qquad y(0) = 0, \qquad y'(0) = 1$$

OR

Q. No .4: a) Use convolution theorem to find the inverse of $\frac{1}{s(s+1)(s+2)}$

b) Solve the system of equation using Laplace transform:

$$\frac{d^2x}{dt^2}+\frac{dy}{dt}+3x=15e^{-t}$$

$$\frac{d^2y}{dt^2}-\frac{4dx}{dt}+3y=15\sin 2t$$

$$x(0)=35, x'(0)=-48, y(0)=27, y'(0)=-55$$

Q. No.5: a) Find the Fourier series of the function $f(x)=e^{ax}, x\in(0,2\pi)$.

b) Find the temperature distribution in a bar of length L, with its both ends and lateral surface insulated when the initial temperature in the bar is $f(x)$. Deduce when $f(x)=x^2$ *and* $L=10$.

OR

Q. No.5: a) Find the i) Fourier cosine integral and ii) Fourier sine integral of the function

$$\begin{cases} f(x)=sinx \text{ if } 0\le x\le\pi \\ =0 \text{ if } x>\pi \end{cases}$$

b) Find Fourier series of $f(x)=x^3, x\in(-\pi,\pi)$.

Central University of Haryana
Even Semester Term End Examination June 2022 (Reappear)
B. Tech. Programmes
Branch: Computer Science and Engineering

Course Code: BT MT 301 **Max Time: 3 Hours**
Course Title: Mathematics-3 **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
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PART -I

Q. No.1:
(a)Determine whether the function ids functionally dependent or not.
$$u = sinx + siny; v = \sin(x + y)$$
(b) If $f(x) = \begin{cases} \frac{\pi}{2}, & 0 < x < \pi \\ 0, & x > \pi \end{cases}$, Find $B(\omega)$?
(c) Show that $\lim_{x\to 0}\lim_{y\to 0} f(x,y) \neq \lim_{y\to 0}\lim_{x\to 0} f(x,y)$, if $f(x,y) = \frac{x-y}{x+y}$.
(d) Find the general solution of the differential equation $\frac{dy}{dx} = e^{x+y}$?
(e) Find the general solution of the differential equation $(D^2 - 2)y = 1$.
(f) Compute the function $f(f), if\ \ F(s) = \frac{3s+4}{(s^2+9)}$?
(g) Find the Laplace transform of $\delta(t - a)$?

PART –II

Q. No.2: a) Find the general solution of the differential equation:
$$(D^2 - 1)y = x\,sinx + x^2e^x$$
b) Solve the differential equation $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 5y = x^2\sin(logx)$
OR
Q. No.2: a) Solve the differential equation
$$(1 + x)^2y'' + (1 + x)y' - y = \ln(x + 1)^2 + x - 1$$
b) Solve the differential equation by the method of variation of parameters:
$$(D^2 - 2D + 2)y = e^x tanx$$

Q. No.3: a) Find the maximum and minimum distance from the origin to the curve:
$$3x^2 + 4xy + 6y^2 = 140$$
b) Expand $cosx\ cosy$ in the powers of x ad y up to fourth degree term.
OR
Q. No 3: a) Examine the continuity of the function
$$f(x,y) = \frac{x^2}{\sqrt{x^2+y^2}}, for\ (x \neq 0, y \neq 0)$$
$$= 3, \qquad for\ (x = 0, y = 0)$$
b) Using the Leibnitz's rule evaluate the definite integral $\int_0^1 x^m(logx)^n dx$

Q. No 4: a) Find the Laplace transform of the function $\begin{cases} g(t) = 0, & 0 < t < 5 \\ = t - 3, & t > 5 \end{cases}$
b) Solve the differential equation using Laplace transform:
$$y'' + 2y' + 5y = e^{-t}, \qquad y(0) = 0, \qquad y'(0) = 1$$
OR

Q. No .4: a) Use convolution theorem to find the inverse of $\frac{1}{s(s+1)(s+2)}$

b) Solve the system of equation using Laplace transform:

$$\frac{d^2x}{dt^2}+\frac{dy}{dt}+3x=15e^{-t}$$

$$\frac{d^2y}{dt^2}-\frac{4dx}{dt}+3y=15\sin 2t$$

$$x(0)=35, x'(0)=-48, y(0)=27, y'(0)=-55$$

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Q. No.5: a) Find the i) Fourier cosine integral and ii) Fourier sine integral of the function

$$\begin{cases} f(x)=sinx\ if\ 0\le x\le\pi \\ \quad\ =0\ if\ x>\pi \end{cases}$$

b) Find Fourier series of $f(x)=x^3, x\in(-\pi,\pi)$.

Central University of Haryana
EVEN Semester Term End Examination June 2022 –
B.Tech. Programmes
Branch: Electrical Engineering and Printing & Packaging Technology
Course Code: BT AUD 409A and BT AUD410A **Max Time:** 3 Hrs
Course Title: Indian Constitution **Max Marks:** 70

Instructions:

Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).

Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

a) Define the term Universal Adult Franchise?
b) Many of the provisions of the Indian Constitution have been adopted from the Constitutions of various countries? Mention the names of those countries?
c) Define the importance of fundamental duties?
d) Define the Diplomatic powers enjoyed by the President of India?
e) What is the meaning of Constitutional Amendments?
f) Mention the names of various urban local governments?
g) Write down the importance of Fundamental Right to freedom?

PART –II

Q. No.2 Describe in detail the various salient features of the Indian Constitution?

OR

Q. No.2 Describe all the Fundamental rights guaranteed by the constitution of India along with their articles? Also explain how the fundamental rights are protected by the Constitution?

Q. No.3 Describe the various categories of Directive Principles of State policy and also explain their role in maintaining peace and prosperity in the nation?

OR

Q. No 3 Explain the distribution of the executive powers between the Centre and the States. Also mention the major reasons behind the distribution of executive powers between the centre and the states?

Q. No.4 Define the meaning of term 'Emergency provisions'? Mentions its various types and also mention the grounds on which President Rule can be imposed?

OR

Q. No .4 Define the characteristics of parliamentary form of Government? Also describe the various provisions of the Constitution that can be amended by the special majority of the Parliament?

Q. No.5 Define the importance of Fundamental Right to Freedom? Explain all the six rights protected by article 19 under Fundamental Right to freedom?

OR

Q. No.5 Define the term 'Urban Local Government'? Explain how Municipal Corporation differs from Municipality on the basis of their administrative structure and functioning?

Central University of Haryana
Even Semester Term End Examination June 2022 (Reappear)
B. Tech. Programme
Branch: Electrical/CIVIL/PPT

Course Code: BT MAT 120 (A/B)
Course Title: Mathematics-II

Max Time: 3 Hours
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q 1.

a) Find integrating factor and hence solve the differential equation $(x - y)dx - dy = 0$.

b) Find the solution of Bernoulli equation $xy + 3y' = xy^{-2}$.

c) Discuss the transformation $w = cosz$.

d) Find a homogeneous linear differential equation with real coefficients of lowest order which has $x^2e^{2x} + 2e^{-2x}$ as the particular solution.

e) Using Cauchy-Riemann equations, show that the function $f(z) = |z|$ is not analytic at any point.

f) Find the directional derivative of $f = x^2yz + 4xz^2$ at (1, -2, -1) in the direction $2\bar{\imath} - \bar{\jmath} - 2\bar{k}$.

g) Find the constant a and b so that the surface $ax^2 - byz = (a + 2)x$ will be orthogonal to the surface $4x^2y + z^3 = 4$ at the point $(1, -1, 2)$.

PART –II

Q 2.

a) Find the general solution of the equation $(D^2 + 3D + 2)y = \frac{1}{1+e^x}$, using the method of variation of parameters.

b) Solve the differential equation $(x + 1)^3y'' + 3(x + 1)^2y' + (x + 1)y = 6\ln(x + 1)$

OR

Q 2.

a) Find the current at any time $t > 0$ in a circuit having in series a constant electromotive force $40V$, a register 10 Ω, and an inductor $0.2H$ given that initial current is zero. Find the current when $E(t) = 150\ cos200t$.

c) Find the general solution of the equation $(D^2 - 4\ D + 4)y = x^3e^{2x} + xe^{2x}$, using the method of undetermined coefficients.

Q3.

a) i) Determine the poles of the function $f(z) = \frac{z+1}{z^2(z-2)}$ and find the residue at each pole.

ii) Apply Cauchy Residue theorem to evaluate $\int_0^{2\pi} \frac{d\theta}{2+\cos\theta}$.

b) Evaluate $\int_C \frac{e^{2z}}{(z+1)^4} dz$, where C is the circle $|z| = 2$ using Cauchy integral formula.

OR

Q3.

a) Expand the function $f(z) = \frac{1}{z(z-1)(z-2)}$, for $|z| > 2$ using Laurent's series.

b) i) Show that the function $v(x, y) = e^x \sin y$ is harmonic. Find the conjugate function $u(x, y)$ and the corresponding analytic function $f(z)$.

ii) Prove that the function $f(z) = \cos z$ is analytic in the finite z-plane.

Q 4.

a) Define irrotational field and prove that $\bar{A} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$ is irrotational. Find a scalar function $f(x, y, z)$ such that $\bar{A} = \nabla f$.

b) Find the area of the region bounded by $y = x^2$ and $y = x + 2$, Using Green's theorem.

OR

Q 4.

a) Verify Stroke's theorem for $\bar{A} = y^2 i + xyj - xzk$, where S is the hemisphere

$$x^2 + y^2 + z^2 = a^2, z \geq 0$$

b) If $\nabla f = (y^2 - 2xyz^3)i + (3 + 2xy - x^2z^3)j + (6z^3 - 3x^2yz^2)k$, find f if $f(1, 0, 1) = 8$.

Q 5.

a) Evaluate $\iint_R e^{-(x+y)} \sin\left(\frac{\pi y}{x+y}\right) dx\, dy$ where R is the entire first quadrant in the xy-plane.

b) Calculate the area which is inside the cardioid $r = 2(1 + \cos\theta)$ and outside the circle $r = 2$.

OR

Q 5.

a) i) Evaluate the integral $\int_0^{\pi} \int_0^{x} x \sin y\, dy\, dx$.

ii) Evaluate the integral $\iint_D (4xy - y^2) dx\, dy$ where D is the rectangle bounded by $x = 1, x = 2, y = 0, y = 3$.

b) Evaluate $\iiint \left[\frac{(1-x-y-z)}{xyz}\right]^{\frac{1}{2}} dx\, dy\, dz$ taken over the volume bounded by the planes $x = 0, y = 0, z = 0$ and $x + y + z = 1$.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Printing and Packaging Technology

Course Code: BT PPT 601A — Max Time: 3 Hours
Course Title: Digital and Security Printing — Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Describe in short
(a) Preflighting
(b) Security printing.
(c) RIP
(d) OVI
(e) Invisible fluorescent fibers
(f) Rainbow printing
(g) MICR cheque

PART –II

Q. No.2 Discuss the various digital proofing techniques.

OR

Q. No.2 Explain digital methods of handling imposition and trapping.

Q. No.3 What is CTP? Explain design of plate image setters with the help of diagram.

OR

Q. No 3 What do you mean by digital imaging? Explain also various printing plates for digital imaging.

Q. No.4 Discuss on various security features on Indian bank notes.

OR

Q. No .4 Discuss on various security printing documents along with security features.

Q. No.5. Explain various printing technologies used in security printing documents.

OR

Q. No.5 Discuss the recent trends and developments in security printing.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Printing and Packaging Technology
Course Code: BT PPT405A **Max Time:** 3 Hrs
Course Title: Essentials of Management **Max Marks:** 70

Instructions:

Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).

Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 (2*7 = 14)

a) Define Management?
b) Differentiate between Public and Private Organizations?
c) Define Decentralization of Authority?
d) What is Performance Management?
e) State the importance of informal groups?
f) Define Budgetary Control?
g) Define Leadership?

PART –II

Q. No.2 Explain any four principles of Henry Fayol with suitable examples and Describe the Work study techniques of Scientific Management? (14 marks)

OR

Q. No.2 Describe the Great Illumination Experiment performed by Elton Mayo along with the major findings of this study and discuss the importance of System approach of management? (14 marks)

Q. No.3 Define Delegation of authority? What is Planning and explain the types and process of planning with suitable example? (14 marks)

OR

Q. No 3 Define the nature and purpose of Organizing? Explain the Decision-making process with suitable example? (14 marks)

Q. No.4 Define the importance of Communication in an organization and explain the Communication process along with barriers of communication? (14 marks)

OR

Q. No .4 Discuss the importance of Job design and explain the process of Recruitment and Selection with the help of a suitable example? (14 marks)

Q. No.5 Discuss the need and benefits of reporting and explain the characteristics as well as two major aspects of group behaviour that are helpful in understanding group behaviour? (14 marks)

OR

Q. No.5 Describe the various features of Controlling and explain the Controlling process with suitable example? (14 marks)

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech **Session: 2021-22**

Semester: 6th **Max. Time: 3 Hours**

Course Title: Positive Psychology **Max. Marks: 70**

Course Code: BT PPT 607A

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) A short note on Courage, Wisdom, and knowledge.
b) What do you understand by Pleasant Life, Engaged life, and Meaningful Life?
c) What do you mean by positive emotions?
d) What do you mean by Happiness?
e) Briefly explain Consciousness
f) What is the difference between Empathy and Sympathy?
g) Give a real-life example of Prosocial Behavior and Altruism.

Q 2. (2X7=14)

a) Explain Eastern Perspective on Positive Psychology.
b) What are the Assumptions of Positive Psychology?
c) Briefly Explain the Classifications of Human Virtues.

Q3. (2X7=14)

a) Explain the effect of positive emotions on Health resources- Physical, Psychological and Social?
b) How Positive Emotions Effect Well-being of an individual?
c) What are the different factors affecting Happiness? Discuss various strategies to enhance happiness?

Q 4. (2X7=14)

a) Explain briefly the concepts of wisdom, hope and optimism.
b) Discuss the consciousness approach to human action and spirituality.
c) How well-being and mindfulness affects an individual's life.

Q 5. (2X7=14)

a) What are the different ways for maintaining the Healthy Relationship?
b) What is Love? Explain the Triangular Theory of Love.
c) Explain Prosocial Behavior with Example. Explain how it is different from Altruism.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Printing and Packaging Technology

Course Code: BT PPT401A **Max Time: 3Hrs**
Course Title: Offset Technology **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

(PART-I)

Q 1.

a) Define print media.

b) List down the tools used in the sheet fed offset press.

c) Mention the functions of side lays.

d) What are the benefits of split duct system?

e) What are the roles of fountain solution?

f) Mention the functions of cylinder gears.

g) Indicate the role of anti-setoff spray powder.

(PART-II)

Q 2.

a) Write a note on recent trends in offset technology.

b) What are the different categories of sheet fed offset presses?

OR

Q.2 Why safe handling of tools, equipment and materials in sheet fed offset presses are so important?

Q3.

a) List down the various parts of a feeding unit of a multi colour sheetfed offset press.

b) What are the roles and functions of inking system of a sheet fed offset press?

OR

Q3. Write a note on different inking system of a sheet fed offset press.

Q 4. Discuss on the various rollers in an inking system along with their characteristics.

OR

Q 4.

a) What are the various constituents of fountain solution?

b) Write a note on progressive print-out.

Q 5. List down the various roles and functions of delivery system of a sheet fed offset press.

OR

Q 5.

a) Discuss on sheetfed offset press trouble shootings.

b) What are the various sub-parts of ISO:12647.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Printing and Packaging Technology

Course Code: **BT PPT 603A** Max Time: **3 hours**
Course Title: **Print Finishing and Converting** Max Marks: **70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

a) Define Print Finishing.

b) What do you mean by perforation?

c) Write name of any four binding tools.

d) Define Gathering.

e) Describe loose leaf binding.

f) What do you mean by securing operation?

g) Write name of any two types of folding with diagram.

PART –II

Q. No.2 Give brief introduction to print finishing and binding section from printing and packaging industry point of view.

OR

Q. No.2 Discuss in details about various types of binding materials used for preparation of finished product in print industry.

Q. No.3 Explain various parts of semi automatic Cutting machine and their working procedure with suitable diagram.

OR

Q. No 3 Discuss in details about various problems and remedies of guillotines cutting machine.

Q. No.4 Describe the basic principle of folding and explain types of folding with suitable diagram.

OR

Q. No .4

a) Write short note on folding scheme with diagram.

b) Explain various folding terminology.

Q. No.5 Discuss in details about principle of gathering also explain working procedure of gathering machine.

OR

Q. No.5

a) Explain working procedure of wire stitching machine with diagram.

b) Describe the term collating and inserting with suitable diagram.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: B.Tech. (PPT)

Course Code: BT PPT 403 A
Course Title: Packaging Process- I

Max Time:3 hrs
Max Marks:70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 .

(a) Write about types of packaging?
(b) Define Shelf-life and list down factors affecting the shelf-life.
(c) Discuss about types of design.
(d) Under what circumstances you would consider changes in package design.
(e) Write about collapsible tubes?
(f) What do you understand by RFID in packaging?
(g) State Eco-friendly packaging?

PART –II

Q. No.2. Explain selection of a package in detail.
OR
Q. No.2. Explain selection criteria of packaging material.

Q. No.3. Explain elements and principles of design in detail with diagram.
OR
Q. No 3. Write in detail about the structural design of folding cartons and glass bottles?

Q. No.4. Explain corrugated box manufacturing process in detail.
OR
Q. No .4. Write in detail about flexible pouches forming machines?

Q. No.5. Discuss aerosol packaging, aseptic packaging and anti-static packaging with their use in packaging industries.
OR
Q. No.5. What do you understand about cushion packaging and explain design requirements and types of cushion packaging?

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Printing and Packaging Technology

Course Code: BT PPT608A **Max Time: 3Hrs**
Course Title: Colour Essentials **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Write a short note on the following:
(a) Colour management.
(b) HSB colour model.
(c) Metamerism
(d) Types of originals
(e) GCR
(f) Dot area measurement
(g) Retouching.

PART –II

Q. No.2 Write about the principle of colour management. What are the functions of colour management?

OR

Q. No.2 Explain RGB, HSB and ICC colour models used in colour management.

Q. No.3 Write about originals and transparencies and its types also mention qualities of a good original.

OR

Q. No 3 Discuss in detail the process of manual colour separation.

Q. No.4 Explain instruments used in colour measurement and working of any one.

OR

Q. No .4 Explain the factors which influences colour printing and discuss colour control strips.

Q. No.5 What is screening? Discuss about different types of screening methods in detail.

OR

Q. No.5 Compare different types of scanners stating their advantages and disadvantages.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: PRINTING AND PACKAGING TECHNOLOGY

Course Code: **BT PPT 613A** **Max Time: 3 Hours**
Course Title: **SMART PACKAGING** **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) What is Active Packaging.

b) What is Intelligent Packaging.

c) Write about the Antimicrobial Packaging systems for food.

d) Write about the design of antimicrobial packaging systems.

e) RFID in Smart Packaging.

f) What is Beverage Packaging.

g) Write about smart packaging for Beverage Products.

PART –II

Q. No.2 Write notes on: (a) Temperature control packaging
(b) Temperature compensating films.

OR

Q. No.2 Discuss the role various types of releasers and absorbers in smart packaging.

PART –III

Q. No.3 Explain in detail the mechanism of the antimicrobial packaging system.

OR

Q. No 3 Write notes on: (a) history of antimicrobial packaging system in smart packaging.
(b) design of antimicrobial packaging systems.

PART –IV

Q. No.4 Define in detail RFID, types and its applications in smart packaging.

OR

Q. No .4 Write notes on: (a) smart packaging systems characteristics of the RFID.
(b) how materials impact on RFID.

PART –IV

Q. No.5 Describe in detail beverages packaging and its various beverage packaging - pro- biotic release packaging, Enzyme release packaging and Gas release packaging,

OR

Q. No.5 List down the various beverage packaging - odour removal Packaging, thermo - chromic labelling and anti - counterfeit packaging and its applications.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Printing and Packaging Technology

Course Code: BT PPT 409A **Max Time: 03 Hours**
Course Title: Printing and Packaging Material **Max Marks:70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1.

(a) What is thermoplastic?
(b) Write use of metallized films?
(c) Write about matt paper and newsprint paper.
(d) State nature of paper.
(e) Write about light sensitive materials.
(f) Define vehicles.
(g) What is rheology?

PART –II

Q. No.2. Explain classification of polymers in detail with examples.

OR

Q. No.2. Write chemical and mechanical properties of polyethylene, polypropylene and PVC with their use in the packaging field?

Q. No.3. Write physical properties of paper in detail?

OR

Q. No 3. Explain pressure-sensitive adhesives, heat-sealing adhesives and-chemically reactive adhesives.

Q. No.4. Explain photographic materials used in printing industries in detail.

OR

Q. No .4. Write about aluminium foil and discuss its properties?

Q. No.5. Explain drying properties of ink in detail.

OR

Q. No.5. Explain end-use properties of ink in detail.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Printing and Packaging Technology

Course Code: BT PPT605A **Max Time: 3Hrs**
Course Title: Specialty Printing, Marketing and Legislation in Packaging **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

(PART-I)

Q 1. Explain the following -

a) Specialty Printing
b) RFID
c) Physical Distribution
d) Package design
e) Packaging and Export Marketing
f) Eco regulations
g) FPO

(PART-II)

Q 2. Throw light on the following -

a) Debossing and Diecutting,
b) White Ink Printing and Barcode.

OR

Q 2. Write note on

a) UV Printing and Foil stamping,
b) Gold foil and Triplex.

Q 3.

a) Depict the Demand forecasting with regard to Marketing and Material Management.
b) Describe the structure, models and Market research in context to Marketing.

OR

Q 3. What do You know about Material Management? Discuss its importance in the field of Printing and Packaging.

Q 4.

a) Explain the Impact of Package design on Marketing and Sales.

b) Justify the statement "Better Packaging is an effective Instrument of Marketing".

OR

Q 4. Write a detailed note on 'Role of Package as Self-salesman'; & 'Communication and Sales appeal'. How You will locate the Sales requirement areas?

Q 5.

a) Describe Loss prevention, Pollution control; & FDA rules and regulations.

b) What is Weight and Measures Act/Packaged Commodities Act? Discuss in detail.

OR

Q 5. Throw light on Legal requirement, Recyclability of Packaging Media and Technologies; and PFA rules and regulations.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Printing and Packaging Technology

Course Code: BT PPT 406A — Max Time: 3 Hours
Course Title: Printing & Packaging Materials Science-II — Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Write on rheology in terms of printing inks.

(b) What do you mean by eco-friendly materials?

(c) Write on diazo compound.

(d) What do you mean by organic compound?

(e) Impact of toxic materials in printing press.

(f) Write any two optical properties of inks

(g) Role of pH in fountain solution.

PART –II

Q. No.2 Discuss on various ingredients of printing and packaging inks in details.

OR

Q. No.2 Explain general characteristics of printing inks for flexography and offset printing processes.

Q. No.3. Explain acid-base concepts and pH scale in details.

OR

Q. No 3 What is function of buffer solution in printing? Explain also acidic and alkaline buffers solutions.

Q. No.4 What do you mean by recycled papers? Explain also steps carried out in the recycling of waste papers.

OR

Q. No .4 Discuss on cleaning agents used in both printing and packaging segments.

Q. No.5 What is adhesive? Also explain the various types of adhesives in detail.

OR

Q. No.5 Write note on following:

(a) Aromatic compounds.

(b) Applications of adhesive in packaging and printing industries.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Printing and Packaging Technology

Course Code: **BT PPT 407A** Max Time: **3 Hours**
Course Title:**Costing, Estimating and ERP** Max Marks: **70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.
Note:-Calculator may allowed

PART -I

Q. No.1

a) What do you mean by indirect cost?
b) Write down the formula to calculate equivalent weight of paper.
c) Define costing and it's objectives.
d) What is the importance of accurate estimating?
e) Describe hourly rates.
f) Define fixed and variable cost.
g) What do you mean by Daily Docket?

PART –II

Q. No.2

a) Explain the importance of Costing and Estimating in printing and publishing industry.(7)
b) Define cost, price and profit with their relevance in costing and estimation department.(7)

OR

Q. No.2 What do you mean by costing system? Give brief introduction to Indian Federation costing system.(14)

Q. No.3

a) Estimate the quantity of Book black ink required in Kg for 17,500 copies of a 30 page booklet, each page with a print area of 150cm^2. All the pages of booklet is printed in type matter with Letterpress process on a high gloss coated paper.(7)
b) How estimating is inter related with sales and purchase department?(7)

OR

Q. No 3

a) A ream of paper in 61x 88cm size having weight 21.5 kg. Find out the weight of same paper in quad imperial size. (7)

b) Discuss in details about the qualification of an estimator for printing and packaging industry.(7)

Q. No.4 Discuss in details about nine elements of cost with suitable example.(14)

OR

Q. No .4

a) What do you mean by hourly rates also explain the recovery of elements of cost distribution of expenses. (7)

b) Describe Time rate system and Work rate system with their advantages.(7)

Q. No.5 Discuss in details about the estimation of a complete job from designing to binding and finishing.(14)

OR

Q. No.5 What do you mean by ERP? Also describe various functions and application of ERP in Printing and Packaging Industry.(14)

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 206A — **Max Time: 3 hrs**
Course Title: Geomatics Engineering — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:-

a) Platform
b) Black Body Radiation
c) Orbital Period
d) Sidelap
e) Nadir
f) Digital Image
g) Map Projection

PART –II

Q. No.2 Explain the importance of maps in Geomatics Engineering. Also, briefly explain different terminologies used in map making.
OR
Q. No.2 Differentiate between GPS and GIS. Write down the applications of coordinate system in various branches of civil engineering.

Q. No.3 Briefly explain different laws being applicable from time to time in remote sensing.
OR
Q. No 3 Explain energy interactions in detail with suitable examples.

Q. No.4 Explain different types of platforms with neat diagrams. Explain radiometric corrections and Image histogram.
OR
Q. No .4 What do you understand by orbital characteristics? Explain in detail with neat diagrams. What is data processing in ArcGIS? Dsicuss.

Q. No.5 Explain different types of data models being used in GIS. What do you mean by GIS data base management system? Explain.
OR

Q. No.5 What is DGPS? Explain hyperspectral remote sensing and its applications in detail.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 752A **Max Time: 3 hrs**
Course Title: Road Safety Audit **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Flexible markers
(b) Reflectors
(c) IPC 338
(d) Crash Clusters
(e) Need of crash data
(f) Emergency care
(g) Informatory signs

PART –II

Q. No.2 (A) Write down the steps required for improving road safety in India. How road safety engineering is different in India from other countries?

Q. No.2 (B) What is the need of planning for network in case of road safety engineering? Explain.

OR

Q. No.2 (A) Explain road safety scenario in India. What are the road accident characteristics involved in ensuring better road safety?

Q. No.2 (B) What is the importance of land use in road safety? Explain.

Q. No.3 (A) What is Road Safety Auditing? Explain the concept and need of road safety audit.

Q. No 3 (B) What are road safety hazards? How we can improve road safety with the help of traffic calming measures?

OR

Q. No.3 Write down the code required for road safety audit as per IRC/ Explain in detail different stages in Road Safety Auditing procedure. (14 Marks)

Q. No.4 (A) Explain speed management issues in India. "Road infrastructure plays an important role in road safety engineering." Discuss.

Q. No.4 (B) Explain different speed zone signs including construction zones as per IRC. Why enforcement is necessary in road safety engineering? Explain in detail.

OR

Q. No.4 (A) What do you mean by safe system approach? Explain the global perspective of it in detail.

Q. No .4 (B) Explain in detail different components of road safety required on Kundli-Manesar-Palwal expressway.

Q. No.5 (A) Differentiate between crash investigation and crash reconstruction.
Q. No.5 (B) What do you understand by crash costing and economic appraisal? Explain construction zone markings and signs as per IRC.

OR

Q. No.5 (A) What is road safety engineering? Discuss. Explain the human factors related to crashes for road safety.

Q. No.5 (B) Explain the safety provisions required for workers at construction sites. How road safety auditing is different from crash reconstruction?

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech **Session: 2021-22**

Semeste: VI **Max. Time: 3 Hours**

Course Title: Hydrology and Water Resources **Max. Marks: 70**

Course Code: BT CE 602 A

Instructions:

1. Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (7X2=14)

a) What are the various differences between recording and non- rain gauges?
b) How you will estimate missing data?
c) What do you mean by unit hydrograph? Explain how it is different from storm hydrograph.
d) What is meant by C2-S2 water? Discuss its usefulness for irrigating fine textured soil.
e) 10 cumecs of water is delivered to a 32 hectares field, for 4 hours. Soil probing after the irrigation indicates that 0.3 meter of water has been stored in the root zone. Compute the water application efficiency.
f) What do you mean by Meandering of River?
g) Write a short note on canal alignment.

Q 2. (2X7=14)

a) The normal annual rainfall at stations A, B, C and D in a basin are 80.97, 67.59, 76.28 and 92.01 cm respectively. In the year 1975, the station D was inoperative and stations A, B, C are recorded 91.11, 72.23, 79.89 cm respectively. Estimate rainfall at station D in that year.
b) Discuss the factors affecting the infiltration capacity of an area. Explain how it is different from rate of infiltration.
c) What do you mean by Evapo-transpiration? Explain various methods of its measurement.

Q3. (2X7=14)

a) What do you mean by hyetograph? Describe how it is different from Storm hydrograph.
b) Two storms each of 6-h duration and having rainfall excess values of 3.0 and 2.0 cm respectively occur successively. The 2-cm ER rain follows the 3-cm rain. The 6-h unit hydrograph for the catchment is given below in table. Calculate the resulting DRH.

Time(hrs.)	0	3	6	9	12	15	18	24	30	36	42	48	54	60	69
Uh ordinates (m^3/s)	0	25	50	85	125	160	185	160	110	60	36	25	16	8	0

c) Rainfall of magnitude of 3.8 cm and 2.8 cm occurring on two consecutive 4- h duration on a catchment of area 27 km^2 produced the following hydrograph of flow at the outlet of the catchment. Estimate the rainfall excess and ϕ index.

Time from start (hrs.)	6	0	6	12	18	24	30	36	42	48	54	60	66
Observed flow (m^3/s)	6	5	13	26	21	16	12	9	7	5	5	4.5	4.5

Q 4. (2X7=14)

a) Define Irrigation and explain its necessity in a tropical country like India. How Furrow irrigation is different from Sprinkler irrigation? Which one is preferred in India and why?

b) The Culturable commanded area of a watercourse is 1200 hectares. Intensities of sugarcane and wheat crops are 20% and 40% respectively. The duties for the crops at the head of the watercourse are 730 hectares/cumec and 1800 hectares/cumec, respectively. Find the discharge required at the head of the watercourse and determine the design discharge at the outlet, assuming a time factor equal to 0.8.

c) What are the possible causes of water losses in a canal? What are the methods adopted for reducing such loss. What are the empirical formulas's used to calculate the losses.

Q 5. (2X7=14)

a) Design a regime channel for a discharge of 50 cumecs, with a silt factor = 1.0, by using Lacey's theory.
b) Explain with neat sketches the different types of spurs which are commonly used for controlling and training Indian rivers?
c) Define Balancing depth for excavating canals. Calculate the balancing depth for a channel section having a bed width equal to 18 m and side slopes of 1: 1in cutting and 2:1 in filling. The bank embankments are kept 3.0 m higher than the ground level (berm level) and crest width of bank is kept as 2.0 m.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 752A
Course Title: Road Safety Audit

Max Time: 3 hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks ~~each with~~ internal choice.

PART -I

Q. No.1 Define the following terms:-

(a) Cat Eye
(b) IPC 304A
(c) Rumble Strips
(d) Delineator
(e) Traffic Cones
(f) Accident Analysis
(g) Crosswalk

PART –II

Q. No.2 Explain road safety scenario in India. What are the road accident characteristics involved in ensuring better road safety? Explain in detail.
OR
Q. No.2 "Road environment is necessary for improving road safety." Discuss. What is the importance of land use in road safety? Explain.

Q. No.3 Write down the code required for road safety audit as per IRC. Explain different stages in Road Safety Auditing procedure.
OR
Q. No 3 Explain road design issues in RSA. What are the design standards required for better RSA in the field? Discuss.

Q. No.4 What do you mean by safe system approach? Explain the global perspective of it in detail.
OR
Q. No .4 Explain different types of speed limits used on highways. Why traffic signs are necessary for better road safety? Explain.

Q. No.5 What is road safety engineering? How road safety engineering is different from road safety audit? Discuss. Explain the human factors related to crashes for road safety.

OR

Q. No.5 Explain the safety provisions required for workers at construction sites. How road safety auditing is different from crash reconstruction? Explain in detail.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech **Session: 2021-22**

Semester: VI **Max. Time: 3 Hours**

Course Title: Concrete Technology **Max. Marks: 70**

Course Code: BT CE 601 A

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What are the major Bogue's Compounds of cement? Discuss their role in hydration of cement.

b) Discuss Bulking of sand; if the sand is measured by volume and no allowance is made for bulking of sand what will be its effect on a nominal concrete mix 1:2:4 for a bulking of 15 percent.

c) Explain the different types of slump with neat and clean sketch.

d) Define Shrinkage and Creep. How Plastic Shrinkage is different from drying shrinkage.

e) Differentiate between Nominal Mix, Standard Mix and Design Mix. Also Tabulate the Environmental Exposure condition as per IS Code.

f) Describe the carbonation of concrete in details.

g) Define light weight concrete. Discuss the typical range of aggregate unit weight for making structural light weight concrete.

Q 2. (2X7=14)

a) Describe the physical property of cement. Enlist the test required to determine them. Explain any of them as pr IS guidelines.

b) Determine the fineness modulus of aggregate for the following result of sieve analysis. What does the result indicate?

IS Sieve Size	10 mm	4.75 mm	2.36 mm	1.18 mm	600μm	300μm	150μm	75μm
Percentage Passing	100	92	74	55	23	12	9	7

c) What are admixtures? Enlist the different admixtures used in concrete construction. Explain the function and property of any one type of admixtures.

Q3. (2X7=14)

a) Define Workability of concrete; enlist the different method for measuring it in the laboratory. Also discuss the factors affecting the workability of fresh concrete.

b) Define Curing. Why it is required. Also classify the different types of curing.

c) Define the term "**concrete strength**" and their different types. Describe the relation between them. Also discuss any test performed on hardened concrete to determine tensile strength of concrete.

Q 4. (2X7=14)

a) Calculate the quantities of ingredients required to produce one cubic meter of structural concrete. The mix is to be used in proportions of one part of cement to 1.37 parts of sand to 2.77 parts of 20 mm nominal size crushed coarse aggregate by dry volumes with a water- cement ratio of 0.49 (by mass). Assume the bulk densities of cement, sand and coarse aggregate to be 1500, 1700, and 1600 kg/m^3, respectively. The percentage of entrained air is 2.

b) List the basic steps of ACI Mix design procedure. Also discuss the major difference between ACI and IS-Concrete mix proportioning guidelines.

c) Explain the importance of grading? Why, Theoretical grading, which produce maximum density cannot be used in practice.

Q 5. (2X7=14)

a) Define Corrosion. Tabulate the IS codal provisions for cover of various exposure conditions. Explain clearly the various agencies of corrosion.

b) Describe the alkali reaction on concrete with their mechanism.

c) Define Hot weather concreting. What are the effects of hot weather concreting? What precautions need to be taken for hot weather concreting?

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 821A — **Max Time: 3 hrs**
Course Title: Pavement Evaluation and Management — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:-

a) Consolidation deformation
b) Failure of wearing course
c) Reflection cracking
d) Roughness
e) Principle of FWD
f) PSI
g) PMS

PART –II

Q. No.2 Explain the methods for the evaluation of pavement in detail. Explain different types of distresses in flexible pavement.

OR

Q. No.2 Explain the factors affecting the performance of pavement. Explain in pavement deformation in pavements.

Q. No.3 For which purpose Bump Integrator is used? Explain the procedure of it. Explain digital ultrasonic concrete tester.

OR

Q. No 3 Explain dynaflect testing for the evaluation of rigid pavement. Explain the design steps included in Benkelman Beam Deflection Method.

Q. No.4 Explain flexible overlay over flexible pavement by using benkelman beam method with a neat sketch.

Existing black top pavement was tested using Benkelman Beam with a test vehicle of 8170 kg rear axle load. Observations recorded at a pavement temperature of 43°C are given below:

Length of test stretch = 300 m

Serial Number subsection	Rebound deflection (mm)	Serial number subsection	Rebound deflection (mm)
1	1.46	7	1.68
2	1.52	8	1.74
3	1.56	9	1.96
4	1.76	10	1.42
5	1.96	11	1.56
6	1.74	12	1.62

Compute the thickness of overlay of bituminous concrete, taking allowable deflection as 1.25 mm, if the factor of subgrade moisture correction is 2.0.

OR

Q. No .4 Explain LTPP & ESAL. How the prediction of distress and performance is being done? Discuss.

Q. No.5 Differentiate between network level and project level PMS functions with a neat relationship diagram. What are technical level issues, administrative level issues and legislative level issues in PMS? Explain.

OR

Q. No.5 Differentiate between PMS and MMS. Explain any working design methods included in the pavement management systems.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech (Civil Engineering) **Session: 2021-22**

Semester: Sixth **Max. Time: 3 Hours**

Course Title: Design of Steel Structures **Max. Marks: 70**

Course Code: BTCE 603A

Instructions:

1. Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question no. 2 to 4 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.
3. Question no. 5 has two parts and students are required to answer any one. Each part carries fourteen Marks.

Note: IS 800: 2007 is allowed for use in the examination.

Q 1. (7X2=14)

a) Explain the failures of bolted joints.

b) What are advantages and disadvantages of steel structures?

c) Explain the classification of cross sections as per the IS 800: 2007 based on yield and plastic moments and rotational capacities.

d) Differentiate between web buckling and web crippling.

e) Distinguish between laterally restrained and unrestrained beams

f) Briefly describe the types of foundations used for columns.

g) What is Plate Girder? Explain its various components with sketches.

Q 2. (2X7=14)

a) A bracket of 8 mm thickness is bolted to the flange of a column ISHB300@577N/m. An eccentric load of 300 kN is acting at distance of 350 mm from the center of column. Using M20 bolts of grade 4.6, design the connections.

b) Design the welded connection to connect two plates of width 200 mm and thickness 10 mm for 100 percent efficiency.

c) Design a lap joint between the two plates of width 120 mm, if the thickness of one plate is 16 mm and the other is 12 mm. The joint has to transfer a design load of 160 kN. The plates are of Fe 410 grade. Use bearing type bolts.

Q3. (2X7=14)

a) Design a single angle tension member of a roof truss to carry an axial factored load of 225 kN. Use 20 mm shop bolts of grade 4.6. The effective length of the member is 3m. Consider ISA 10075, 8 mm angle (Ag= 1336 mm^2).

b) Design a simply supported beam of effective span 1.5 m carrying a factored concentrated load of 360 kN at mid span.

c) Design the simply supported main beam of a building supporting concrete floor slab with the following data:

Centre to centre distance of beams – 6m

Span of beam – 7m

Thickness of concrete slab – 240mm

Finished screed – 40mm thick

Weight of concrete slab and finished screed- 24kN/m^3

Imposed load – 4kN/m^2

Q 4. (2X7=14)

a) A column 5 m long has to support a factored load of 3600 kN. The column is effectively held at both ends and restrained in direction at one of the ends. Design the column using beam sections and plates.

b) Design a gusseted base for a column ISHB 350 @72.4 kg/m with flange plates 450 × 20mm carrying a factored axial force of 3000kN. The column rests on M20 grade concrete pedestal. Design the bolted connection also. Assume Fe 410 grade steel and 4.6 grade bolts.

c) Design a suitable slab base for a column section ISHB 200@ 365.9N/m supporting an axial load of 500 kN. The base plate is to rest on a concrete pedestal of M20 grade concrete.

Q 5. (14)

a) Design a plate girder of span 24 m to carry superimposed load of 35 kN/m. Avoid use of bearing and intermediate stiffeners. Use Fe 415 (E250) steel.

b) Design a simply supported gantry girder to carry an electric overhead travelling crane, given

Span of gantry girder= 6.5 m

Span of crane girder=16 m

Crane capacity=250 kN

Self-weight of crane girder excluding trolley= 200 kN

Self-weight of trolley= 50 kN

Minimum hook approach= 1.0 m

Distance between wheels= 3.5 m

Self-weight of rails= 0.3 kN/m

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 821A **Max Time: 3 hrs**
Course Title: Pavement Evaluation and Management **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:-

a) Consolidation deformation
b) Failure of wearing course
c) Reflection cracking
d) Roughness
e) Principle of FWD
f) PSI
g) Unevenness Index

PART –II

Q. No.2 (A) Explain the methods for the evaluation of pavement in detail. Explain different types of distresses in flexible pavement. (7 Marks)

Q. No.2 (B) Explain the factors affecting the performance of pavement. (7 Marks)

OR

Q. No.2 (A) Explain the safety factors which are to be considered for the evaluation of pavement. Explain different types of distresses in rigid pavement. (7 Marks)

Q. No.2 (B) Explain the relation between performance and distress. What do you mean by low temperature shrinkage cracking? (7 Marks)

Q. No.3 (A) For which purpose Bump Integrator is used? Explain the procedure of it. (7 Marks)

Q. No 3 (B) Explain dynaflect testing for the evaluation of rigid pavement. Explain the design steps included in Benkelman Beam Deflection Method. (7 Marks)

OR

Q. No.3 (A) Explain with a neat diagram pavement skid resistance tester. How the structural capacity is important in defining the structural parameters of pavement? (7 Marks)

Q. No 3 (B) Briefly discuss the functional parameters necessary for the evaluation of pavement. Explain the procedure of any one pavement evaluation experiment in detail. (7 Marks)

Q. No.4 (A) Existing black top pavement was tested using Benkelman Beam with a test vehicle of 8170 kg rear axle load. Observations recorded at a pavement temperature of 43°C are given below:

Length of test stretch = 300 m

Serial Number subsection	Rebound deflection (mm)	Serial number subsection	Rebound deflection (mm)
1	1.46	7	1.68
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4	1.76	10	1.42
5	1.96	11	1.56
6	1.74	12	1.62

Compute the thickness of overlay of bituminous concrete, taking allowable deflection as 1.25 mm, if the factor of subgrade moisture correction is 2.0. (7 Marks)

Q. No .4 (B) Explain LTPP & ESAL. How the prediction of distress and performance is being done? (7 Marks)

OR

Q. No.4 (A) Explain in detail flexible overlay over flexible pavements by using conventional design method. Also, discuss flexible overlay over rigid pavement. (7 Marks)

Q. No .4 (B) Benkelman Beam deflection studies were carried out on 15 selected points on a stretch of flexible pavement during summer season using a dual wheel load of 4085 kg, 5.6 kg/cm^2 pressure. The deflection values obtained in mm after making the necessary lag corrections are given below. If the present traffic consists of 750 commercial vehicles per day, determine the thickness of bituminous overlay required, if the pavement temperature during the test was 30°C and the correction factor for subsequent increase in subgrade moisture content is 1.3. Assume annual rate of growth of traffic as 7.5%. Adopt IRC guidance's.

1.40, 1.32, 1.25, 1.35, 1.48, 1.60, 1.65, 1.55, 1.45, 1.40, 1.36, 1.46, 1.50, 1.52, 1.45 mm (7 Marks)

Q. No.5 (A) Differentiate between network level and project level PMS functions with a neat relationship diagram. What are technical level issues, administrative level issues and legislative level issues in PMS? (7 Marks)

Q. No.5 (B) Differentiate between PMS and MMS. Explain any working design methods included in the pavement management systems. (7 Marks)

OR

Q. No.5 (A) Briefly discuss the historical overview and evolution of PMS. Explain DSS in PMS with a neat flow diagram. (7 Marks)

Q. No.5 (B) Explain the implementation and operational issues in PMS. What do you mean by feedback data system? (7 Marks)

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 752A
Course Title: Road Safety Audit

Max Time: 3 hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Flexible markers

(b) Reflectors

(c) IPC 338

(d) Crash Clusters

(e) Need of crash data

(f) Emergency care

(g) Informatory signs

PART –II

Q. No.2 (A) Write down the steps required for improving road safety in India. How road safety engineering is different in India from other countries?

Q. No.2 (B) What is the need of planning for network in case of road safety engineering? Explain.

OR

Q. No.2 (A) Explain road safety scenario in India. What are the road accident characteristics involved in ensuring better road safety?

Q. No.2 (B) What is the importance of land use in road safety? Explain.

Q. No.3 (A) What is Road Safety Auditing? Explain the concept and need of road safety audit.

Q. No 3 (B) What are road safety hazards? How we can improve road safety with the help of traffic calming measures?

OR

Q. No.3 Write down the code required for road safety audit as per IRC/ Explain in detail different stages in Road Safety Auditing procedure. (14 Marks)

Q. No.4 (A) Explain speed management issues in India. "Road infrastructure plays an important role in road safety engineering." Discuss.

Q. No.4 (B) Explain different speed zone signs including construction zones as per IRC. Why enforcement is necessary in road safety engineering? Explain in detail.

OR

Q. No.4 (A) What do you mean by safe system approach? Explain the global perspective of it in detail.

Q. No .4 (B) Explain in detail different components of road safety required on Kundli-Manesar-Palwal expressway.

Q. No.5 (A) Differentiate between crash investigation and crash reconstruction.

Q. No.5 (B) What do you understand by crash costing and economic appraisal? Explain construction zone markings and signs as per IRC.

OR

Q. No.5 (A) What is road safety engineering? Discuss. Explain the human factors related to crashes for road safety.

Q. No.5 (B) Explain the safety provisions required for workers at construction sites. How road safety auditing is different from crash reconstruction?

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 821A — **Max Time: 3 hrs**
Course Title: Pavement Evaluation and Management — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:-

a) Plastic deformation
b) Loss of Binding Action
c) Map cracking
d) Skid resistance
e) Principle of Benkelman Beam
f) Unevenness Index
g) MMS

PART –II

Q. No.2 Explain the safety factors which are to be considered for the evaluation of pavement. Explain different types of distresses in rigid pavement.

OR

Q. No.2 Explain the relation between performance and distress. What do you mean by low temperature shrinkage cracking? Explain in detail.

Q. No.3 Explain with a neat diagram pavement skid resistance tester. How the structural capacity is important in defining the structural parameters of pavement? Explain in detail.

OR

Q. No 3 Briefly discuss the functional parameters necessary for the evaluation of pavement. Explain the procedure of any one pavement evaluation experiment in detail.

Q. No.4 Explain in detail flexible overlay over flexible pavements by using conventional design method. Also, discuss flexible overlay over rigid pavement.

Benkelman Beam deflection studies were carried out on 15 selected points on a stretch of flexible pavement during summer season using a dual wheel load of 4085 kg, 5.6 kg/cm^2 pressure. The deflection values obtained in mm after making the necessary lag corrections are given below. If the present traffic consists of 750 commercial vehicles per day, determine the thickness of bituminous

overlay required, if the pavement temperature during the test was 30°C and the correction factor for subsequent increase in subgrade moisture content is 1.3. Assume annual rate of growth of traffic as 7.5%. Adopt IRC guidance's.

1.40, 1.32, 1.25, 1.35, 1.48, 1.60, 1.65, 1.55, 1.45, 1.40, 1.36, 1.46, 1.50, 1.52, 1.45 mm

OR

Q. No .4 Explain design approaches which have been developed by various transportation agencies. What are the alternatives in pavement design analysis for the economic evaluation of pavement? Discuss.

Q. No.5 Briefly discuss the historical overview and evolution of PMS. Explain DSS in PMS with a neat flow diagram.

OR

Q. No.5 Explain the implementation and operational issues in PMS. What do you mean by feedback data system? Discuss in detail.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech **Session: 2021-22**

Semeste: VI **Max. Time: 3 Hours**

Course Title: Hydrology and Water Resources **Max. Marks: 70**

Course Code: BT CE 602 A

Instructions:

1. Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (7X2=14)

a) What are the various differences between recording and non- rain gauges?
b) How you will estimate missing data?
c) What do you mean by unit hydrograph?
d) What is meant by C2-S2 water? Discuss its usefulness for irrigating fine textured soil.
e) 10 cumecs of water is delivered to a 32 hectares field, for 4 hours. Soil probing after the irrigation indicates that 0.3 meter of water has been stored in the root zone. Compute the water application efficiency.
f) What do you mean by Meandering of River?
g) Write a short note on canal alignment.

Q 2. (2X7=14)

a) The normal annual rainfall at stations A, B, C and D in a basin are 80.97, 67.59, 76.28 and 92.01 cm respectively. In the year 1975, the station D was inoperative and stations A, B, C are recorded 91.11, 72.23, 79.89 cm respectively. Estimate rainfall at station D in that year.
b) Discuss the factors affecting the infiltration capacity of an area. Explain how it is different from rate of infiltration.
c) What do you mean by Evapo-transpiration? Explain various methods of its measurement.

Q3. (2X7=14)

a) What do you mean by hyetograph? Describe how it is different from Storm hydrograph.
b) Two storms each of 6-h duration and having rainfall excess values of 3.0 and 2.0 cm respectively occur successively. The 2-cm ER rain follows the 3-cm rain. The 6-h unit hydrograph for the catchment is given below in table. Calculate the resulting DRH.

Time(hrs.)	0	3	6	9	12	15	18	24	30	36	42	48	54	60	69
Uh ordinates (m^3/s)	0	25	50	85	125	160	185	160	110	60	36	25	16	8	0

c) Rainfall of magnitude of 3.8 cm and 2.8 cm occurring on two consecutive 4- h duration on a catchment of area 27 km^2 produced the following hydrograph of flow at the outlet of the catchment. Estimate the rainfall excess and ϕ index.

Time from start (hrs.)	6	0	6	12	18	24	30	36	42	48	54	60	66
Observed flow (m^3/s)	6	5	13	26	21	16	12	9	7	5	5	4.5	4.5

Q 4. (2X7=14)

a) Define Irrigation and explain its necessity in a tropical country like India. How Furrow irrigation is different from Sprinkler irrigation? Which one is preferred in India and why?

b) The Culturable commanded area of a watercourse is 1200 hectares. Intensities of sugarcane and wheat crops are 20% and 40% respectively. The duties for the crops at the head of the watercourse are 730 hectares/cumec and 1800 hectares/cumec, respectively. Find the discharge required at the head of the watercourse and determine the design discharge at the outlet, assuming a time factor equal to 0.8.

c) What are the possible causes of water losses in a canal? What are the methods adopted for reducing such loss. What are the empirical formulas's used to calculate the losses.

Q 5. (2X7=14)

a) Design a regime channel for a discharge of 50 cumecs, with a silt factor = 1.0, by using Lacey's theory.
b) Explain with neat sketches the different types of spurs which are commonly used for controlling and training Indian rivers?
c) Define Balancing depth for excavating canals. Calculate the balancing depth for a channel section having a bed width equal to 18 m and side slopes of 1: 1in cutting and 2:1 in filling. The bank embankments are kept 3.0 m higher than the ground level (berm level) and crest width of bank is kept as 2.0 m.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BTCE 202A
Course Title: Structural Analysis-I **(Regular)**
Semester: 4th

Max Time: 3 Hours
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 (2X7=14Marks)

a) State Castigliano's first theorem.

b) Explain normal thrust in arches with the help of a diagram.

c) Draw typical configuration of frictionless pulley support in case of suspension bridges.

d) Differentiate between static and kinematic indeterminacy.

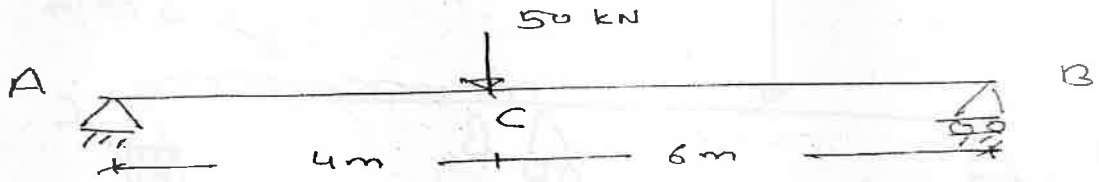
e) State Maxwell's reciprocal theorem.

f) State Muller Breslau's principle.

g) Define Zero force members in the trusses.

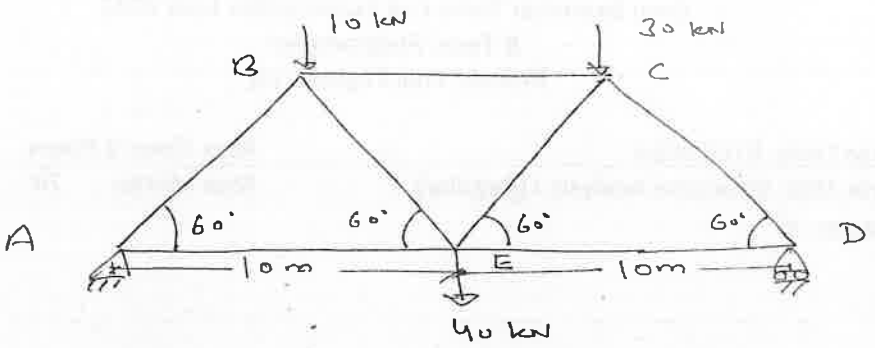
PART –II

Q. No.2: Calculate deflection at C for the beam shown in Figure below using Conjugate Beam Method.

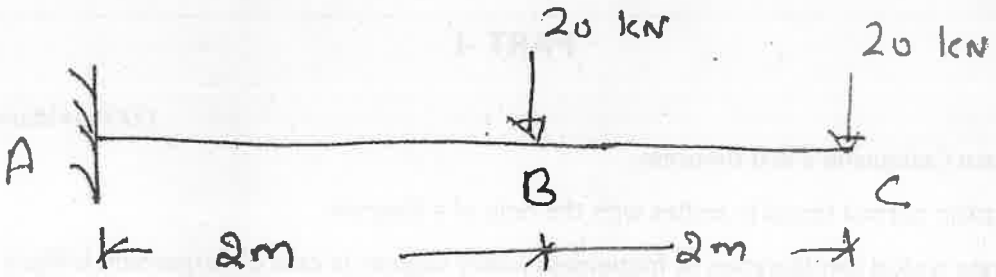


OR

Q. No.2: Determine forces in each member of the truss shown below in the Figure and state the nature of each force.

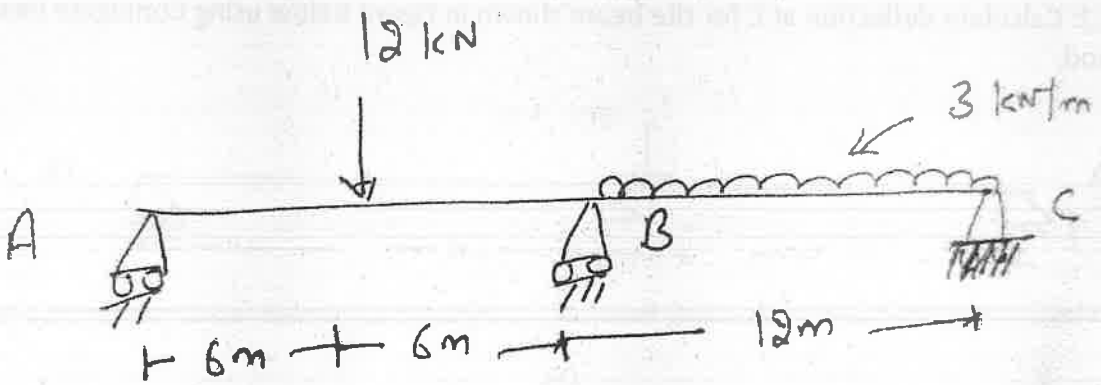


Q. No.3: Determine deflection at free end of cantilever beam shown below $E=2x10^5$ N/mm^2. I = $12x10^6$ mm^4

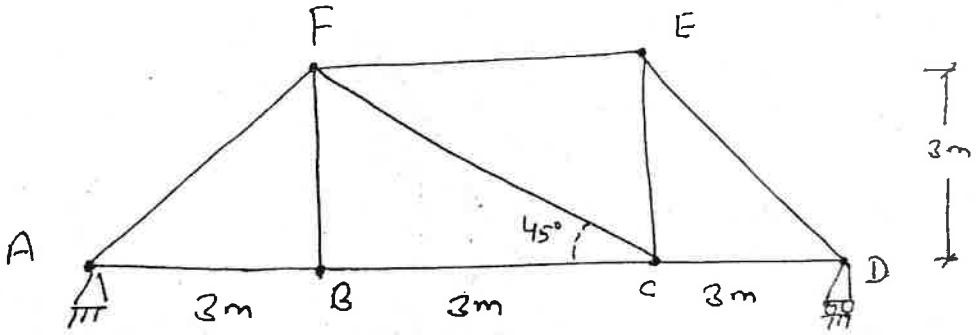


OR

Q. No 3: Analyse the beam shown in Fig. below and find reaction at A, B and C. Draw S.F.D. and B.M.D.

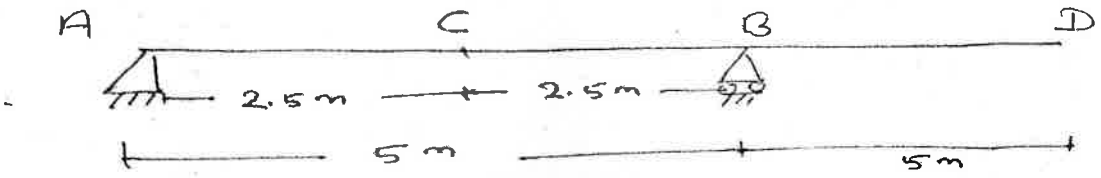


Q. No.4: Draw Influence Line Diagram for member CF and FB of the truss shown below in Figure below.

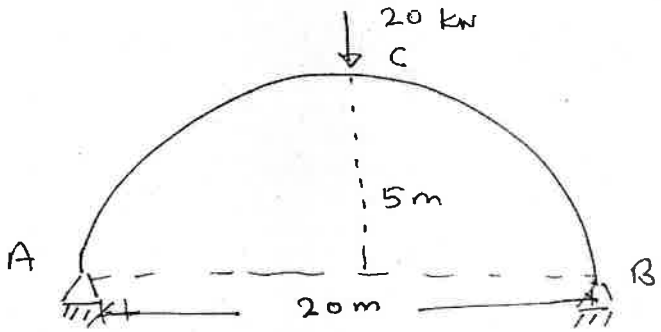


OR

Q. No .4: Draw Influence Line Diagram for Reaction at B, Shear at C and Moment at C for the beam shown in Fig. below.



Q. No.5: A two hinged parabolic arch of span 20m and central rise of 5m carries point load of 20 kN at the crown. Find the reactions at supports and draw SFD and BMD for the arch.



OR

Q. No.5: A suspension cable 140m span and 14 m central dip carries a load of 1 kN/m. Calculate the maximum and minimum tension in the cable. Find horizontal and vertical forces in each pier for the following conditions:

a) If cable passes over a frictionless pulley.
b) if cable is firmly clamped to saddles carried on frictionless rollers.

In each case angle of backstay with horizontal is 30^0

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BTCE 202A — **Max Time: 3 Hours**
Course Title: Structural Analysis-I **(Re-appear)** — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

Q. No.1

a) State Mohr's second theorem. (2x7=14)

b) State Betti's Law.

c) Draw typical configuration of a suspension bridge showing all its components.

d) Differentiate between Cables and beams.

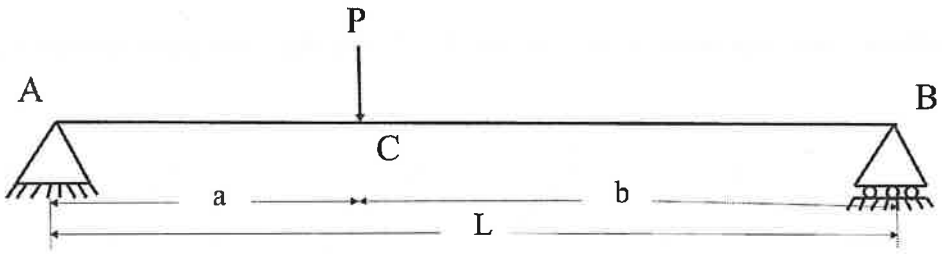
e) Define Influence Lines.

f) Why arches are advantageous to beams in case of long spans?

g) Explain radial shear in arches with the help of a diagram.

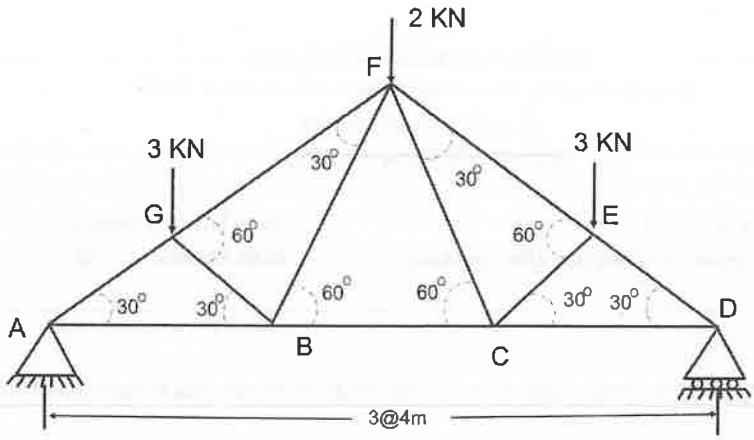
PART –II

Q. No.2: Calculate deflection at C for the beam shown in Figure below using Mohr's second theorem.

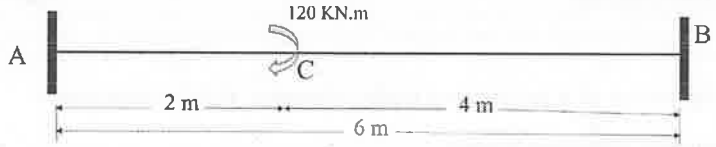


OR

Q. No.2: Determine forces in each member of the roof truss shown below in the Figure and state the nature of each force.

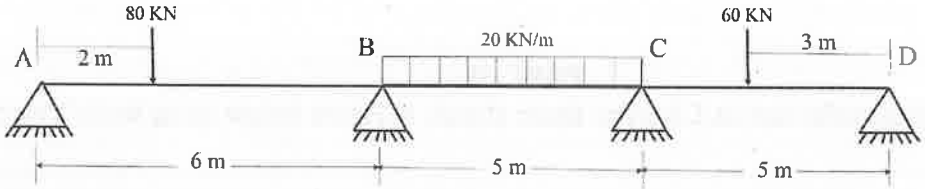


Q. No.3: For the fixed end beam shown in Fig. below, draw S.F.D. and B.M.D. using moment area method and force method of analysis.

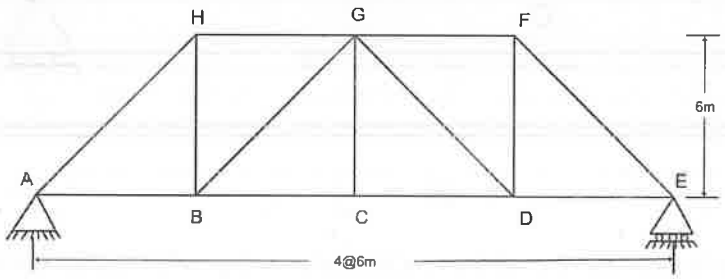


OR

Q. No 3: Analyse the continuous beam shown in Fig. below by using Clapeyron's theorem of three moments and draw S.F.D. and B.M.D.

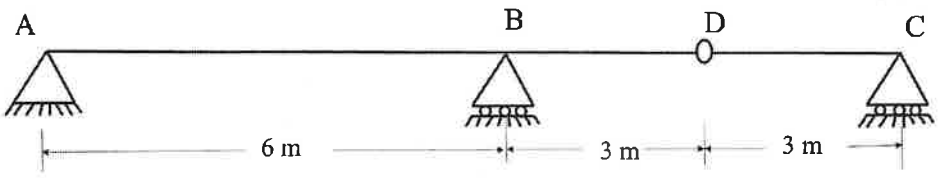


Q. No.4: Draw Influence Line Diagram for member GB and BH of the bridge truss shown below in Fig. below.



OR

Q. No .4: Define rolling loads and Influence lines. Draw Influence Line Diagram for R_A, R_B, R_C and M_B for the beam shown below in Fig. below.

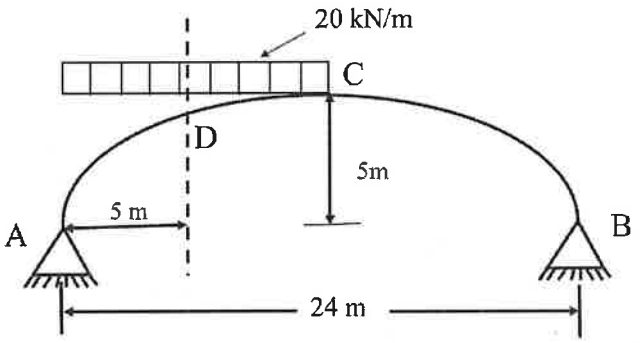


Q. No.5: A three-hinged symmetrical parabolic arch is loaded as shown in Figure below. Calculate:

I. Support reactions

II. Maximum bending moment in the portion AC and BC.

III. Normal thrust and radial shear force at D.



OR

Q. No.5: A Suspension bridge of 250 m span has three hinged stiffening girders supported by a cable, with a central dip of 25 m, if 4-point loads of 150 KN each are placed at the distance of 20 m, 30 m, 40 m and 50 m from the left-hand hinge, Find the shear force and bending moment in the girder at 62.5 m from each end. Also find maximum tension in the cable.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 605A — **Max Time: 3 Hrs.**
Course Title: Foundation Engineering — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 $(2 \times 7 = 14)$

(a) What do you understand by disturbed and undisturbed samples?
(b) Give assumptions of Terzaghi's bearing capacity theory.
(c) Two footings one circular and other square, are founded on the surface of a purely cohesive soil. The diameter of the circular footing is same as that of the side of the square footing. What will be the ratio of their ultimate bearing capacities?
(d) Write short note on mechanical stabilization of soil.
(e) What are under reamed piles? Under what circumstances they are used?
(f) A square plate section 30 cm × 30 cm and length 10 m penetrates a deposit of clay having $c = 5$ kN/m^2 and the mobilizing factor 0.8. What is the load carried by the pile by skin friction only?
(g) Differentiate between finite and infinite slope.

PART –II

Q. No.2

(a) Explain with neat sketch Seismic Refraction Method of soil exploration. (7)
(b) A retaining wall 6 m high supports earth with its face vertical. The earth is cohesionless with particle specific gravity 2.69, angle of internal friction 35 degrees and porosity 40.5%. The earth surface is horizontal and level with the top of the wall. Determine the earth thrust and its line of action on the wall if the earth is water logged to level 2.5 m below the top surface. Neglect wall friction. Draw the pressure diagrams. (7)

OR

Q. No.2

(a) A vertical wall 5 m high, supports a saturated cohesive backfill ($\phi = 0$) with horizontal surface. The top 3 m of the backfill weighs 1.76 t/m^3, and has an apparent cohesion of 1.5 t/m^2. The bulk density and apparent cohesion of the bottom 2 m of the backfill are respectively 1.92 t/m^3 and 2 t/m^2. Determine the likely depth of tension cracks behind the wall. If tension cracks develop, what will be total active earth pressure? Sketch the pressure distribution diagram and locate the point of application of resultant thrust. (8)
(b) What do you understand by soil exploration? Discuss objectives and methods of soil exploration. (6)

Q. No.3

(a) Find the critical angle of an infinite slope in a clay soil having $c' = 20$ kN/m^2, $\phi' = 20$ degrees, $G = 2.72$ and $e = 0.9$ for the following cases:
(i) soil is dry

(ii) the slope is submerged with seepage parallel to the surface.

Q3(b) A hard stratum exists at a depth of 6 m parallel to the ground surface.

(b) Differentiate between general shear failure and local shear failure. (4)

(c) If two foundations, one narrow and another wide and resting on a bed of sand carrying the same intensity of load per unit area, then which one is likely to fail early and why? (3)

OR

Q. No 3

(a) The subsoil at a building site consists of medium sand with $\gamma = 18$ kN/m^3, $c = 0$, $\phi = 32$ degrees and water table at the ground surface. A 2.5 m square footing is to be placed at 1.5 m below the ground surface. Compute the safe bearing capacity of the footing. What will be the safe bearing capacity if the water table goes down to 3 m below the ground surface? [For $\phi = 32$ degrees , $Nq = 20.3$ and $N\gamma = 19.7$] (7)

(b) When a load test was conducted by putting a square plate on the top of a sandy deposit, the ultimate bearing capacity was observed as 60 kN/m^2. What is the ultimate bearing capacity of 1.2 m square footing to be placed on the surface of the same soil? (4)

(c) Write short note on Taylor's stability number. (3)

Q. No.4

(a) A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9 m respectively. If the unconfined compressive strength of the clay is 9 t/m^2 and the pile spacing is 100 cm centre to centre, what is the capacity of the group? Assume factor of safety of 2.5 and adhesion factor 0.75. (7)

(b) Explain with neat sketch the components of well foundation. (7)

OR

Q. No .4

(a) What is "negative skin friction" and its significance in the design of pile foundation? What are its remedial measures? (5)

(b) Which of the following types of piles is likely to have the highest load capacity in compression? Give reasons to support your answer.

(i) Driven pre-cast concrete pile (ii) Pre-cast pile placed in a predrilled hole (iii) Driven steel pipe pile (3)

(c) What is tilt and shift in well foundation? Discuss with neat sketches various methods employed to rectify tilt and shift. (6)

Q. No.5

(a) What do you understand by ground improvement? Why it is needed? Discuss various methods of ground improvement? (7)

(b) What do you understand by dewatering of soil? Explain electro-osmosis method of dewatering of soil with neat sketch. (7)

OR

Q. No.5

(a) What are geotextiles? Discuss types and functions of geotextiles. (6)

(b) Write short notes on: (8)

(i) Well point system

(ii) Application of geotextiles

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations June 2022

Programme:	**B Tech Civil Engineering**	**Session: 2021-22**
Semester:	**VIIth**	**Max. Time: 3 Hours**
Course Title:	**Design of Hydraulic Structures**	**Max. Marks: 70**
Course Code:	**BTCE 701A**	

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

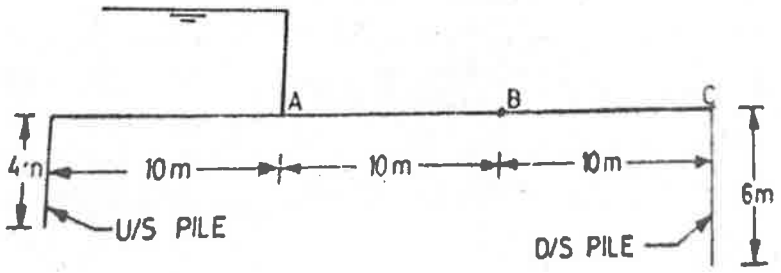
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Question 1. **(3.5x4 = 14)**

a) What are the various components of diversion canal headworks?
b) What is the function of cistern in Canal fall?
c) What is the function of Head Regulator?
d) What is a phreatic line & What is the location of phreatic line in an earth dam?
e) Why a Cutoff is provided in the hydraulic structure? Which Cutoff is effective downstream or upstream?
f) A spillway is an essential for the safety of dam. Justify this statement.
g) Which USBR stilling basin will be provided if Froude number is more than 4.5 and velocity is more than 15m/sec. Draw a neat sketch for that Stilling basin.

Question 2 **(7x2 = 14)**

a) How will you eliminate correction for mutual interference of for the Upstream, intermediate and downstream sheet piles.
b) Write down the design steps of Syphon Aqueducts.
c) Determine the thickness of the floor and uplift pressure by Bligh's Theory at point A. B and C of the downstream floor. Take G = 2.24 and H = 4 m.



Question 3 **(7x2 = 14)**

a) Write down the design steps of Sarda type falls with the help of neat sketch.
b) What do you understand by Canal falls. What are their functions?
c) What are the devices to control silt entry into the off taking canal?

Question 4 **(7x2 = 14)**

a) What are the forces acting on the gravity dam? Show that these forces with the neat sketch.
b) Enumcratc and explain by neat sketches the different ways by which the earthen dams may fail.
c) Determine the central angle of arch dam at which minimum concrete is required.

Question 5 **(7x2 = 14)**

a) What is spillway and what are the different types of a spillway?
b) An ogee spillway has 20 crest gates each having 10 m clear span. Find the maximum flood that can be safely passed by lifting all the gates when maximum reservoir elevation is 110.00 m and the crest level is 106.00 m. Take C = 2.16, Coefficient of end contraction are 0.05 and 0.10 for piers and abutments respectively.
c) What are the different types of energy dissipating methods used below the spillways?

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 605A — **Max Time: 3 Hrs.**
Course Title: Foundation Engineering — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 (2 × 7 = 14)

(a) What do you understand by disturbed and undisturbed samples?
(b) Give assumptions of Terzaghi's bearing capacity theory.
(c) Two footings one circular and other square, are founded on the surface of a purely cohesive soil. The diameter of the circular footing is same as that of the side of the square footing. What will be the ratio of their ultimate bearing capacities?
(d) Write short note on mechanical stabilization of soil.
(e) What are under reamed piles? Under what circumstances they are used?
(f) A square plate section 30 cm × 30 cm and length 10 m penetrates a deposit of clay having c = 5 kN/m^2 and the mobilizing factor 0.8. What is the load carried by the pile by skin friction only?
(g) Differentiate between finite and infinite slope.

PART –II

Q. No.2

(a) Explain with neat sketch Seismic Refraction Method of soil exploration. (7)
(b) A retaining wall 6 m high supports earth with its face vertical. The earth is cohesionless with particle specific gravity 2.69, angle of internal friction 35 degrees and porosity 40.5%. The earth surface is horizontal and level with the top of the wall. Determine the earth thrust and its line of action on the wall if the earth is water logged to level 2.5 m below the top surface. Neglect wall friction. Draw the pressure diagrams. (7)

OR

Q. No.2

(a) A vertical wall 5 m high, supports a saturated cohesive backfill (ϕ = 0) with horizontal surface. The top 3 m of the backfill weighs 1.76 t/m^3, and has an apparent cohesion of 1.5 t/m^2. The bulk density and apparent cohesion of the bottom 2 m of the backfill are respectively 1.92 t/m^3 and 2 t/m^2. Determine the likely depth of tension cracks behind the wall. If tension cracks develop, what will be total active earth pressure? Sketch the pressure distribution diagram and locate the point of application of resultant thrust. (8)
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Q. No.3

(a) Find the critical angle of an infinite slope in a clay soil having c′ = 20 kN/m^2, ϕ'= 20 degrees, G = 2.72 and e = 0.9 for the following cases:
(i) soil is dry

(ii) the slope is submerged with seepage parallel to the surface.
A hard stratum exists at a depth of 6 m parallel to the ground surface. (7)
(b) Differentiate between general shear failure and local shear failure. (4)
(c) If two foundations, one narrow and another wide and resting on a bed of sand carrying the same intensity of load per unit area, then which one is likely to fail early and why? (3)

OR

Q. No 3

(a) The subsoil at a building site consists of medium sand with $\gamma = 18$ kN/m^3, $c = 0$, $\phi = 32$ degrees and water table at the ground surface. A 2.5 m square footing is to be placed at 1.5 m below the ground surface. Compute the safe bearing capacity of the footing. What will be the safe bearing capacity if the water table goes down to 3 m below the ground surface?
[For $\phi = 32$ degrees , $Nq = 20.3$ and $N\gamma = 19.7$] (7)
(b) When a load test was conducted by putting a square plate on the top of a sandy deposit, the ultimate bearing capacity was observed as 60 kN/m^2. What is the ultimate bearing capacity of 1.2 m square footing to be placed on the surface of the same soil? (4)
(c) Write short note on Taylor's stability number. (3)

Q. No.4

(a) A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9 m respectively. If the unconfined compressive strength of the clay is 9 t/m^2 and the pile spacing is 100 cm centre to centre, what is the capacity of the group? Assume factor of safety of 2.5 and adhesion factor 0.75. (7)
(b) Explain with neat sketch the components of well foundation. (7)

OR

Q. No .4

(a) What is "negative skin friction" and its significance in the design of pile foundation? What are its remedial measures? (5)
(b) Which of the following types of piles is likely to have the highest load capacity in compression? Give reasons to support your answer.
(i) Driven pre-cast concrete pile (ii) Pre-cast pile placed in a predrilled hole (iii) Driven steel pipe pile (3)
(c) What is tilt and shift in well foundation? Discuss with neat sketches various methods employed to rectify tilt and shift. (6)

Q. No.5

(a) What do you understand by ground improvement? Why it is needed? Discuss various methods of ground improvement? (7)
(b) What do you understand by dewatering of soil? Explain electro-osmosis method of dewatering of soil with neat sketch. (7)

OR

Q. No.5

(a)What are geotextiles? Discuss types and functions of geotextiles. (6)
(b) Write short notes on: (8)
(i) Well point system
(ii) Application of geotextiles

Central University of Haryana
Even Semester End Term Examination June 2022
B.Tech. Programme
Branch: Civil Engineering

Course Code: **BT CE – 218A** **Max Time: 3 Hours**
Course Title: **Mechanical Engineering** **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.
Note: **Steam table will be allowed**

PART –I (2X7= 14)

Q. No.1 (a) What do you understand by Quasi-static process? How it is achieved?
(b) What is cut-off ratio? How it affects the air standard efficiency of diesel cycle?
(c) Draw P-V and T-S diagrams of isobaric, isochoric processes.
(d) Draw P-V and T-S diagrams of isentropic, isenthalpic, and isothermal processes.
(e) What is impulse turbine?
(f) Discuss differential pully block of simple lifting machine.
(g) Discuss the different types of stress-strain.

PART –II

Q. No.2 (a) A Carnot heat engine draws heat from a reservoir at temperature T_1 and rejects heat to another reservoir at temperature T_3. The Carnot forward cycle engine drives a Carnot reversed cycle engine or Carnot refrigerator which absorbs heat from reservoir at temperature T_2 and rejects heat to a reservoir at temperature T_3. If the high temperature $T_1 = 600$ K and low temperature $T_2 = 300$ K; determine:

(i) The temperature T_3 such that heat supplied to engine Q_1 is equal to the heat absorbed by refrigerator Q_2.
(ii) The efficiency of Carnot engine and C.O.P. of Carnot refrigerator.

(b) Explain the "Kelvin Plank Statement" of second law of thermodynamics.

OR

Q. No.2 (a) Steam enters a steam turbine at a pressure of 15 bar and 350°C with a velocity of 60 m/s. The steam leaves the turbine at 1.2 bar and with a velocity of 180 m/s. Assuming the process to be reversible adiabatic, determine the work done per kg of steam flow through the turbine. Neglect the change in potential energy.

(b) Explain the "Clausius Statement" of second law of thermodynamics.

Q. No.3 (a) Compare the performance of Otto and Diesel cycle with P-V and T-S diagrams on the basis of

(i) Same compression ratio
(ii) Same heat input
(iii) Constant maximum pressure and heat supplied

(b) Explain the following:

(i) Adiabatic mixing of air streams
(ii) Working principle of an Air-Conditioning System

OR

Q. No 3 (a) Describe with neat sketches the methods employed for improvement of thermal efficiency of open cycle gas-turbine power plant.

(b) Explain the following:

(i) Heating and Humidification process
(ii) Enthalpy of moist air

Q. No.4 a) Write the construction details and working principle of Pelton turbine with diagram.

b) A single purchase crab winch, has the following details:
Length of lever = 700 mm, Number of pinion teeth = 12, Number of spur gear teeth = 96, Diameter of load axle= 200 mm. It is observed that an effort of 60 N can lift a load of 1800 N and an effort of 120 N can lift a load of 3960 N. (a) What is the law of the machine? (b) find efficiency of the machine in both the cases, (c) Probable effort to lift a load of 4500 N.

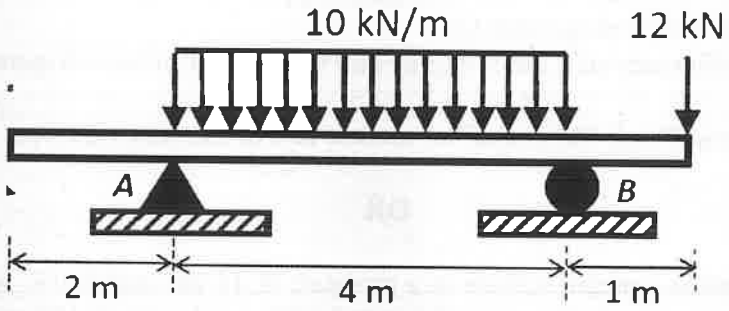
OR

Q. No .4 a) Write the classification of turbines and discuss in detail highlighting the differences.

b) Write the definition of simple machine, compound machine, velocity ratio, mechanical advantage, efficiency of machine, law of machine, reversibility of machine.

Q. No.5a) Discuss different types of gear and gear train with diagram.

b) Calculate the shear force and bending moment for the beam subjected to the loads as shown in the figure, draw the shear force diagram (SFD) and bending moment diagram (BMD). Also, find out the maximum bending moment and location of it.



OR

Q. No.5 a) Write the classification Brakes and clutch.

b) Draw and discuss in detail stress strain curve of ductile material.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech. **Session: 2021-22**

Semester: 6th **Max. Time: 3 Hours**

Course Title: Environmental Engineering – II **Max. Marks: 70**

Course Code: BT CE 604A

Instructions:

1. Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (7X2=14)

1) What is dry weather flow? Briefly explain the procedure of estimation of sewage and storm water for a city.
2) What do mean by physical quality parameters of sewage. Explain in detail by mentioning their standard parameters.
3) Explain the terms (a) Relative stability (b) Population Equivalent
4) Predict the population for the year 2031 and 2041 from the following population dataof an old city.

Year	1971	1981	1991	2001	2011	2021
Population	8,58,545	10,15,672	12,01,553	16,91,538	20,77,820	25,85,862

5) Differenciate between BOD, COD and TOC
6) Write a short on oxidation pond
7) What are the various methods of testing sewers?

Q2 (2X7=14)

a) Explain the different types of sewerage systems.

b) Design a sewer for a maximum discharge of 650 L/s running half full. Consider Manning's rugosity coefficient n = 0.012, and gradient of sewer S = 0.0001.

c) A waste water stream (flow = 2 m^3/s, ultimate BOD = 90 mg/l) is joining a small river (flow = 12 m^3/s, ultimate BOD = 5 mg/l). Both water streams get mixed up instantaneously. Cross-sectional area of the river is 50 m^2. Assuming the de-oxygenation rate constant, k' = 0.25/day and any other required data, find where the critical deficit will occur and also BOD (in mg/l) of the river water, 10 km downstream of the mixing point?

Q3. (2X7=14)

a) What is the basic principle of sewage treatment? Draw a neat sketch of sewage treatment as per various unit operations in sequence.

b) Design the primary sedimentation tank to treat wastewater with average flow rate of 10 MLD and peak flow of 22.5 MLD.

c) Discuss classification of screens and state application of each class.

Q 4. (2X7=14)

a) What do you mean by septic tank? How it is designed for a sewerage system.

b) Write a short note on –

(i) Sewage Farming

(ii) Activated sludge process.

c) Explain the process of sewage disposal through injection into groundwater and write down the Indian standards for disposal of effluent.

Q 5. (2X7=14)

a) How sewer connections for houses and residential buildings are done? Explain in detail.

b) Explain the following with neat sketches -

I. Imhoff tanks

II. septic tank

c) Clearly differenciate between the manhole and drop manhole. Also draw the neat sketches of above.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 206A — **Max Time: 3 hrs**
Course Title: Geomatics Engineering — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:-

a) EMR
b) Ideal Remote Sensing System
c) Swath
d) Overlap
e) Zenith
f) Pixel
g) Map Design

PART –II

Q. No.2 Explain GCS in detail. Also, explain different elements of GPS.

OR

Q. No.2 (a) What are satellite constellations and signal? What do you understand by GCS and PCS? Discuss.
Q. No.2 (b) Differentiate between GPS and GIS. Write down the applications of coordinate system in various branches of civil engineering.

Q. No.3 What is the principle of remote sensing? Explain the process of remote sensing in detail with a neat diagram.

OR

Q. No 3 (a) What is spectral reflectance curve? Also, explain interaction of earth surface with EMR in different regions.

Q. No 3 (b) Explain energy interactions in detail with suitable examples.

Q. No.4 Explain spatial resolution and spectral resolution in detail. What are geometric corrections? Discuss.

OR

Q. No.4 (a) Explain different types of sensors used in remote sensing systems in detail. Explain the classification of images and interpretation.
Q. No.4 (b) What do you understand by orbital characteristics? Explain in detail with neat diagrams. What is data processing in ArcGIS? Discuss.

Q. No.5 What are different components of GIS? Explain. What is geo-referencing and digital representation of geographic data? Discuss.

OR

Q. No.5 (a) Write down the applications of GIS in civil engineering in detail. Write at least 15 applications.
Q. No.5 (a) What is DGPS? Explain hyperspectral remote sensing and its application in detail.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 206A
Course Title: Geomatics Engineering

Max Time: 3 hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:- (2x7=14)

a) EMR
b) Ideal Remote Sensing System
c) Swath
d) Overlap
e) Zenith
f) Pixel
g) Map Design

PART –II

Q. No.2 Explain GCS in detail. Also, explain different elements of GPS. 14

OR

Q. No.2 (a) What are satellite constellations and signal? What do you understand by GCS and PCS? Discuss. 7

Q. No.2 (b) Differentiate between GPS and GIS. Write down the applications of coordinate system in various branches of civil engineering. 7

Q. No.3 What is the principle of remote sensing? Explain the process of remote sensing in detail with a neat diagram. 14

OR

Q. No 3 (a) What is spectral reflectance curve? Also, explain interaction of earth surface with EMR in different regions. 7

Q. No 3 (b) Explain energy interactions in detail with suitable examples. 7

Q. No.4 Explain spatial resolution and spectral resolution in detail. What are geometric corrections? Discuss. 14

OR

Q. No.4 (a) Explain different types of sensors used in remote sensing systems in detail. Explain the classification of images and interpretation. 7

Q. No.4 (b) What do you understand by orbital characteristics? Explain in detail with neat diagrams. What is data processing in ArcGIS? Discuss. 7

Q. No.5 What are different components of GIS? Explain. What is geo-referencing and digital representation of geographic data? Discuss. 14

OR

Q. No.5 (a) Write down the applications of GIS in civil engineering in detail. Write at least ten applications. 7

Q. No.5 (a) What is DGPS? Explain hyperspectral remote sensing and its application in detail. 7

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech (Civil Engineering)
Semester: Sixth
Course Title: Project Cost Analysis
Course Code: BTCE 623A

Session: 2021-22
Max. Time: 3 Hours
Max. Marks: 70

Instructions:

1. Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (7X2=14)

a) What are different types of the estimates? Explain any two briefly.

b) Differentiate between supplementary and Revised Estimate.

c) State four factors which affects rate analysis.

d) Enumerate the different methods to calculate the earthwork.

e) What is Rate analysis?

f) Explain the following term i) Salvage Value ii) Scrap Value iii) Obsolescence

g) What is Depreciation and methods of calculating depreciation?

Q 2. (2X7=14)

a) What do you mean by estimate? Also explain the different method of estimates in detail.

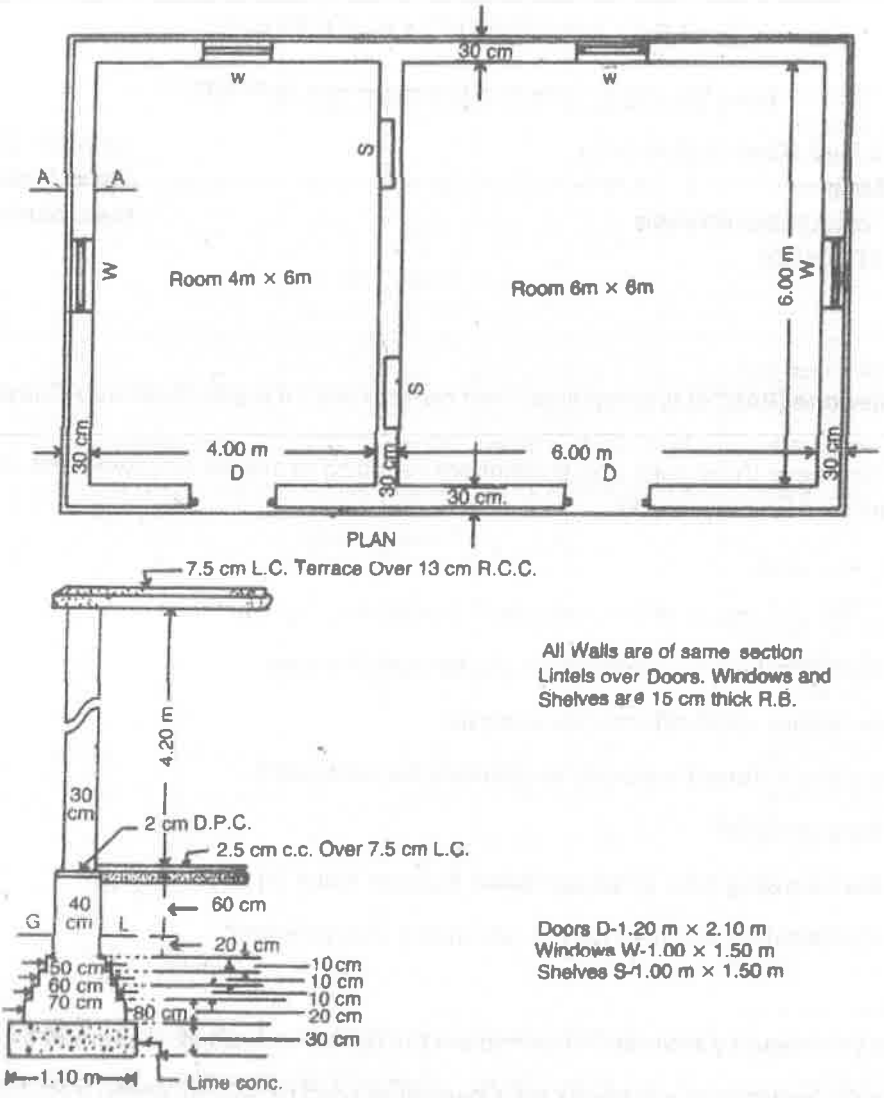
b) Estimate the quantity of earthwork for a portion of road for 400 m length from following data.

Formation width of the load is 10 metre. Side slopes are 2:1 banking, 1.5:1 in cutting.

Station	Distance in metre	R.L. of Ground	R.L. of formation
25	1000	51.00	52.00
26	1040	50.90	‖
27	1080	50.50	‖
28	1120	50.80	‖
29	1160	50.60	‖
30	1200	50.70	‖
31	1240	51.20	Downward gradient
32	1280	51.40	of 1 in 200
33	1320	51.30	‖
34	1360	51.00	‖
35	1400	50.60	‖

c) Estimate the quantities of the following items for a two room building as shown in figure i) Earthwork in excavation ii) Lime concrete in Foundation iii) 1st class brickwork in cement mortar 1:6 in foundation and plinth 4) 2.5 cm c.c damp proof course

TWO ROOMED BUILDING



Q3. (2X7=14)

a) Write the specification for different class of buildings.

b) Write the detail specifications of the following items. i. Plastering ii. Brickwork

c) Write down the detailed specifications of the Road work.

Q 4. (2X7=14)

a) Find the Rate analysis for 10 cu.m. RCC work of Cement concrete 1:2:4

b) Find the rate analysis for 100 sq.m. of DPC 2.5 cm thick.

c) Find the Rate analysis for 100 sq.m. 12 mm Plastering 1:6

Q 5. (2X7=14)

a) Briefly explain the following terms
i) Valuation ii) Sinking Fund iii) Annuity iv) Outgoings

b) A two storied RCC building is located on 250 sq m plot, having plinth area of 100 sq m. The building life may be taken as 60 years. The building fetches a gross rent of Rs 25000/month. Work out the capitalized value of the property on the basis of 6% net yield. For sinking fund 3% compound interest may be assumed. Cost of land may be taken as Rs 50,000 per sq m. Other data may be assumed suitably.

c) What are the different methods of Valuation? Explain briefly.

Central University of Haryana
Bachelor of Technology- Civil Engineering
Forth Semester Examination – June 2022
Subject Name: Fluid Mechanics II
Course Code: BTCE -402
(Reappear question paper)

Time: 3 Hours **Maximum Marks: 70**

Note: This question paper has two sections : Section A, Section B .
Attempt all Questions from Sec.-A.
Attempt any two parts from each questions in Sec.-B. All the questions are compulsory.

Section –A

7X2 = 14

(Each question carries 2 marks)

1(a) Write down minor losses in pipes.

1 (b) Derive an equation for critical depth in open channel flow.

1(c) What is a Specific energy curve? Draw a neat sketch for specific energy curve.

1(d) Define subsonic and supersonic flow with the help of Mach number.

1(e) What do you mean by drag and Lift force.

1(f) Discuss about reciprocating pump.

1(g) What do you understand Cavitation in pumps?

Section B

(56)

Question no. 2

2(a) Derive an equation for the laminar flow through circular pipe. (7)

2(b) Derive an equation for parallel pipes with the help of neat sketch. (7)

2© A piping system consists of three pipes arranged in series

	Pipe	Length	Diameter
a.	AB	1800m	50 cm
b.	BC	1200m	40 cm
c.	CD	600m	30 cm

Transform the system to (i) an equivalent length of 40 cm diameter pipe (ii) an equivalent diameter for the pipe 3600 m long. (7)

Question no. 3

3(a) Derive an equation for the hydraulic jump for the rectangular channel. (7)

3(b) In a rectangular channel of 0.5 m width, a hydraulic jump occurs at a point where depth of water of flow is 0.15 m and Froude number is 2.5. Determine

(i) The specific energy (ii) The critical depth and subsequent depths
(ii) Loss of head (iv) Energy Dissipated (7)

3© A trapezoidal channel has a bed width of 3.0 m and side slopes of 1:1. The bottom slope of the channel is 0.0036. If a discharge of 15 m^3/s passes in this channel at a depth of 1.25 m, estimate the value of Chezy coefficient C. (7)

Question no. 4

4(a) Derive Bernoulli's energy equation for compressible fluids for isothermal and adiabatic processes. (7)

4(b) If the temperature and pressure at sea level are 288 K and 101.3 kN/m^2 respectively, find the atmospheric pressure at a height of 10 km above sea level by taking the linear temperature lapse rate as 6.35 K/km. Take density of air at sea level as 1.205 kg/m^3. (7)

4© Assuming the cross sectional area of a passenger car to be $2.7m^2$ with a drag co efficient of 0.6,estimate energy requirement at a speed of 60km/hr. Assume weight of car to be 30kN and coefficient of friction 0.012.assume $\rho = 1.208kg/m^3$ (7)

Question no. 5

5(a) Write down working of Francis turbine with neat sketch. (7)

5(b) A single jet pelton wheel runs at 300 rpm under a head of 510 m. The jet diameter is 200 mm, its deflection inside the bucket is 165^0 and its relative velocity is reduced by 15% due to friction. Determine:

(i) Water Pressure
(ii) Resultant force on the bucket
(iii) Overall efficiency
Take Cv = 0.98 and Ku = 0.46 (7)

5© List the main component parts of a centrifugal pump and explain them briefly. (7)

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations June, 2022

Programme:	**B Tech Civil Engineering**	**Session: 2021-22**
Semester:	**IVth**	**Max. Time: 3 Hours**
Course Title:	**Fluid Mechanics II**	**Max. Marks: 70**
Course Code:	**BTCE 204A**	

Instructions:

1. 1 Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question No. 2 to 5 have three parts and student need to answer any two parts of each question.

Each part carries seven marks.

Question 1. **(7X2 = 14)**

a) Derive an equation for head loss in pipes due to friction - DarcyWeisbach equation
b) Derive a relation in between Manning's Coefficient and Chezy's Coefficient.
c) Differentiate between Supercritical and Sub critical flow.
d) A 5m wide rectangular channel conveys $10m^3$/sec of water with a velocity of 10 m/s. Is there a condition of Hydraulic jump to occur?
e) How will you calculate length and height of Hydraulic jump?
f) Differentiate between HGL and TGL.
g) An oil of viscosity 9 poise and specific gravity 0.9 is flowing through a horizontal pipe of 60 mm diameter. If the pressure drop in 100m length of pipe is $1800kN/m^2$. Determine the rate of flow of oil.

Question 2 **(7x2 = 14)**

a) A canal is formed with side slopes of 2 horizontal: 1 vertical and a bottom width of 3.0 m. The longitudinal slope is 1 in 5000. Using Manning's formula and assuming Manning's n = 0.025, calculate the depth of water for a discharge of 3.1 m^3/s in uniform flow.
b) Derive Chezy's equation for the uniform flow in open channel.
c) Derive an equation for Most Economical Circular channel section.

Question 3 **(7x2 = 14)**

a) For a constant specific energy of 1.8 N.m/N, calculate the maximum discharge that may occur in a rectangular channel 5.0 m wide. Also find out critical velocity.
b) What is meant by Hydraulic jump? Derive an expression for the hydraulic jump.

c) A stationary hydraulic jump occurs in a rectangular channel with the initial and sequent depth being equal to 0.20 m and 1.20 m respectively. Estimate (i) the discharge per unit width and (ii) the energy loss.

Question 4 **(7x2 = 14)**

a) Derive dynamic equation of Gradually Varied flow in wide rectangular channel.

b) Classify water surface profiles M_3, M_2, S_1, C_3, H_2, H_3 & A_2 with neat diagram.

c) A short reach of a 2 m wide rectangular open channel has its bed level rising in the direction of flow at a slope of 1 in 10000. It carries a discharge of $4m^3/s$ and its Manning 's coefficient is 0.016. The flow in this reach is gradually varying. At a certain section in this reach, the depth of flow was measured as 0.5m. Find out the rate of change of the water depth with distance, dy/dx?

Question 5 **(7x2 = 14)**

a) Derive an expression for shear stress on the basis of Prandtl Mixing Length Theory.

b) Two reservoirs are connected by a pipeline consisting of two pipes, one of 15 cm diameter and length 6 m and other diameter 22.5 cm & 16 m length. It the difference of water levels in the two reservoirs is 6 m, calculate the discharge & draw the energy gradient line. Take f = 0.04.

c) Show that two pipes described by (L, D_1, f_1), (L, D_2, f_2) are connected in series there are equivalent pipe (L, D_e, f_e) is related as

$$f_eL_e/D_e^5 = f_eL_e/D_1^5 + f_2L_2/D_2^5$$

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations June 2022

Programme: B. Tech. Programmes (Civil branch) Reappear **Session: 2021-22**
Semester: IInd **Max. Time: 3 Hours**
Course Title: Chemistry **Max. Marks: 70**
Course Code: BT CH 102A

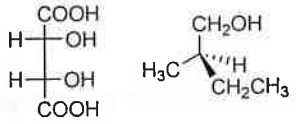
Instructions:

Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

Part-1

Q 1.

a. Absolute configuration for the given compounds are:



b. Calculate the wavenumber in cm^{-1} for IR radiation of 10 μm.

c. What is Auxochrome?

d. What are extrinsic semiconductors? Give examples.

e. How many fundamental modes of vibrations do you expect from CO_2 molecule?

f. Differentiate between temporary and permanent hardness.

g. When does a real gas obey the ideal gas equation closely? (7×2=14)

Part-2

Q 2.

a. What is Schrodinger Equation? Explain its application for the term Particle in a box solutions.

b. What is meant by "Effective nuclear charge"? Calculate Z_{eff} experienced by a 2p electron in nitrogen atom?

c. Construct the Pi-molecular orbitals for 1,3-butadiene. (5,4,5=14)

OR

Q 2.

a. Report the magnetic behaviour of the given complex ions with the help of CFT:
(i) $[Fe(CN)_6]^{3-}$ (ii) $[Ni(F)_6]^{4-}$

b. On the basis of MOT explain that the bond order of O_2^+ is more than O_2 molecule.

c. What are first second and third ionization energies of an element? What are the factors on which ionization energy of an element depends? (5,5,4=14)

Q 3.

a. Give the pictorial presentation of conformational analysis in butane considering rotation about C2-C3 bond?

b. Differentiate between racemic mixture and meso compound with example.
c. Discuss SN1 and SN2 reactions with mechanistic details. (5,4,5=14)

OR

Q 3.

a. What is chirality? Is chiral center, the necessity condition for a molecule to be chiral?
b. Explain following reactions with examples
   i) Reduction carbonyl compounds with metal hydrides ii) Addition in alkene
c. What is the Difference between Enantiomers & Diastereomers? Give examples. (5,6,3=14)

Q 4.

a. Calculate the electrode potential of a copper wire dipped in 0.1 *M* $CuSO_4$ solution at 25 °C. The standard electrode potential of copper is 0.34 V.
b. What do you mean by "Dry and Wet corrosion"? Explain with examples.
c. What is the equation of state for real gas? How do you derive a real gas equation? (4,5,5=14)

OR

Q 4.

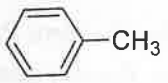
a. Calculate the pH and pOH of 0.03 M solution of HCl at 25°C.
b. What is entropy? Why the change in entropy in a system is not a suitable criteria to define spontaneous change?
c. What is Nernst Equation? Describe the application of Nernst equation. (5,4,5=14)

Q 5.

a. How you will differentiate following pair of compounds from their IR spectra?

i) H_3C-NH_2 and $H_3C-\overset{H_2}{\underset{}{C}}-OH$ ii) $H_3C-\overset{O}{\overset{\|}{C}}-H$ and $H_3C-\overset{O}{\overset{\|}{C}}-Cl$

b. Draw the finer NMR spectrum (with splitting) for following compounds.

$H_3C-\underset{H}{C}=CH_2$ 

c. What is a surface characterization technique? Explain SEM in detail. (5,5,4=14)

OR

Q 5.

a. What is the application of UV-visible spectroscopy? Assign the λ_{max} and Epsilon (Ɛ) values for benzene and aniline.
b. What is IR spectroscopy? List three factors that influence the intensity of an IR absorption band?
c. What is chemical shift in NMR spectroscopy? Explain the delta scale. (5,4,5=14)

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme:	**B.Tech (Civil) Reappear**	**Session: 2021-22**
Semester:	**3rd**	**Max. Time: 3 Hours**
Course Title:	**Strength of Material**	**Max. Marks: 70**
Course Code:	**BT CE 201 A**	

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) A steel rod 1 m long and 20 mm x 20 mm in cross section is subjected to a tensile force of 40 kN. Determine the elongation of the rod, if the modulus of elasticity for the rod material is 200 GPa

b) Define Beam and Classify the beam

c) Differentiate between ordinary and pure bending.

d) How will you find the strength of a solid shaft?

e) Describe the assumption in Euler's column theory

f) State Mohr's I^{ST} and II^{nd} theorem.

g) Define Conjugate beam and give the relation between actual beam and conjugate beam.

Q 2. (2X7=14)

a) Discuss the stress-strain diagram for ductile and brittle material in detail.

b) A simply supported beam 6 m long is carrying a uniformly distributed load of 5kN/m over a length of 3 m from the right end. Draw the shear force and bending moment diagram for the beam and also calculate the maximum bending moment of the section.

c) The stresses at point of a machine component are 150 MPa and 50 Mpa both tensile in nature. Find the intensities of normal, shear and resultant stresses on a plane inclined at an angle of 55^{o} with the axis of major tensile stress. Also find the magnitude of the maximum shear stress in the component.

Q3. (2X7=14)

a) A circular beam of 100 mm diameter is subjected to a shear force of 30 kN. Calculate the value of maximum shear stress and sketch the variation of shear stress along the depth of the beam.

b) Derive an expression for shear stress distribution for the rectangular section and show that $\tau_{max} = 1.5\ (\tau_{avg})$.

c) Define the term bending stress and prove the Prove the Relation,

$$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$$

Where M is bending moment, I is moment of Inertia of the section, σ is bending stress, E, is Young's Modulus of Elasticity, R is radius of Curvature.

Q 4. (2X7=14)

a) Explain the term Torque and Polar modulus. Also determine the diameter of the shaft when a hollow shaft is to transmit 200 kW at 80 r.p.m. if the shear stress is not to exceed 60 MPa and internal diameter is 0.6 of the external diameter.

b) A solid shaft of mild steel 240 mm diameter is to be replaced by a hollow shaft of alloy steel for which allowable shear stress is 22 percent greater than solid shaft. The power to be transmitted is to be increased by 20 percent and speed of rotation is increased by 5 percent. Determine the maximum internal diameter of the hollow shaft.

c) What do you mean by Column and Strut? Distinguish clearly between Long Column and Short Column. Also discuss the failure mechanism of long column and short column.

Q 5. (2X7=14)

a) State the relationship between slope, deflection and radius of curvature of a simply supported beam. Also find the expression for slope of a beam at the support A and deflection of the beam at its centre if a simply supported beam AB of span L and stiffness EI carries a concentrated load P at its centre.

b) With the help of moment area method, find the deflection of the cantilever beam at its free end if a cantilever beam of span 2.5 m is subjected to gradually varying load from zero at the free end to 40 kN/m over fixed end. Take EI for the cantilever beam as 13 x 10^{12} N-mm^2

c) A beam ACB of length L, simply supported at the ends has moment of inertia 4I for the length AC and I for the length CB and is loaded with point load W at C. Using Conjugate beam method determine i) slope at end A and ii) deflection at mid span. Also compute the numerical values taking W= 8kN, length of CB portion is 2.5 m and total length (L) of beam ACB is 12.5 m, I = 5000cm4 and E = 2x 105 N/mm2.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech. (Electrical Engineering) **Session: 2021-22**

Semester: VI **Max. Time: 3 Hours**

Course Title: Power Systems II **Max. Marks: 70**

Course Code: BTEE601A

Instructions:

Question no. 1 (part-I) is compulsory and carries total 14 marks (Each sub-question carries 2 marks).

Question No. 2 to 5 carry 14 marks each with internal choice.

Part-I

Q 1. (7X2=14)

a) Classify various types of buses in a power system for load flow studies. Justify the classification.

b) Explain the ideal speed droop characteristics of a speed governor.

c) What is the necessity to regulate voltage and frequency in the power system?

d) What is the difference of ACE in single-area and two area power systems

e) Summarize the common advantages of STATCOM?

f) How restructured power system differ from monopoly system.

g) Distinguish between vertical integrated system and regulated system.

Part-II

Q 2. The load flow data for a three-bus system is given in tables. The voltage magnitude at bus 2 is to be maintained at 1.04 p.u. The maximum and minimum reactive power limits for bus 2 are 0.2 and 0.5 p.u. respectively. Taking bus 1 as the slack bus, determine the voltages of the various buses at the end of first iteration starting with a flat voltage profile for all buses except slack bus using Gauss-Seidel method with acceleration factors 1.6.

Bus code	*Impedance*	*Bus code*	*Line charging admittance* $\frac{y'_{pq}}{2}$
1–2	0.06 + *j*0.18	1	*j* 0.05
1–3	0.02 + *j*0.06	2	*j*0.06
2–3	0.04 + *j*0.12	3	*j*0.05

Bus code	*Assumed voltages*	*Generation*		*Load*	
		MW p.u.	*MV Ar p.u.*	*MW p.u.*	*MV Ar p.u*
1	1.06 + *j*0.0	0.0	0.0	0.0	0.00
2	1.0 + *j*0.0	0.2	0.0	0.0	0.00
3	1.0 + *j*0.0	0.0	0.0	0.6	0.25

OR

Q 2. The following is the system data for a load flow solution:

The line admittances:

Bus code	*Admittance*
1–2	$2-j8.0$
1–3	$1-j4.0$
2–3	$0.666-j\,2.664$
2–4	$1-j4.0$
3–4	$2-j8.0$

The schedule of active and reactive powers:

Bus code	*P*	*Q*	*V*	*Remarks*
1	–	–	1.06	Slack
2	0.5	0.2	$1+j0.0$	*PQ*
3	0.4	0.3	$1+j0.0$	*PQ*
4	0.3	0.1	$1+j0.0$	*PQ*

Determine voltages at end of first iteration using Gauss-Seidel method. Take $\alpha = 1.6$.

Q 3. Two generators rated at 120MW and 250 MW are operating in parallel. The governor setting on the machines are such that have 4 percent and 3 percent drops. Determine (i) The load taken by each machine for a total load 200MW.(ii) The percentage no load speed and rated output of machine 1 to made by the speeder motor if the machine are to share a load equally.

OR

Q 3. Two generators rated 400MW and 700MW are operated in parallel. The droop characteristics of their governors are 3% and 4% respectively from no load to full load. Assuming that the governors are operating in 50Hz at no load, how would a load of 1000MW is shared between them? What will be the system frequency at this load? Assume linear governor operation. Determine the full load speed for each machine.

Q 4. A 415kV line is fed through a 132/415 kV transformer from a constant 132kV supply. At the load end of the line, the voltage is reduced by another transformer of ratio 415/132 KV. The total impedance of line is 40+ j80 ohms both transformers are equipped with tap changing; the product of the two off nominal setting is unity. If the load on the system is 200 MW at 0.8 pf lagging. Calculate the settings of the tap changers required to maintain the voltage at 132KV.

Q 4. Discuss various components of SCADA with neat diagram. Also list some of the common features of SCADA.

Q 5. Explain with neat diagram different entities involved in deregulation.

OR

Q 5. Explain the method of price selection in Single sided and double sided linear bid market.

Central University of Haryana
EVEN Semester Term End Examinations June 2022
B.Tech. Programmes
Branch: Electrical Engineering (Semester-4th)

Course code: BT EV 408
Course Title: Environmental Science

Max Time: 3 Hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (each sub Question carries two marks)
Question number 2 (two) to 5 (five) carries 14 marks each with internal choice.

PART-I

Q.No.1
(a) Define the renewable energy resources and give examples?
(b) Define eutrophication and give its impact on aquatic environment?
(c) Define biosphere reserve and give examples?
(d) Define genetic diversity and give its examples?
(e) Give the significance of food web?
(f) What is biogas? Give its importance?
(g) Define ozone layer and give its cause of depletion?

PART-II

Q. No. 2 Explain the scope and multidisciplinary nature of environmental science?
OR
Q. No. 2 Explain the various causes of deforestation and discuss the consequences of deforestation with case study?

PART-III

Q.No.3 Define ecological succession & give its importance and also explain its process with the help of an example?
OR
Q. No.3 Draw and explain the pyramid of number, biomass and energy in grassland and forest ecosystem with example?

PART-IV

Q.No.4 Define biodiversity and discuss its values and threats?
OR
Q.No.4 Define Hot-spots of biodiversity and explain the various biodiversity conservation techniques?

PART-V

Q.No.5 Define water pollution. Explain its sources and discuss its impacts on the ecosystem with case study?
OR
Q.No.5 What are green house gases? Give their characteristics and explain the impact and control of global warming?

Central University of Haryana
III/V Semester Term End Examination June 2022 (Re-apper)
B.Tech. Programmes
Branch: All branch (2nd year)

Course Code: **BT EE306A** **Max Time: 3hrs**
Course Title: **MEASUREMENTS AND INSTRUMENTATION** **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carry two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Question No.1 Write short note on:

(a) The Wien's bridges is suitable for the measurement of frequency of the range of .....

(b) What is the mean by real, true and actual value in the network?

(c) Megger is a ..... type instrument.

(d) What is the power factor?

(e) The two watt meters used for the measurement of power input read 50 kW each. What will be the readings of the two watt meters if the power factor is changed to 0.8 leading keeping the total input power same?

(f) ..... Instruments measure the total quantity of electricity delivered at a particular time.

(g) What is the role of bridges in the network?

PART –II

Unit-I

Question No.2 (a Define the following terms: (a) Accuracy (b) Precision (c) Resolution (d) Threshold (e) Sensitivity (7)
Question No.2 (b) Explain the Classification of Instruments. (7)

Or

Question No.2 (a) With the help of block diagram explain the Generalized Instrument. (7)
Question No.2 (b) Explain the differences between indicating and integrating instruments. Also explain the various methods of providing controlling torque and damping torque in indicating instruments. (7)

Unit-II

Question No.3 (a) With the help of diagram explain the construction and working principle of voltmeter. (7)

Question No.3 (b) Explain the Moving iron type Instruments. (7)

Or

Question No.3 How to extend the range of the ammeter and voltmeter? Explain in detail.(14)

Unit-III

Question No.4 (a) Discuss different types of frequency meters used in practice? (7)

Question No.4 (b) Explain how three phase power factor meters gives indications which are independent of waveform shape and frequency? (7)

Or

Question No.4 (a) With the help of diagram explain the construction and working of watt meter. (7)

Question No.4 (b) Explain the energy meter with detail. (7)

Unit-IV

Question No.5 What is the method of Kelvin's double bridge follow to measurement the low resistance? Explain in detail. (14)

Or

Question No.5 Write the short note of

a. Wein's bridges (7)

b. Hays Bridge (7)

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Electrical Engineering (Semester IV)

Course Code: BT EE407A **Max Time: 3hrs.**
Course Title: Signals and Systems **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. 1 (7×2=14)

(a) Define periodic signal and non-periodic signal. Find whether the signal given by x(n) = 5cos (6πn) is periodic or not?
(b) Define continuous time complex exponential signal, continuous time real exponential signal and continuous time growing exponential signal?
(c) What are Dirichlet's conditions for Fourier series? State the time shifting property in relation to Fourier series.
(d) Define memory and memoryless system.
(e) What is meant by aliasing and what are the effects of aliasing?
(f) Define Nyquist rate and Nyquist interval.
(g) What is region of convergence (ROC) with respect to Z transform?

PART –II

Q. No.2 For thegiven signal x(t) shown in fig. (1), find the signals:

(i) $x(t-3)$ *and* $x(t+3)$ (ii) $x(2t+2)$ *and* $x\left(\frac{1}{2}t-2\right)$ (iii) $x\left(\frac{5}{3}t\right)$ *and* $x\left(\frac{3}{5}t\right)$ (iv) $x(-t+2)$ *and* $x(-t-2)$

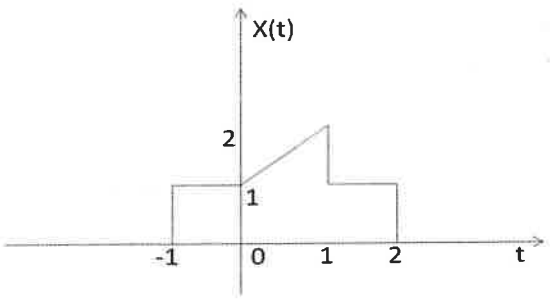


Fig. 1

OR

Q. No.2 Determine output of the system

$y[n]-\frac{1}{9}y[n-2]=x[n-1]$, If the input $x[n]=\left(\frac{1}{2}\right)^n u[n]$ and initial condition is $y[-1]=8$.

Q. No.3 Find the time domain signal whose Fourier series coefficient are given by:

$$C_n = j\delta(n-1) - j\delta(n+1) + \delta(n-3) + \delta(n+3), \omega_0 = \pi$$

OR

Q. No 3 Find the DFT of the sequence *x(n)*= [1,1,0,0] and the IDFT *of Y(k)*= [1,0,1,0].

Q. No.4 Verify Parseval's theorem for the sequence $x(n) = \left(\frac{1}{4}\right)^n u(n)$

OR

Q. No .4 Find the z-transform and the ROC of the signal

$$x(n) = \left[3\left(2^n\right) - 4\left(3^n\right)\right].u(n)$$

Q. No.5 Explain filtering and filters in detail with neat and clean diagram and mathematical expressions.

OR

Q. No.5 Explain Bandwidth in detail with neat and clean diagram and mathematical expressions.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

(Regular/Reappear)

Programme: B.Tech | **Session: 2021-22**

Semester: 4th Semester | **Max. Time: 3 Hours**

Course Title: Electric Machine II | **Max. Marks: 70**

Course Code: BT EE403A/BT EE402

Instructions:

1. Question number One (PART-1) is compulsory and carries 14 marks (Each sub question carries two Marks). Question number 2(two) to 5 (Five) (PART-II) carry fourteen marks each with internal choice.

PART -I

Q 1. (2X7=14 marks)

a) Derive the condition of maximum torque in 3-phase Induction motor?

b) Define voltage regulation of an alternators and write it mathematical equation?

c) Compare between 3-phase Induction motor and Synchronous machine?

d) Explain production of rotating field in single phase induction motor?

e) Explain Pitch factor and Distribution factor?

f) Explain squirrel cage, slip-ring and double cage Induction machine?

g) How magnetic field produced by a single winding in ac machine?

PART-II

Q 2. (14 marks)

Explain Pulsating magnetic field produced by spatially displaced windings for:

a) windings spatially shifted by 90-degree b) windings spatially shifted by 120 degrees.

OR

What is the reason for parallel operation of alternators? Explain necessary condition for paralleling alternators? Two Generators A and B operate in parallel. Station capacity of A is 50 MW and that of B is 25 MW. Full load speed regulation of station A is 3% and that of B is 3.5%. Calculate the load sharing if the connected load is 50MW. No load frequency is 50 Hz.

Q3. (14 Marks)

Explain the procedure of drawing the circle diagram of an Induction motor? What information can be drawn from the circle diagram?

OR

What is meant by slip in an Induction motor? Why must slip be present for motor action? Why cannot an Induction Motor run at Synchronous Speed? If a 8 pole Induction motor supplied from a three phase, 50 Hz supply has a rotor frequency of 2.5 Hz. Calculate (i) Slip (ii) Speed of the motor (iii) Frequency of current at Starting (iv) Frequency of current at full load

Q 4. (14 marks)

Explain Double revolving field theory for Single phase Induction motor? Draw and explain the equivalent circuit of a single-phase Induction motor and discuss the procedure for determining the parameters of equivalent circuit?

OR

What is the performance calculation of a Single-phase Induction motor? Explain Block rotor test and No load test of Single phase Induction motor with suitable diagram?

Q 5. (14 marks)

What is armature reaction? Explain the effect of armature reaction on terminal voltage of an alternators at (i) Unity power factor load (ii) Leading power factor (iii) Lagging Power factor.

OR

A 3-phase star connected alternator is rated at 1600 KVA, 13500 V. The armature effective resistance and synchronous reactance are 1.5 ohm and 30 ohms respectively per phase. Calculate the percentage regulation for a load of 1280 KW at power factors of (i) 0.8 lagging (ii) unity (iii) 0.8 leading.

Central University of Haryana
II Semester Term End Examination June 2022 (Reappear)
B.Tech. Programmes
Branch: B.Tech Electrical Engineering

Course Code: BT EPH 203 **Max Time: 3 Hours**
Course Title: Engineering Physics-II **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Explain the concepts of lattice, basis and crystal structure. How are they related?
(b) How does the classical free electron theory lead to the Ohm's law?
(c) Distinguish between a metal, a semiconductor and an insulator on the basis of their energy band structure.
(d) What is classical theory of paramagnetism?
(e) What is superconductivity?
(f) What do you understand by the quantum size effect?
(g) A laser beam has a power of 50 mW. It has an aperture of 5×10^{-3} m and it emits light of wavelength 7200 Å. The beam is focused with a lens of focal length 0.1 m. Calculate the area and the intensity of the image.

PART –II

Q. No.2 Determine the interplanar spacing between the two parallel planes with Miller indices (h, k, l) in a cubic crystal of side a.
OR
Q. No.2 Derive expressions for the Fermi energy and density of states for a free electron gas in one dimension.

Q. No.3 Describe the periodic zone scheme, extended zone scheme and reduced zone scheme for representing E-k relationships.
OR
Q. No 3 Discuss the formation of allowed and forbidden energy bands on the basis of the Kronig-Penney model. What is the effect of changing the binding energy of electron on the energy bands?

Q. No.4 Distinguish between the characteristics features of diamagnetism, paramagnetism, ferrimagnetism, antiferromagnetism. Give an example of each type of material. Comment on the temperature variation of susceptibility for all types of materials.

OR

Q. No .4 Explain the difference between type I and type II superconductors using the Meissner effect. Prove that the Meissner effect and the disappearance of resistivity in a superconductor are mutually consistent.

Q. No.5 What is the full form of LASER? Differentiate between spontaneous and stimulated emissions. What are the Einstein coefficient related to spontaneous and stimulated emission?

OR

Q. No.5 What is a laser? What are the unique characteristics of a laser beam and the main types of lasers? Discuss the application of lasers in industry and medicine.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech **Session: 2021-22**

Semester: 6th Semester **Max. Time: 3 Hours**

Course Title: SENSORS AND TRANSDUCERS **Max. Marks: 70**

Course Code: BT EE642A

Instructions:

1. Question number One (PART-1) is compulsory and carries 14 marks (Each sub question carries two Marks). Question number 2(two) to 5(Five) (PART-II) carry fourteen marks each with internal choice.

PART -I

Q 1. (2X7=14 marks)

a) Explain basic concept of sensors and transducer and their classification?

b) What is potentiometer? Explain it construction and working principle?

c) With neat diagram, Explain the working of Capacitive transducers?

d) Explain how torque and pressure can be measured?

e) What is chemical sensor? How pH values can be measured?

f) What are the advantages of smart sensors and standards for smart sensors?

g) Write in brief about the data transmission and telemetry?

PART-II

Q 2. (14 marks)

Explain the Principle and working operation of Linear Variable Differential Transducer (LVDT)? Also draw the plot showing variation in amplitude and phase of the output with displacement?

OR

The output of a LVDT is connected to 5V voltmeter through an amplifier whose amplification factor is 250. An output of 2mV appears across the terminal of LVDT

when the cores moves through a distance of 0.5mm. If the multi-meter has a 100 divisions and the scale can be read to a 1/5 of a division. Calculate: (i) Sensitivity and (ii) Resolution of the instrument in mm.

Q3. (14 Mark)

Explain the working principle of Piezo-electric transducer with neat diagram? Also draw equivalent circuit of piezo electric transducers? Explain impulse response of piezo electric crystal?

OR

Define Hall Effect transducer and its working principle? Explain Photovoltaic cells, Photoconductive cells, Semiconductor photodiode and phototransistors?

Q 4. (14 marks)

Explain how temperature, flow, electromagnetic flow meters, thermal meters, wire anemometers, shaft power and thermal conductivity can be measured?

OR

Explain how force, ultrasonic flow meter, liquid level, displacement, velocity, speed and acceleration can be measured?

Q 5. (14 marks)

Explain smart sensors and what are the components of smart sensors? Draw a neat diagram of general architecture of smart sensors?

OR

Write a brief introduction of data acquisition systems? Mention its objective and configuration and explain the types of data acquisition system.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Electrical Engineering

Course Code: BT EE405A **Max Time: 3hrs**
Course Title: Power Systems - 1 **Max Marks: 70M**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks). Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

1. (a) Write the importance of electrostatic precipitator.
   (b) What are the different classifications of nuclear reactor and on what basis it is done?
   (c) What is meant by Ferranti effect?
   (d) What is the effect of earth on line capacitance?
   (e) Explain the arcing phenomenon in circuit breaker?
   (f) How does Resistance Switching Work?
   (g) Discuss the relation between relay and circuit breaker?

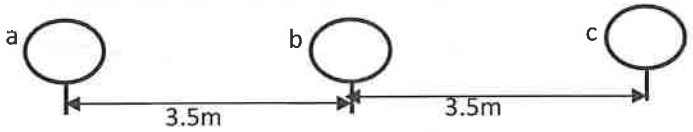
PART –II

Q. No.2 Describe the functions of economizer and super heater in a thermal power plant. What is feed water? What are the problems associated due to impurities in feed water? How they can be eliminated. (14)

OR

Q. No.2 Explain the working of a Nuclear Power Station with a neat layout diagram? (14)

Q. No.3 (a) Derive the expression for the capacitance of a three phase line having unsymmetrical spacing (7).
(b) A three phase 50Hz transmission line has flat horizontal spacing with 3.5m between adjacent conductors. The conductors are hard drawn seven strand copper (outside conductor diameter =1.05cm). The voltage of the line is 110kV. Find the capacitance to neutral and the charging current per kilometre of line. (7).



OR

Q. No.3 Derive the expression for the (a) inductance of a single phase line and (b) inductance per phase of a three phase line (7x2=14).

Q. No.4 Explain in detail the construction and working principle of bulk oil circuit breaker. List out the advantages and disadvantages of the bulk oil circuit breaker (14).

OR

Q. No.4 What are the properties to be followed by the contact material of vacuum circuit breaker. With a neat sketch explain the operating of vacuum circuit breaker? (14)

Q. No.5 (a) Discuss the different types of transformer faults. What are the various protective schemes available for transformer? (7)

(b) List out the applications of non directional over current and directional over current relays? (7)

OR

Q. No.5 Explain in detail about (a) Electromagnetic attraction and (b) Electromagnetic induction relays? (7x2=14)

Central University of Haryana
ODD Semester Term End Examination June 2022
B.Tech. Programmes
Branch: EE (Reappear)
Course Code: BTMS401 **Max Time: 3 hours**
Course Title: Numerical Methods in Engineering

Instructions:

Question Number one (PART-I) is compulsory and carries total 14 marks (Each sub Question carries two Marks).

Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q 1. (2X7=14)

a) Find the stationary point of Stationary point of $f(x) = x^{\frac{1}{3}}(1+x)$.

b) Write a note on Kuhn-Tucker conditions.

c) What is the minimum value of $f(x,y) = x - y + 2x^2 + 2xy + y^2$ using random walk method from the point [0,0] with a starting step length of $\lambda = 1.0$.

d) Match the following

A. Newton-Raphson	1. Integration
B. Runge-kutta	2. Root finding
C. Gauss-seidel	3. Ordinary Differential Equations
D. Simpson's Rule	4. Solution of system of Linear Equations

e) What is the convergence criterion of Gauss Seidal method.

f) We need to enclose a field with a fence. We have 500 feet of fencing material with a building on one side of the field where we will not need any fencing. Determine the maximum area of the field that can be enclosed by the fence.

g) Classify the Second order partial differential equation

$$x\frac{\partial^2 u}{\partial x^2} + 2x\frac{\partial^2 u}{\partial x \partial y} + (x+y)\frac{\partial^2 u}{\partial y^2} = 0$$

PART –II

Q. No.2 (a) Find three positive numbers whose sum is 30 and the sum of whose squares is as small as possible.

(b) What is the minimum value of $f(x,y,z) = x^2 + 4y^2 + 2z^2$ on the plane x − 2y + z = 15.

OR

Q. No.2 (a) Find the extreme values of $f(x,y) = x^3 + y^3 + 2x^2 + 4y^2 + 6$.

(b) Find the dimension of a box of largest volume that can be inscribed in a sphere of unit radius.

Q. No.3(a) Solve the following system of linear equation using Gauss Elimination method:

$3x + 3y + 2z = 1, \quad x + 2y = 4, 10y + 3z = -2, \quad 2x - 3y - z = 5.$

(b) Solve the following system of linear equation using Gauss Jacobi method:

$$2x + 3y + 5z = 9;\ 7x + 3y - 2z = 8;\ 2x + 3y + z = 5$$

OR

Q. No 3(a) Find the value of a and b for which the equations

$$x + ay + z = 3$$
$$x + 2y + 2z = b$$
$$x + 5y + 3z = 9$$

are consistent. When will these equations have a unique solution?

(b) A company manufacturing air coolers has two plants located at Bombay and Calcutta with a capacity of 200 units and 100 units per week respectively. The company supplies the air-coolers to its four showrooms situated at Ranchi, Delhi, Lucknow and Kanpur which have a maximum demand of 75, 100, 100 and 30 units respectively. Due to differences in raw material cost and transportation cost, the profit per unit in rupees differs with places which is shown in table below.

	Ranchi	Delhi	Lucknow	Kanpur
Bombay	90	90	100	110
Calcutta	50	70	130	85

Plan the production programme to maximize the profit. The Co. may have its production capacity at both plants partly or wholly unused.

Q. No.4 (a) Write a note on unconstraint minimization methods.

(b) Find a suitable scaling of variables to reduce the condition number of the Hessian matrix of the following function to 1

$$f(x, y) = 6x^2 + 2y^2 - 6xy - x - 2y$$

OR

Q. No.4(a) Minimize $f(x, y) = 2x^2 + y^2 + 2xy + x - y$ using random walk method from the point (0,0) with a starting step length 1 and compare the result with univariate method.

(b) Consider the minimization of the function using Powell method.

$f(x, y) = 6x^2 + 2y^2 - 6xy - x - 2y$

Also, If S=(1,2) denote a search direction, find a direction conjugate to S.

Q.No.5(a) Write a note on constraint direct and indirect optimization methods.

(b) Solve the following using Penalty method

$$Max\ Z = 4x + y + 3z + 5u \text{ subject to}$$
$$4x - 6y - 5z - 4u \geq -20$$
$$-3x - 2y + 4z + u \leq 10$$
$$-8x - 3y + 3z + 2u \geq 20$$
$$x, y, z, u \geq 0$$

OR

Q.No.5(a) Find the largest eigen value of the following using Power method.

$$\begin{bmatrix} 9 & -1 & 9 \\ 3 & -1 & 3 \\ -7 & 1 & -7 \end{bmatrix}$$

(b) Use classical Runge–Kutta method to find the value of $y(0.2)$ for the following system of first order ODEs. Use step size $h = 0.1$.

$$\frac{dy}{dx} = x + z;\ \frac{dz}{dx} = y^2 + x + z; y(0) = 0; z(0) = 0;$$

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Electrical Engineering

Course Code: BT EE804 A **Max Time: 3 Hours**
Course Title: Power Electronics and Control for Renewable Energy System
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks). Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1
(a) What is meant by duty cycle?
(b) Write the function of Freewheeling diode.
(c) What do you mean by buck-boost converter?
(d) Define Phase locked loop.
(e) What do you understand by switched model of power electronics converter?
(f) Write about linear control approach for power electronics converter.
(g) Explain the function of multilevel inverter.

PART –II

Q. No.2 Write about sinusoidal pulse width modulation (SPWM) in details with Circuit diagram.

OR

Q. No.2 What do you mean by DC-AC converters. Explain with circuit diagram and waveform.

Q. No.3 What do you understand by Classical Averaged Model. Explain with circuit diagram.

OR

Q. No 3 Discuss about Small Signal Analysis in details.

Q. No.4 Explain about Variable-Structure Control of Power Electronic Converters.

OR

Q. No .4 Write about Linear Control Approaches for DC-DC Power Converters.

Q. No.5 Discuss about Control of Wind Energy Systems.

OR

Q. No.5 Write about Control of voltage source converters with LCL filter.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Electrical Engineering (Semester –VIth)

Course Code: BT EE 603A **Max Time: 3 Hours**
Course Title: Micro-processor and Micro-controller **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks). Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) What do you mean by RISC processor?
(b) What is Micro-controller?
(c) Define: Accumulator, Stack Pointer.
(d) What do you mean by interrupts? Write name of interrupts.
(e) Write short note on Serial port operation.
(f) What is baud rate? Explain modes for baud rate.
(g) Explain the indexed addressing and based index addressing modes of 8086.

PART –II

Q. No.2 Draw neat and clean Pin diagram of 8086 microprocessors and Explain all signals.

OR

Q. No.2 What do you mean by timing diagram and machine cycle of 8086 microprocessor. Discuss in detail.

Q. No.3 Define instruction set. Explain data transfer instruction, arithmetic instruction and logical instruction with examples.

OR

Q. No 3 Discuss about different types of interrupts of 8086. Also discuss about priority of interrupts.

No.4 Write a program for generating square waves of 5 kHz frequency with flowchart.

OR

Q. No .4 Explain architecture of 8051. Differentiate micro-processor and micro-controller.

Q. No.5 Write short note on: a) UART b) Serial port control register.

OR

Q. No.5 Discuss 8051 micro-controller interfacing with stepper motor in details.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 206A
Course Title: Geomatics Engineering

Max Time: 3 hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:-

a) Platform
b) Black Body Radiation
c) Orbital Period
d) Sidelap
e) Nadir
f) Digital Image
g) Map Projection

PART –II

Q. No.2 Explain the importance of maps in Geomatics Engineering. Also, briefly explain different terminologies used in map making.
OR
Q. No.2 Differentiate between GPS and GIS. Write down the applications of coordinate system in various branches of civil engineering.

Q. No.3 Briefly explain different laws being applicable from time to time in remote sensing.
OR
Q. No 3 Explain energy interactions in detail with suitable examples.

Q. No.4 Explain different types of platforms with neat diagrams. Explain radiometric corrections and Image histogram.
OR
Q. No .4 What do you understand by orbital characteristics? Explain in detail with neat diagrams. What is data processing in ArcGIS? Dsicuss.

Q. No.5 Explain different types of data models being used in GIS. What do you mean by GIS data base management system? Explain.
OR

Q. No.5 What is DGPS? Explain hyperspectral remote sensing and its applications in detail.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 752A **Max Time: 3 hrs**
Course Title: Road Safety Audit **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Flexible markers
(b) Reflectors
(c) IPC 338
(d) Crash Clusters
(e) Need of crash data
(f) Emergency care
(g) Informatory signs

PART –II

Q. No.2 (A) Write down the steps required for improving road safety in India. How road safety engineering is different in India from other countries?

Q. No.2 (B) What is the need of planning for network in case of road safety engineering? Explain.

OR

Q. No.2 (A) Explain road safety scenario in India. What are the road accident characteristics involved in ensuring better road safety?

Q. No.2 (B) What is the importance of land use in road safety? Explain.

Q. No.3 (A) What is Road Safety Auditing? Explain the concept and need of road safety audit.

Q. No 3 (B) What are road safety hazards? How we can improve road safety with the help of traffic calming measures?

OR

Q. No.3 Write down the code required for road safety audit as per IRC/ Explain in detail different stages in Road Safety Auditing procedure. (14 Marks)

Q. No.4 (A) Explain speed management issues in India. "Road infrastructure plays an important role in road safety engineering." Discuss.

Q. No.4 (B) Explain different speed zone signs including construction zones as per IRC. Why enforcement is necessary in road safety engineering? Explain in detail.

OR

Q. No.4 (A) What do you mean by safe system approach? Explain the global perspective of it in detail.

Q. No .4 (B) Explain in detail different components of road safety required on Kundli-Manesar-Palwal expressway.

Q. No.5 (A) Differentiate between crash investigation and crash reconstruction.

Q. No.5 (B) What do you understand by crash costing and economic appraisal? Explain construction zone markings and signs as per IRC.

OR

Q. No.5 (A) What is road safety engineering? Discuss. Explain the human factors related to crashes for road safety.

Q. No.5 (B) Explain the safety provisions required for workers at construction sites. How road safety auditing is different from crash reconstruction?

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech **Session: 2021-22**

Semeste: VI **Max. Time: 3 Hours**

Course Title: Hydrology and Water Resources **Max. Marks: 70**

Course Code: BT CE 602 A

Instructions:

1. Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (7X2=14)

a) What are the various differences between recording and non- rain gauges?

b) How you will estimate missing data?

c) What do you mean by unit hydrograph? Explain how it is different from storm hydrograph.

d) What is meant by C2-S2 water? Discuss its usefulness for irrigating fine textured soil.

e) 10 cumecs of water is delivered to a 32 hectares field, for 4 hours. Soil probing after the irrigation indicates that 0.3 meter of water has been stored in the root zone. Compute the water application efficiency.

f) What do you mean by Meandering of River?

g) Write a short note on canal alignment.

Q 2. (2X7=14)

a) The normal annual rainfall at stations A, B, C and D in a basin are 80.97, 67.59, 76.28 and 92.01 cm respectively. In the year 1975, the station D was inoperative and stations A, B, C are recorded 91.11, 72.23, 79.89 cm respectively. Estimate rainfall at station D in that year.

b) Discuss the factors affecting the infiltration capacity of an area. Explain how it is different from rate of infiltration.

c) What do you mean by Evapo-transpiration? Explain various methods of its measurement.

Q3. (2X7=14)

a) What do you mean by hyetograph? Describe how it is different from Storm hydrograph.

b) Two storms each of 6-h duration and having rainfall excess values of 3.0 and 2.0 cm respectively occur successively. The 2-cm ER rain follows the 3-cm rain. The 6-h unit hydrograph for the catchment is given below in table. Calculate the resulting DRH.

Time(hrs.)	0	3	6	9	12	15	18	24	30	36	42	48	54	60	69
Uh ordinates (m^3/s)	0	25	50	85	125	160	185	160	110	60	36	25	16	8	0

c) Rainfall of magnitude of 3.8 cm and 2.8 cm occurring on two consecutive 4- h duration on a catchment of area 27 km^2 produced the following hydrograph of flow at the outlet of the catchment. Estimate the rainfall excess and ϕ index.

Time from start (hrs.)	6	0	6	12	18	24	30	36	42	48	54	60	66
Observed flow (m^3/s)	6	5	13	26	21	16	12	9	7	5	5	4.5	4.5

Q 4. (2X7=14)

a) Define Irrigation and explain its necessity in a tropical country like India. How Furrow irrigation is different from Sprinkler irrigation? Which one is preferred in India and why?

b) The Culturable commanded area of a watercourse is 1200 hectares. Intensities of sugarcane and wheat crops are 20% and 40% respectively. The duties for the crops at the head of the watercourse are 730 hectares/cumec and 1800 hectares/cumec, respectively. Find the discharge required at the head of the watercourse and determine the design discharge at the outlet, assuming a time factor equal to 0.8.

c) What are the possible causes of water losses in a canal? What are the methods adopted for reducing such loss. What are the empirical formulas's used to calculate the losses.

Q 5. (2X7=14)

a) Design a regime channel for a discharge of 50 cumecs, with a silt factor = 1.0, by using Lacey's theory.
b) Explain with neat sketches the different types of spurs which are commonly used for controlling and training Indian rivers?
c) Define Balancing depth for excavating canals. Calculate the balancing depth for a channel section having a bed width equal to 18 m and side slopes of 1: 1in cutting and 2:1 in filling. The bank embankments are kept 3.0 m higher than the ground level (berm level) and crest width of bank is kept as 2.0 m.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 752A **Max Time: 3 hrs**
Course Title: Road Safety Audit **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks ~~each with i~~nternal choice.

PART -I

Q. No.1 Define the following terms:-
(a) Cat Eye
(b) IPC 304A
(c) Rumble Strips
(d) Delineator
(e) Traffic Cones
(f) Accident Analysis
(g) Crosswalk

PART –II

Q. No.2 Explain road safety scenario in India. What are the road accident characteristics involved in ensuring better road safety? Explain in detail.
OR
Q. No.2 "Road environment is necessary for improving road safety." Discuss. What is the importance of land use in road safety? Explain.

Q. No.3 Write down the code required for road safety audit as per IRC. Explain different stages in Road Safety Auditing procedure.
OR
Q. No 3 Explain road design issues in RSA. What are the design standards required for better RSA in the field? Discuss.

Q. No.4 What do you mean by safe system approach? Explain the global perspective of it in detail.
OR
Q. No .4 Explain different types of speed limits used on highways. Why traffic signs are necessary for better road safety? Explain.

Q. No.5 What is road safety engineering? How road safety engineering is different from road safety audit? Discuss. Explain the human factors related to crashes for road safety.

OR

Q. No.5 Explain the safety provisions required for workers at construction sites. How road safety auditing is different from crash reconstruction? Explain in detail.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech **Session: 2021-22**

Semester: VI **Max. Time: 3 Hours**

Course Title: Concrete Technology **Max. Marks: 70**

Course Code: BT CE 601 A

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What are the major Bogue's Compounds of cement? Discuss their role in hydration of cement.

b) Discuss Bulking of sand; if the sand is measured by volume and no allowance is made for bulking of sand what will be its effect on a nominal concrete mix 1:2:4 for a bulking of 15 percent.

c) Explain the different types of slump with neat and clean sketch.

d) Define Shrinkage and Creep. How Plastic Shrinkage is different from drying shrinkage.

e) Differentiate between Nominal Mix, Standard Mix and Design Mix. Also Tabulate the Environmental Exposure condition as per IS Code.

f) Describe the carbonation of concrete in details.

g) Define light weight concrete. Discuss the typical range of aggregate unit weight for making structural light weight concrete.

Q 2. (2X7=14)

a) Describe the physical property of cement. Enlist the test required to determine them. Explain any of them as pr IS guidelines.

b) Determine the fineness modulus of aggregate for the following result of sieve analysis. What does the result indicate?

IS Sieve Size	10 mm	4.75 mm	2.36 mm	1.18 mm	600µm	300µm	150µm	75µm
Percentage Passing	100	92	74	55	23	12	9	7

c) What are admixtures? Enlist the different admixtures used in concrete construction. Explain the function and property of any one type of admixtures.

Q3. (2X7=14)

a) Define Workability of concrete; enlist the different method for measuring it in the laboratory. Also discuss the factors affecting the workability of fresh concrete.

b) Define Curing. Why it is required. Also classify the different types of curing.

c) Define the term "**concrete strength**" and their different types. Describe the relation between them. Also discuss any test performed on hardened concrete to determine tensile strength of concrete.

Q 4. (2X7=14)

a) Calculate the quantities of ingredients required to produce one cubic meter of structural concrete. The mix is to be used in proportions of one part of cement to 1.37 parts of sand to 2.77 parts of 20 mm nominal size crushed coarse aggregate by dry volumes with a water- cement ratio of 0.49 (by mass). Assume the bulk densities of cement, sand and coarse aggregate to be 1500, 1700, and 1600 kg/m^3, respectively. The percentage of entrained air is 2.

b) List the basic steps of ACI Mix design procedure. Also discuss the major difference between ACI and IS-Concrete mix proportioning guidelines.

c) Explain the importance of grading? Why, Theoretical grading, which produce maximum density cannot be used in practice.

Q 5. (2X7=14)

a) Define Corrosion. Tabulate the IS codal provisions for cover of various exposure conditions. Explain clearly the various agencies of corrosion.

b) Describe the alkali reaction on concrete with their mechanism.

c) Define Hot weather concreting. What are the effects of hot weather concreting? What precautions need to be taken for hot weather concreting?

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 821A — **Max Time: 3 hrs**
Course Title: Pavement Evaluation and Management — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:-

a) Consolidation deformation
b) Failure of wearing course
c) Reflection cracking
d) Roughness
e) Principle of FWD
f) PSI
g) PMS

PART –II

Q. No.2 Explain the methods for the evaluation of pavement in detail. Explain different types of distresses in flexible pavement.

OR

Q. No.2 Explain the factors affecting the performance of pavement. Explain in pavement deformation in pavements.

Q. No.3 For which purpose Bump Integrator is used? Explain the procedure of it. Explain digital ultrasonic concrete tester.

OR

Q. No 3 Explain dynaflect testing for the evaluation of rigid pavement. Explain the design steps included in Benkelman Beam Deflection Method.

Q. No.4 Explain flexible overlay over flexible pavement by using benkelman beam method with a neat sketch.

Existing black top pavement was tested using Benkelman Beam with a test vehicle of 8170 kg rear axle load. Observations recorded at a pavement temperature of 43°C are given below:

Length of test stretch = 300 m

Serial Number subsection	Rebound deflection (mm)	Serial number subsection	Rebound deflection (mm)
1	1.46	7	1.68
2	1.52	8	1.74
3	1.56	9	1.96
4	1.76	10	1.42
5	1.96	11	1.56
6	1.74	12	1.62

Compute the thickness of overlay of bituminous concrete, taking allowable deflection as 1.25 mm, if the factor of subgrade moisture correction is 2.0.

OR

Q. No .4 Explain LTPP & ESAL. How the prediction of distress and performance is being done? Discuss.

Q. No.5 Differentiate between network level and project level PMS functions with a neat relationship diagram. What are technical level issues, administrative level issues and legislative level issues in PMS? Explain.

OR

Q. No.5 Differentiate between PMS and MMS. Explain any working design methods included in the pavement management systems.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech (Civil Engineering) **Session: 2021-22**

Semester: Sixth **Max. Time: 3 Hours**

Course Title: Design of Steel Structures **Max. Marks: 70**

Course Code: BTCE 603A

Instructions:

1. Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question no. 2 to 4 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.
3. Question no. 5 has two parts and students are required to answer any one. Each part carries fourteen Marks.

Note: IS 800: 2007 is allowed for use in the examination.

Q 1. (7X2=14)

a) Explain the failures of bolted joints.

b) What are advantages and disadvantages of steel structures?

c) Explain the classification of cross sections as per the IS 800: 2007 based on yield and plastic moments and rotational capacities.

d) Differentiate between web buckling and web crippling.

e) Distinguish between laterally restrained and unrestrained beams

f) Briefly describe the types of foundations used for columns.

g) What is Plate Girder? Explain its various components with sketches.

Q 2. (2X7=14)

a) A bracket of 8 mm thickness is bolted to the flange of a column ISHB300@577N/m. An eccentric load of 300 kN is acting at distance of 350 mm from the center of column. Using M20 bolts of grade 4.6, design the connections.

b) Design the welded connection to connect two plates of width 200 mm and thickness 10 mm for 100 percent efficiency.

c) Design a lap joint between the two plates of width 120 mm, if the thickness of one plate is 16 mm and the other is 12 mm. The joint has to transfer a design load of 160 kN. The plates are of Fe 410 grade. Use bearing type bolts.

Q3. (2X7=14)

a) Design a single angle tension member of a roof truss to carry an axial factored load of 225 kN. Use 20 mm shop bolts of grade 4.6. The effective length of the member is 3m. Consider ISA 10075, 8 mm angle (Ag= 1336 mm^2).

b) Design a simply supported beam of effective span 1.5 m carrying a factored concentrated load of 360 kN at mid span.

c) Design the simply supported main beam of a building supporting concrete floor slab with the following data:

Centre to centre distance of beams – 6m

Span of beam – 7m

Thickness of concrete slab – 240mm

Finished screed – 40mm thick

Weight of concrete slab and finished screed- 24kN/m^3

Imposed load – 4kN/m^2

Q 4. (2X7=14)

a) A column 5 m long has to support a factored load of 3600 kN. The column is effectively held at both ends and restrained in direction at one of the ends. Design the column using beam sections and plates.

b) Design a gusseted base for a column ISHB 350 @72.4 kg/m with flange plates 450 × 20mm carrying a factored axial force of 3000kN. The column rests on M20 grade concrete pedestal. Design the bolted connection also. Assume Fe 410 grade steel and 4.6 grade bolts.

c) Design a suitable slab base for a column section ISHB 200@ 365.9N/m supporting an axial load of 500 kN. The base plate is to rest on a concrete pedestal of M20 grade concrete.

Q 5. (14)

a) Design a plate girder of span 24 m to carry superimposed load of 35 kN/m. Avoid use of bearing and intermediate stiffeners. Use Fe 415 (E250) steel.

b) Design a simply supported gantry girder to carry an electric overhead travelling crane, given

Span of gantry girder= 6.5 m

Span of crane girder=16 m

Crane capacity=250 kN

Self-weight of crane girder excluding trolley= 200 kN

Self-weight of trolley= 50 kN

Minimum hook approach= 1.0 m

Distance between wheels= 3.5 m

Self-weight of rails= 0.3 kN/m

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 821A — **Max Time: 3 hrs**
Course Title: Pavement Evaluation and Management — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:-

a) Consolidation deformation
b) Failure of wearing course
c) Reflection cracking
d) Roughness
e) Principle of FWD
f) PSI
g) Unevenness Index

PART –II

Q. No.2 (A) Explain the methods for the evaluation of pavement in detail. Explain different types of distresses in flexible pavement. (7 Marks)

Q. No.2 (B) Explain the factors affecting the performance of pavement. (7 Marks)

OR

Q. No.2 (A) Explain the safety factors which are to be considered for the evaluation of pavement. Explain different types of distresses in rigid pavement. (7 Marks)

Q. No.2 (B) Explain the relation between performance and distress. What do you mean by low temperature shrinkage cracking? (7 Marks)

Q. No.3 (A) For which purpose Bump Integrator is used? Explain the procedure of it. (7 Marks)

Q. No 3 (B) Explain dynaflect testing for the evaluation of rigid pavement. Explain the design steps included in Benkelman Beam Deflection Method. (7 Marks)

OR

Q. No.3 (A) Explain with a neat diagram pavement skid resistance tester. How the structural capacity is important in defining the structural parameters of pavement? (7 Marks)

Q. No 3 (B) Briefly discuss the functional parameters necessary for the evaluation of pavement. Explain the procedure of any one pavement evaluation experiment in detail. (7 Marks)

Q. No.4 (A) Existing black top pavement was tested using Benkelman Beam with a test vehicle of 8170 kg rear axle load. Observations recorded at a pavement temperature of 43°C are given below:

Length of test stretch = 300 m

Serial Number subsection	Rebound deflection (mm)	Serial number subsection	Rebound deflection (mm)
1	1.46	7	1.68
2	1.52	8	1.74
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4	1.76	10	1.42
5	1.96	11	1.56
6	1.74	12	1.62

Compute the thickness of overlay of bituminous concrete, taking allowable deflection as 1.25 mm, if the factor of subgrade moisture correction is 2.0. (7 Marks)

Q. No .4 (B) Explain LTPP & ESAL. How the prediction of distress and performance is being done? (7 Marks)

OR

Q. No.4 (A) Explain in detail flexible overlay over flexible pavements by using conventional design method. Also, discuss flexible overlay over rigid pavement. (7 Marks)

Q. No .4 (B) Benkelman Beam deflection studies were carried out on 15 selected points on a stretch of flexible pavement during summer season using a dual wheel load of 4085 kg, 5.6 kg/cm^2 pressure. The deflection values obtained in mm after making the necessary lag corrections are given below. If the present traffic consists of 750 commercial vehicles per day, determine the thickness of bituminous overlay required, if the pavement temperature during the test was 30°C and the correction factor for subsequent increase in subgrade moisture content is 1.3. Assume annual rate of growth of traffic as 7.5%. Adopt IRC guidance's.

1.40, 1.32, 1.25, 1.35, 1.48, 1.60, 1.65, 1.55, 1.45, 1.40, 1.36, 1.46, 1.50, 1.52, 1.45 mm (7 Marks)

Q. No.5 (A) Differentiate between network level and project level PMS functions with a neat relationship diagram. What are technical level issues, administrative level issues and legislative level issues in PMS? (7 Marks)

Q. No.5 (B) Differentiate between PMS and MMS. Explain any working design methods included in the pavement management systems. (7 Marks)

OR

Q. No.5 (A) Briefly discuss the historical overview and evolution of PMS. Explain DSS in PMS with a neat flow diagram. (7 Marks)

Q. No.5 (B) Explain the implementation and operational issues in PMS. What do you mean by feedback data system? (7 Marks)

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 752A
Course Title: Road Safety Audit

Max Time: 3 hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Flexible markers

(b) Reflectors

(c) IPC 338

(d) Crash Clusters

(e) Need of crash data

(f) Emergency care

(g) Informatory signs

PART –II

Q. No.2 (A) Write down the steps required for improving road safety in India. How road safety engineering is different in India from other countries?

Q. No.2 (B) What is the need of planning for network in case of road safety engineering? Explain.

OR

Q. No.2 (A) Explain road safety scenario in India. What are the road accident characteristics involved in ensuring better road safety?

Q. No.2 (B) What is the importance of land use in road safety? Explain.

Q. No.3 (A) What is Road Safety Auditing? Explain the concept and need of road safety audit.

Q. No 3 (B) What are road safety hazards? How we can improve road safety with the help of traffic calming measures?

OR

Q. No.3 Write down the code required for road safety audit as per IRC/ Explain in detail different stages in Road Safety Auditing procedure. (14 Marks)

Q. No.4 (A) Explain speed management issues in India. "Road infrastructure plays an important role in road safety engineering." Discuss.

Q. No.4 (B) Explain different speed zone signs including construction zones as per IRC. Why enforcement is necessary in road safety engineering? Explain in detail.

OR

Q. No.4 (A) What do you mean by safe system approach? Explain the global perspective of it in detail.

Q. No .4 (B) Explain in detail different components of road safety required on Kundli-Manesar-Palwal expressway.

Q. No.5 (A) Differentiate between crash investigation and crash reconstruction.

Q. No.5 (B) What do you understand by crash costing and economic appraisal? Explain construction zone markings and signs as per IRC.

OR

Q. No.5 (A) What is road safety engineering? Discuss. Explain the human factors related to crashes for road safety.

Q. No.5 (B) Explain the safety provisions required for workers at construction sites. How road safety auditing is different from crash reconstruction?

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 821A
Course Title: Pavement Evaluation and Management

Max Time: 3 hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:-

a) Plastic deformation
b) Loss of Binding Action
c) Map cracking
d) Skid resistance
e) Principle of Benkelman Beam
f) Unevenness Index
g) MMS

PART –II

Q. No.2 Explain the safety factors which are to be considered for the evaluation of pavement. Explain different types of distresses in rigid pavement.

OR

Q. No.2 Explain the relation between performance and distress. What do you mean by low temperature shrinkage cracking? Explain in detail.

Q. No.3 Explain with a neat diagram pavement skid resistance tester. How the structural capacity is important in defining the structural parameters of pavement? Explain in detail.

OR

Q. No 3 Briefly discuss the functional parameters necessary for the evaluation of pavement. Explain the procedure of any one pavement evaluation experiment in detail.

Q. No.4 Explain in detail flexible overlay over flexible pavements by using conventional design method. Also, discuss flexible overlay over rigid pavement.

Benkelman Beam deflection studies were carried out on 15 selected points on a stretch of flexible pavement during summer season using a dual wheel load of 4085 kg, 5.6 kg/cm^2 pressure. The deflection values obtained in mm after making the necessary lag corrections are given below. If the present traffic consists of 750 commercial vehicles per day, determine the thickness of bituminous

overlay required, if the pavement temperature during the test was 30°C and the correction factor for subsequent increase in subgrade moisture content is 1.3. Assume annual rate of growth of traffic as 7.5%. Adopt IRC guidance's.

1.40, 1.32, 1.25, 1.35, 1.48, 1.60, 1.65, 1.55, 1.45, 1.40, 1.36, 1.46, 1.50, 1.52, 1.45 mm

OR

Q. No .4 Explain design approaches which have been developed by various transportation agencies. What are the alternatives in pavement design analysis for the economic evaluation of pavement? Discuss.

Q. No.5 Briefly discuss the historical overview and evolution of PMS. Explain DSS in PMS with a neat flow diagram.

OR

Q. No.5 Explain the implementation and operational issues in PMS. What do you mean by feedback data system? Discuss in detail.

Central University of Haryana
ODD Semester Term End Examination April 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 208A — **Max Time: 3 Hrs**
Course Title: Transportation Engineering - I — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question no. 2 to 5 **(PART-II)** have three parts and students need to answer any two parts of each question. Each part carries seven marks.

PART I

Q1. Write short notes on any four of the following: (7 X 2 = 14)

(a) Joints in concrete pavements
(b) Traffic Signs
(c) Cutback Bitumen
(d) Bitumen Emulsion
(e) Traffic Islands
(f) PIEV theory
(g) Skid and Slip of vehicle

PART II

Q2. (a) Derive the expression for determining superelevation "e" for a vehicle moving with a design speed "V" negotiating a horizontal curve with radius "R" provided the coefficient of lateral friction is to be taken as "f". (2 X 7 = 14)
(b) Discuss the properties of an ideal alignment. Further discuss different factors controlling the alignment of road.
(c) Define PCU. Further discuss the concept of Level of Service.

Q3. (a) The speeds of overtaking and overtaken vehicles are 80 and 60 kmph respectively. The average reaction time for driver and acceleration for overtaking vehicle are 2 seconds and 1m/sec^2 respectively. Calculate the minimum and desirable lengths of the overtaking zone when the vehicle coming from the opposite direction is moving with speed of 60 kmph. (2 X 7 = 14)
(b) Discuss different methods employed for traffic volume studies. Further discuss various ways to represent traffic volume data.
(c) Identify different layers in flexible and rigid pavements by clean diagrams. Further briefly discuss these layers and materials used for construction.

Q4. (a) Calculate the stresses at interior, edge and corner regions of a cement concrete pavement by Westergaard's stress equations. Given modulus of elasticity of concrete = 3 X 10^5 kg/cm^2, Poison's ratio of concrete = 0.15, thickness of concrete pavement = 18 cm, modulus of subgrade reaction = 8.5 kg/cm^2, wheel load = 5100 kg, radius of loaded area = 15 cm. (2 X 7 = 14)

(b) Define road safety audit. Further discuss various safety concerns in highway projects.

(c) Draw a neat and clean diagram identifying different geometric elements of the road. Further briefly discuss these cross-sectional elements.

Q5. (a) Calculate the length of transition curve as well as the shift of curve with the following data: (2 X 7 = 14)

Design speed = 65 kmph, Radius of curve = 220 m, Pavement width with widening = 7.5 m, allowable rate of introduction of super-elevation = 1 in 150, pavement is rotated about centre line.

(b) List out the factors considered for the design of pavement. Further explain EAL and EWSL and how they are employed in pavement analysis and design.

(c) Explain CBR method for design of flexible pavement.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech **Session: 2021-22**

Semeste: VI **Max. Time: 3 Hours**

Course Title: Hydrology and Water Resources **Max. Marks: 70**

Course Code: BT CE 602 A

Instructions:

1. Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (7X2=14)

a) What are the various differences between recording and non- rain gauges?
b) How you will estimate missing data?
c) What do you mean by unit hydrograph?
d) What is meant by C2-S2 water? Discuss its usefulness for irrigating fine textured soil.
e) 10 cumecs of water is delivered to a 32 hectares field, for 4 hours. Soil probing after the irrigation indicates that 0.3 meter of water has been stored in the root zone. Compute the water application efficiency.
f) What do you mean by Meandering of River?
g) Write a short note on canal alignment.

Q 2. (2X7=14)

a) The normal annual rainfall at stations A, B, C and D in a basin are 80.97, 67.59, 76.28 and 92.01 cm respectively. In the year 1975, the station D was inoperative and stations A, B, C are recorded 91.11, 72.23, 79.89 cm respectively. Estimate rainfall at station D in that year.
b) Discuss the factors affecting the infiltration capacity of an area. Explain how it is different from rate of infiltration.
c) What do you mean by Evapo-transpiration? Explain various methods of its measurement.

Q3. (2X7=14)

a) What do you mean by hyetograph? Describe how it is different from Storm hydrograph.
b) Two storms each of 6-h duration and having rainfall excess values of 3.0 and 2.0 cm respectively occur successively. The 2-cm ER rain follows the 3-cm rain. The 6-h unit hydrograph for the catchment is given below in table. Calculate the resulting DRH.

Time(hrs.)	0	3	6	9	12	15	18	24	30	36	42	48	54	60	69
Uh ordinates (m^3/s)	0	25	50	85	125	160	185	160	110	60	36	25	16	8	0

c) Rainfall of magnitude of 3.8 cm and 2.8 cm occurring on two consecutive 4- h duration on a catchment of area 27 km^2 produced the following hydrograph of flow at the outlet of the catchment. Estimate the rainfall excess and ϕ index.

Time from start (hrs.)	6	0	6	12	18	24	30	36	42	48	54	60	66
Observed flow (m^3/s)	6	5	13	26	21	16	12	9	7	5	5	4.5	4.5

Q 4. (2X7=14)

a) Define Irrigation and explain its necessity in a tropical country like India. How Furrow irrigation is different from Sprinkler irrigation? Which one is preferred in India and why?

b) The Culturable commanded area of a watercourse is 1200 hectares. Intensities of sugarcane and wheat crops are 20% and 40% respectively. The dutics for the crops at the head of the watercourse are 730 hectares/cumec and 1800 hectares/cumec, respectively. Find the discharge required at the head of the watercourse and determine the design discharge at the outlet, assuming a time factor equal to 0.8.

c) What are the possible causes of water losses in a canal? What are the methods adopted for reducing such loss. What are the empirical formulas's used to calculate the losses.

Q 5. (2X7=14)

a) Design a regime channel for a discharge of 50 cumecs, with a silt factor = 1.0, by using Lacey's theory.
b) Explain with neat sketches the different types of spurs which are commonly used for controlling and training Indian rivers?
c) Define Balancing depth for excavating canals. Calculate the balancing depth for a channel section having a bed width equal to 18 m and side slopes of 1: 1in cutting and 2:1 in filling. The bank embankments are kept 3.0 m higher than the ground level (berm level) and crest width of bank is kept as 2.0 m.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BTCE 202A
Course Title: Structural Analysis-I **(Regular)**
Semester: 4th

Max Time: 3 Hours
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 (2X7=14Marks)

a) State Castigliano's first theorem.

b) Explain normal thrust in arches with the help of a diagram.

c) Draw typical configuration of frictionless pulley support in case of suspension bridges.

d) Differentiate between static and kinematic indeterminacy.

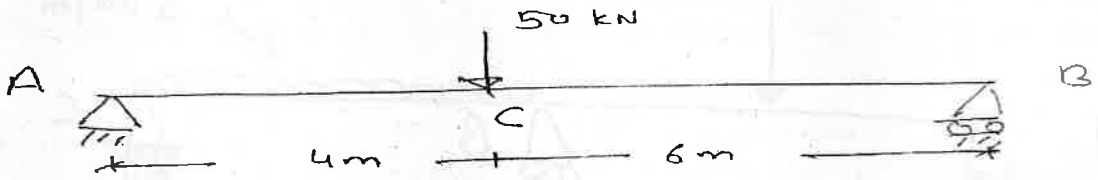
e) State Maxwell's reciprocal theorem.

f) State Muller Breslau's principle.

g) Define Zero force members in the trusses.

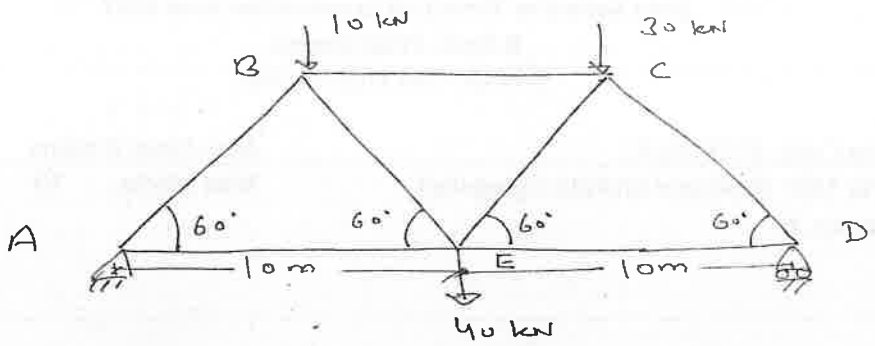
PART –II

Q. No.2: Calculate deflection at C for the beam shown in Figure below using Conjugate Beam Method.

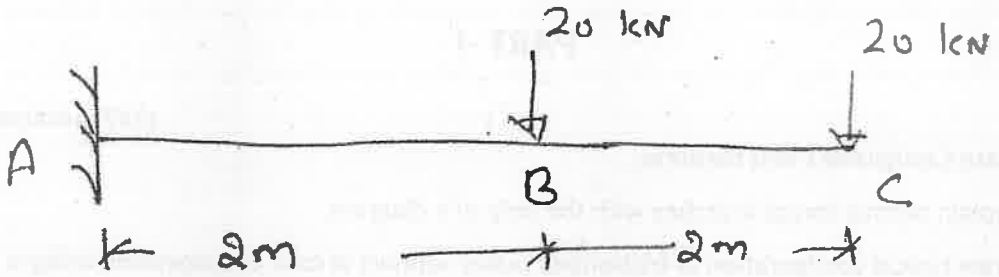


OR

Q. No.2: Determine forces in each member of the truss shown below in the Figure and state the nature of each force.

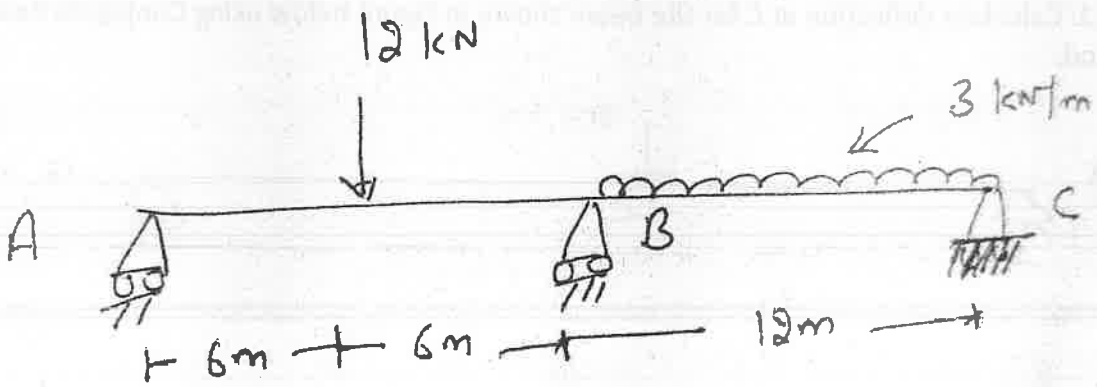


Q. No.3: Determine deflection at free end of cantilever beam shown below $E=2x10^5$ N/mm^2. $I = 12x10^6$ mm^4

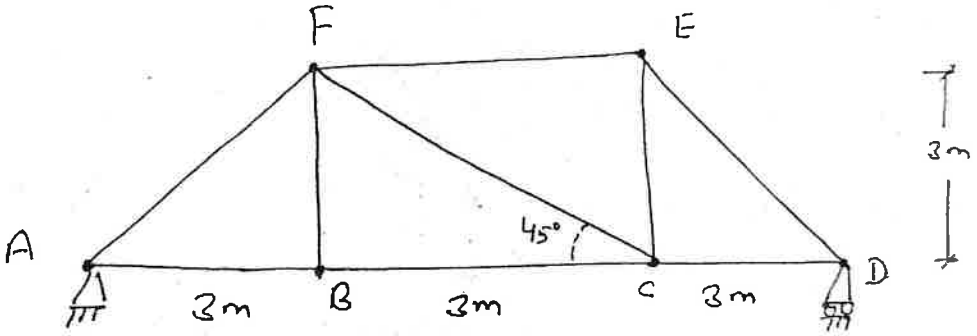


OR

Q. No 3: Analyse the beam shown in Fig. below and find reaction at A, B and C. Draw S.F.D. and B.M.D.

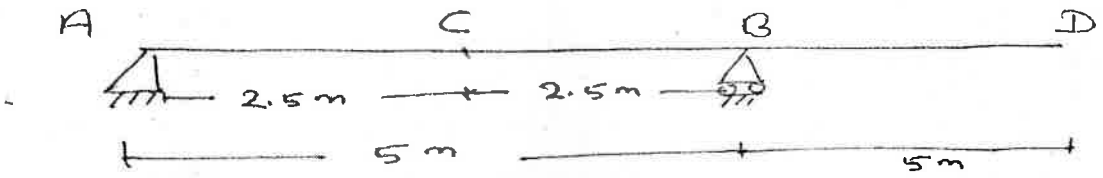


Q. No.4: Draw Influence Line Diagram for member CF and FB of the truss shown below in Figure below.

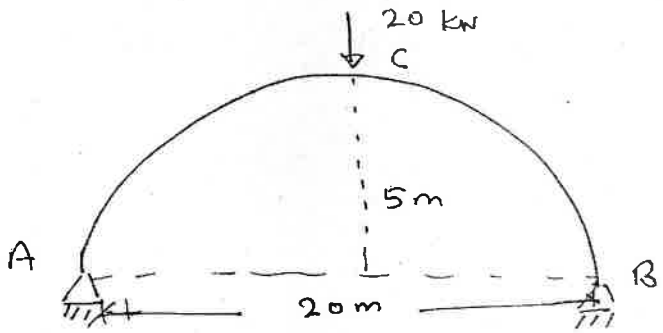


OR

Q. No .4: Draw Influence Line Diagram for Reaction at B, Shear at C and Moment at C for the beam shown in Fig. below.



Q. No.5: A two hinged parabolic arch of span 20m and central rise of 5m carries point load of 20 kN at the crown. Find the reactions at supports and draw SFD and BMD for the arch.



OR

Q. No.5: A suspension cable 140m span and 14 m central dip carries a load of 1 kN/m. Calculate the maximum and minimum tension in the cable. Find horizontal and vertical forces in each pier for the following conditions:

a) If cable passes over a frictionless pulley.
b) if cable is firmly clamped to saddles carried on frictionless rollers.

In each case angle of backstay with horizontal is 30^0

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BTCE 202A
Course Title: Structural Analysis-I **(Re-appear)**

Max Time: 3 Hours
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

Q. No.1

a) State Mohr's second theorem. (2x7=14)

b) State Betti's Law.

c) Draw typical configuration of a suspension bridge showing all its components.

d) Differentiate between Cables and beams.

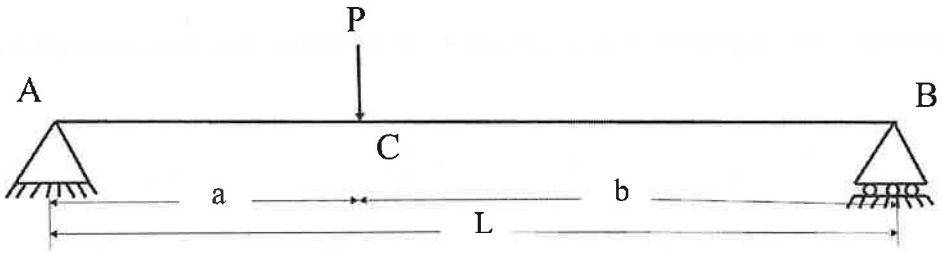
e) Define Influence Lines.

f) Why arches are advantageous to beams in case of long spans?

g) Explain radial shear in arches with the help of a diagram.

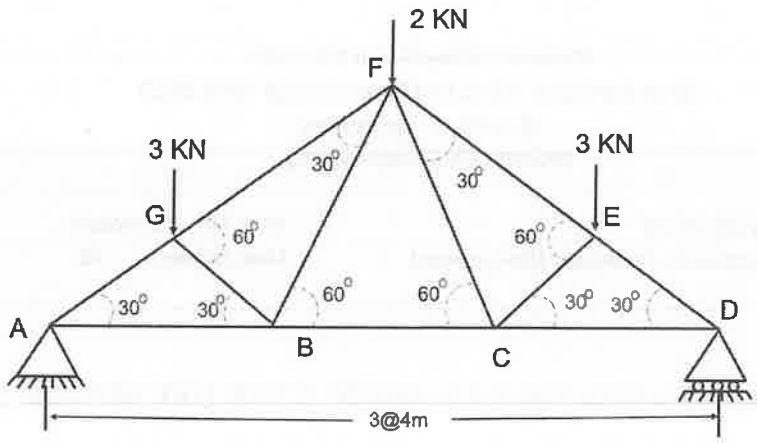
PART –II

Q. No.2: Calculate deflection at C for the beam shown in Figure below using Mohr's second theorem.

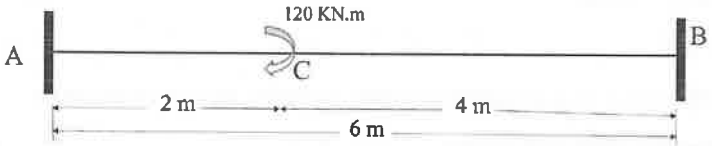


OR

Q. No.2: Determine forces in each member of the roof truss shown below in the Figure and state the nature of each force.

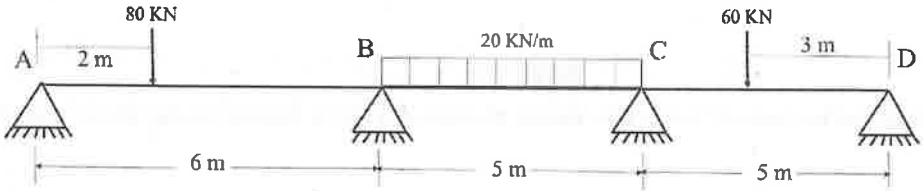


Q. No.3: For the fixed end beam shown in Fig. below, draw S.F.D. and B.M.D. using moment area method and force method of analysis.

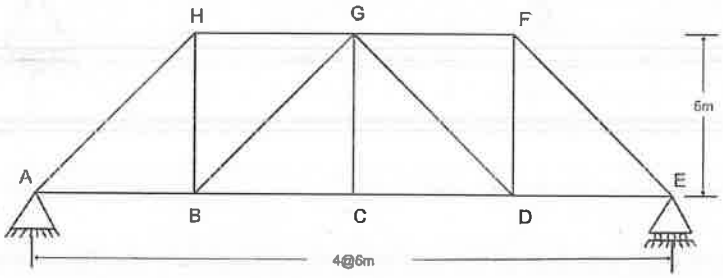


OR

Q. No 3: Analyse the continuous beam shown in Fig. below by using Clapeyron's theorem of three moments and draw S.F.D. and B.M.D.

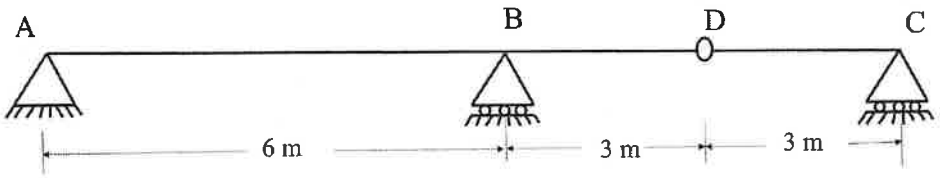


Q. No.4: Draw Influence Line Diagram for member GB and BH of the bridge truss shown below in Fig. below.



OR

Q. No .4: Define rolling loads and Influence lines. Draw Influence Line Diagram for R_A, R_B, R_C and M_B for the beam shown below in Fig. below.

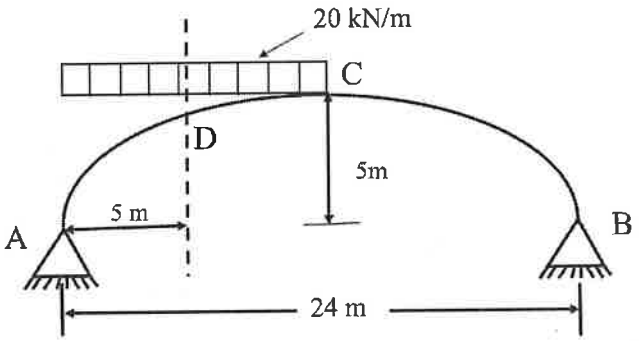


Q. No.5: A three-hinged symmetrical parabolic arch is loaded as shown in Figure below. Calculate:

I. Support reactions

II. Maximum bending moment in the portion AC and BC.

III. Normal thrust and radial shear force at D.



OR

Q. No.5: A Suspension bridge of 250 m span has three hinged stiffening girders supported by a cable, with a central dip of 25 m, if 4-point loads of 150 KN each are placed at the distance of 20 m, 30 m, 40 m and 50 m from the left-hand hinge, Find the shear force and bending moment in the girder at 62.5 m from each end. Also find maximum tension in the cable.

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 605A — **Max Time: 3 Hrs.**
Course Title: Foundation Engineering — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 $(2 \times 7 = 14)$

(a) What do you understand by disturbed and undisturbed samples?
(b) Give assumptions of Terzaghi's bearing capacity theory.
(c) Two footings one circular and other square, are founded on the surface of a purely cohesive soil. The diameter of the circular footing is same as that of the side of the square footing. What will be the ratio of their ultimate bearing capacities?
(d) Write short note on mechanical stabilization of soil.
(e) What are under reamed piles? Under what circumstances they are used?
(f) A square plate section 30 cm × 30 cm and length 10 m penetrates a deposit of clay having c = 5 kN/m^2 and the mobilizing factor 0.8. What is the load carried by the pile by skin friction only?
(g) Differentiate between finite and infinite slope.

PART –II

Q. No.2

(a) Explain with neat sketch Seismic Refraction Method of soil exploration. (7)
(b) A retaining wall 6 m high supports earth with its face vertical. The earth is cohesionless with particle specific gravity 2.69, angle of internal friction 35 degrees and porosity 40.5%. The earth surface is horizontal and level with the top of the wall. Determine the earth thrust and its line of action on the wall if the earth is water logged to level 2.5 m below the top surface. Neglect wall friction. Draw the pressure diagrams. (7)

OR

Q. No.2

(a) A vertical wall 5 m high, supports a saturated cohesive backfill ($\phi = 0$) with horizontal surface. The top 3 m of the backfill weighs 1.76 t/m^3, and has an apparent cohesion of 1.5 t/m^2. The bulk density and apparent cohesion of the bottom 2 m of the backfill are respectively 1.92 t/m^3 and 2 t/m^2. Determine the likely depth of tension cracks behind the wall. If tension cracks develop, what will be total active earth pressure? Sketch the pressure distribution diagram and locate the point of application of resultant thrust. (8)
(b) What do you understand by soil exploration? Discuss objectives and methods of soil exploration. (6)

Q. No.3

(a) Find the critical angle of an infinite slope in a clay soil having c′ = 20 kN/m^2, ϕ'= 20 degrees, G = 2.72 and e = 0.9 for the following cases:
(i) soil is dry

(ii) the slope is submerged with seepage parallel to the surface. (7)

Q3(b) A hard stratum exists at a depth of 6 m parallel to the ground surface. (7)

(b) Differentiate between general shear failure and local shear failure. (4)

(c) If two foundations, one narrow and another wide and resting on a bed of sand carrying the same intensity of load per unit area, then which one is likely to fail early and why? (3)

OR

Q. No 3

(a) The subsoil at a building site consists of medium sand with $\gamma = 18$ kN/m^3, $c = 0$, $\phi = 32$ degrees and water table at the ground surface. A 2.5 m square footing is to be placed at 1.5 m below the ground surface. Compute the safe bearing capacity of the footing. What will be the safe bearing capacity if the water table goes down to 3 m below the ground surface?
[For $\phi = 32$ degrees , $Nq = 20.3$ and $N\gamma = 19.7$] (7)

(b) When a load test was conducted by putting a square plate on the top of a sandy deposit, the ultimate bearing capacity was observed as 60 kN/m^2. What is the ultimate bearing capacity of 1.2 m square footing to be placed on the surface of the same soil? (4)

(c) Write short note on Taylor's stability number. (3)

Q. No.4

(a) A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9 m respectively. If the unconfined compressive strength of the clay is 9 t/m^2 and the pile spacing is 100 cm centre to centre, what is the capacity of the group? Assume factor of safety of 2.5 and adhesion factor 0.75. (7)

(b) Explain with neat sketch the components of well foundation. (7)

OR

Q. No .4

(a) What is "negative skin friction" and its significance in the design of pile foundation? What are its remedial measures? (5)

(b) Which of the following types of piles is likely to have the highest load capacity in compression? Give reasons to support your answer.
(i) Driven pre-cast concrete pile (ii) Pre-cast pile placed in a predrilled hole (iii) Driven steel pipe pile (3)

(c) What is tilt and shift in well foundation? Discuss with neat sketches various methods employed to rectify tilt and shift. (6)

Q. No.5

(a) What do you understand by ground improvement? Why it is needed? Discuss various methods of ground improvement? (7)

(b) What do you understand by dewatering of soil? Explain electro-osmosis method of dewatering of soil with neat sketch. (7)

OR

Q. No.5

(a)What are geotextiles? Discuss types and functions of geotextiles. (6)

(b) Write short notes on: (8)
(i) Well point system
(ii) Application of geotextiles

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations June 2022

Programme:	**B Tech Civil Engineering**	**Session: 2021-22**
Semester:	**VIIth**	**Max. Time: 3 Hours**
Course Title:	**Design of Hydraulic Structures**	**Max. Marks: 70**
Course Code:	**BTCE 701A**	

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

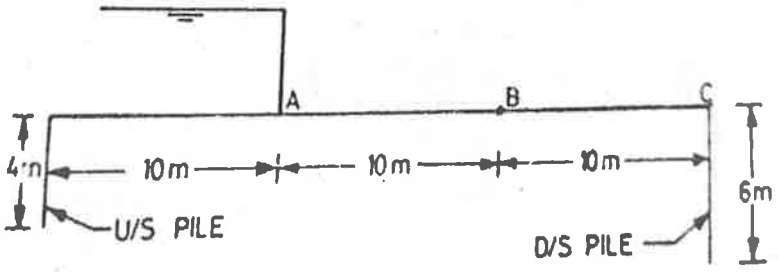
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Question 1. **(3.5x4 = 14)**

a) What are the various components of diversion canal headworks?
b) What is the function of cistern in Canal fall?
c) What is the function of Head Regulator?
d) What is a phreatic line & What is the location of phreatic line in an earth dam?
e) Why a Cutoff is provided in the hydraulic structure? Which Cutoff is effective downstream or upstream?
f) A spillway is an essential for the safety of dam. Justify this statement.
g) Which USBR stilling basin will be provided if Froude number is more than 4.5 and velocity is more than 15m/sec. Draw a neat sketch for that Stilling basin.

Question 2 **(7x2 = 14)**

a) How will you eliminate correction for mutual interference of for the Upstream, intermediate and downstream sheet piles.
b) Write down the design steps of Syphon Aqueducts.
c) Determine the thickness of the floor and uplift pressure by Bligh's Theory at point A. B and C of the downstream floor. Take G = 2.24 and H = 4 m.



Question 3 **(7x2 = 14)**

a) Write down the design steps of Sarda type falls with the help of neat sketch.
b) What do you understand by Canal falls. What are their functions?
c) What are the devices to control silt entry into the off taking canal?

Question 4 **(7x2 = 14)**

a) What are the forces acting on the gravity dam? Show that these forces with the neat sketch.
b) Enumerate and explain by neat sketches the different ways by which the earthen dams may fail.
c) Determine the central angle of arch dam at which minimum concrete is required.

Question 5 **(7x2 = 14)**

a) What is spillway and what are the different types of a spillway?
b) An ogee spillway has 20 crest gates each having 10 m clear span. Find the maximum flood that can be safely passed by lifting all the gates when maximum reservoir elevation is 110.00 m and the crest level is 106.00 m. Take C = 2.16, Coefficient of end contraction are 0.05 and 0.10 for piers and abutments respectively.
c) What are the different types of energy dissipating methods used below the spillways?

Central University of Haryana
Even Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 605A — **Max Time: 3 Hrs.**
Course Title: Foundation Engineering — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 (2 × 7 = 14)

(a) What do you understand by disturbed and undisturbed samples?
(b) Give assumptions of Terzaghi's bearing capacity theory.
(c) Two footings one circular and other square, are founded on the surface of a purely cohesive soil. The diameter of the circular footing is same as that of the side of the square footing. What will be the ratio of their ultimate bearing capacities?
(d) Write short note on mechanical stabilization of soil.
(e) What are under reamed piles? Under what circumstances they are used?
(f) A square plate section 30 cm × 30 cm and length 10 m penetrates a deposit of clay having c = 5 kN/m^2 and the mobilizing factor 0.8. What is the load carried by the pile by skin friction only?
(g) Differentiate between finite and infinite slope.

PART –II

Q. No.2

(a) Explain with neat sketch Seismic Refraction Method of soil exploration. (7)
(b) A retaining wall 6 m high supports earth with its face vertical. The earth is cohesionless with particle specific gravity 2.69, angle of internal friction 35 degrees and porosity 40.5%. The earth surface is horizontal and level with the top of the wall. Determine the earth thrust and its line of action on the wall if the earth is water logged to level 2.5 m below the top surface. Neglect wall friction. Draw the pressure diagrams. (7)

OR

Q. No.2

(a) A vertical wall 5 m high, supports a saturated cohesive backfill (ϕ = 0) with horizontal surface. The top 3 m of the backfill weighs 1.76 t/m^3, and has an apparent cohesion of 1.5 t/m^2. The bulk density and apparent cohesion of the bottom 2 m of the backfill are respectively 1.92 t/m^3 and 2 t/m^2. Determine the likely depth of tension cracks behind the wall. If tension cracks develop, what will be total active earth pressure? Sketch the pressure distribution diagram and locate the point of application of resultant thrust. (8)
(b) What do you understand by soil exploration? Discuss objectives and methods of soil exploration. (6)

Q. No.3

(a) Find the critical angle of an infinite slope in a clay soil having c′ = 20 kN/m^2, ϕ'= 20 degrees, G = 2.72 and e = 0.9 for the following cases:
(i) soil is dry

(ii) the slope is submerged with seepage parallel to the surface.
A hard stratum exists at a depth of 6 m parallel to the ground surface. (7)
(b) Differentiate between general shear failure and local shear failure. (4)
(c) If two foundations, one narrow and another wide and resting on a bed of sand carrying the same intensity of load per unit area, then which one is likely to fail early and why? (3)

OR

Q. No 3

(a) The subsoil at a building site consists of medium sand with $\gamma = 18$ kN/m^3, $c = 0$, $\phi = 32$ degrees and water table at the ground surface. A 2.5 m square footing is to be placed at 1.5 m below the ground surface. Compute the safe bearing capacity of the footing. What will be the safe bearing capacity if the water table goes down to 3 m below the ground surface?
[For $\phi = 32$ degrees , $Nq = 20.3$ and $N\gamma = 19.7$] (7)
(b) When a load test was conducted by putting a square plate on the top of a sandy deposit, the ultimate bearing capacity was observed as 60 kN/m^2. What is the ultimate bearing capacity of 1.2 m square footing to be placed on the surface of the same soil? (4)
(c) Write short note on Taylor's stability number. (3)

Q. No.4

(a) A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9 m respectively. If the unconfined compressive strength of the clay is 9 t/m^2 and the pile spacing is 100 cm centre to centre, what is the capacity of the group? Assume factor of safety of 2.5 and adhesion factor 0.75. (7)
(b) Explain with neat sketch the components of well foundation. (7)

OR

Q. No .4

(a) What is "negative skin friction" and its significance in the design of pile foundation? What are its remedial measures? (5)
(b) Which of the following types of piles is likely to have the highest load capacity in compression? Give reasons to support your answer.
(i) Driven pre-cast concrete pile (ii) Pre-cast pile placed in a predrilled hole (iii) Driven steel pipe pile (3)
(c) What is tilt and shift in well foundation? Discuss with neat sketches various methods employed to rectify tilt and shift. (6)

Q. No.5

(a) What do you understand by ground improvement? Why it is needed? Discuss various methods of ground improvement? (7)
(b) What do you understand by dewatering of soil? Explain electro-osmosis method of dewatering of soil with neat sketch. (7)

OR

Q. No.5

(a) What are geotextiles? Discuss types and functions of geotextiles. (6)
(b) Write short notes on: (8)
(i) Well point system
(ii) Application of geotextiles

Central University of Haryana
Even Semester End Term Examination June 2022
B.Tech. Programme
Branch: Civil Engineering

Course Code: **BT CE – 218A** **Max Time: 3 Hours**
Course Title: **Mechanical Engineering** **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.
Note: **Steam table will be allowed**

PART –I (2X7= 14)

Q. No.1 (a) What do you understand by Quasi-static process? How it is achieved?
(b) What is cut-off ratio? How it affects the air standard efficiency of diesel cycle?
(c) Draw P-V and T-S diagrams of isobaric, isochoric processes.
(d) Draw P-V and T-S diagrams of isentropic, isenthalpic, and isothermal processes.
(e) What is impulse turbine?
(f) Discuss differential pully block of simple lifting machine.
(g) Discuss the different types of stress-strain.

PART –II

Q. No.2 (a) A Carnot heat engine draws heat from a reservoir at temperature T_1 and rejects heat to another reservoir at temperature T_3. The Carnot forward cycle engine drives a Carnot reversed cycle engine or Carnot refrigerator which absorbs heat from reservoir at temperature T_2 and rejects heat to a reservoir at temperature T_3. If the high temperature $T_1 = 600$ K and low temperature $T_2 = 300$ K; determine:

(i) The temperature T_3 such that heat supplied to engine Q_1 is equal to the heat absorbed by refrigerator Q_2.
(ii) The efficiency of Carnot engine and C.O.P. of Carnot refrigerator.

(b) Explain the "Kelvin Plank Statement" of second law of thermodynamics.

OR

Q. No.2 (a) Steam enters a steam turbine at a pressure of 15 bar and 350°C with a velocity of 60 m/s. The steam leaves the turbine at 1.2 bar and with a velocity of 180 m/s. Assuming the process to be reversible adiabatic, determine the work done per kg of steam flow through the turbine. Neglect the change in potential energy.

(b) Explain the "Clausius Statement" of second law of thermodynamics.

Q. No.3 (a) Compare the performance of Otto and Diesel cycle with P-V and T-S diagrams on the basis of

(i) Same compression ratio
(ii) Same heat input
(iii) Constant maximum pressure and heat supplied

(b) Explain the following:

(i) Adiabatic mixing of air streams
(ii) Working principle of an Air-Conditioning System

OR

Q. No 3 (a) Describe with neat sketches the methods employed for improvement of thermal efficiency of open cycle gas-turbine power plant.

(b) Explain the following:

(i) Heating and Humidification process
(ii) Enthalpy of moist air

Q. No.4 a) Write the construction details and working principle of Pelton turbine with diagram.

b) A single purchase crab winch, has the following details:
Length of lever = 700 mm, Number of pinion teeth = 12, Number of spur gear teeth = 96, Diameter of load axle= 200 mm. It is observed that an effort of 60 N can lift a load of 1800 N and an effort of 120 N can lift a load of 3960 N. (a) What is the law of the machine? (b) find efficiency of the machine in both the cases, (c) Probable effort to lift a load of 4500 N.

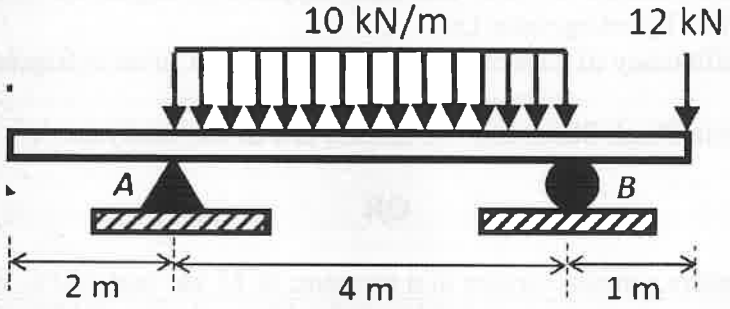
OR

Q. No .4 a) Write the classification of turbines and discuss in detail highlighting the differences.

b) Write the definition of simple machine, compound machine, velocity ratio, mechanical advantage, efficiency of machine, law of machine, reversibility of machine.

Q. No.5a) Discuss different types of gear and gear train with diagram.

b) Calculate the shear force and bending moment for the beam subjected to the loads as shown in the figure, draw the shear force diagram (SFD) and bending moment diagram (BMD). Also, find out the maximum bending moment and location of it.



OR

Q. No.5 a) Write the classification Brakes and clutch.

b) Draw and discuss in detail stress strain curve of ductile material.

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech. **Session: 2021-22**

Semester: 6th **Max. Time: 3 Hours**

Course Title: Environmental Engineering – II **Max. Marks: 70**

Course Code: BT CE 604A

Instructions:

1. Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (7X2=14)

1) What is dry weather flow? Briefly explain the procedure of estimation of sewage and storm water for a city.
2) What do mean by physical quality parameters of sewage. Explain in detail by mentioning their standard parameters.
3) Explain the terms (a) Relative stability (b) Population Equivalent
4) Predict the population for the year 2031 and 2041 from the following population dataof an old city.

Year	1971	1981	1991	2001	2011	2021
Population	8,58,545	10,15,672	12,01,553	16,91,538	20,77,820	25,85,862

5) Differenciate between BOD, COD and TOC
6) Write a short on oxidation pond
7) What are the various methods of testing sewers?

Q2 (2X7=14)

a) Explain the different types of sewerage systems.

b) Design a sewer for a maximum discharge of 650 L/s running half full. Consider Manning's rugosity coefficient n = 0.012, and gradient of sewer S = 0.0001.

c) A waste water stream (flow = 2 m^3/s, ultimate BOD = 90 mg/l) is joining a small river (flow = 12 m^3/s, ultimate BOD = 5 mg/l). Both water streams get mixed up instantaneously. Cross-sectional area of the river is 50 m^2. Assuming the de-oxygenation rate constant, k' = 0.25/day and any other required data, find where the critical deficit will occur and also BOD (in mg/l) of the river water, 10 km downstream of the mixing point?

Q3. (2X7=14)

a) What is the basic principle of sewage treatment? Draw a neat sketch of sewage treatment as per various unit operations in sequence.

b) Design the primary sedimentation tank to treat wastewater with average flow rate of 10 MLD and peak flow of 22.5 MLD.

c) Discuss classification of screens and state application of each class.

Q 4. (2X7=14)

a) What do you mean by septic tank? How it is designed for a sewerage system.

b) Write a short note on –

(i) Sewage Farming

(ii) Activated sludge process.

c) Explain the process of sewage disposal through injection into groundwater and write down the Indian standards for disposal of effluent.

Q 5. (2X7=14)

a) How sewer connections for houses and residential buildings are done? Explain in detail.

b) Explain the following with neat sketches -

I. Imhoff tanks

II. septic tank

c) Clearly differenciate between the manhole and drop manhole. Also draw the neat sketches of above.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 206A — **Max Time: 3 hrs**
Course Title: Geomatics Engineering — **Max Marks: 70**

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:-

a) EMR
b) Ideal Remote Sensing System
c) Swath
d) Overlap
e) Zenith
f) Pixel
g) Map Design

PART –II

Q. No.2 Explain GCS in detail. Also, explain different elements of GPS.

OR

Q. No.2 (a) What are satellite constellations and signal? What do you understand by GCS and PCS? Discuss.
Q. No.2 (b) Differentiate between GPS and GIS. Write down the applications of coordinate system in various branches of civil engineering.

Q. No.3 What is the principle of remote sensing? Explain the process of remote sensing in detail with a neat diagram.

OR

Q. No 3 (a) What is spectral reflectance curve? Also, explain interaction of earth surface with EMR in different regions.

Q. No 3 (b) Explain energy interactions in detail with suitable examples.

Q. No.4 Explain spatial resolution and spectral resolution in detail. What are geometric corrections? Discuss.

OR

Q. No.4 (a) Explain different types of sensors used in remote sensing systems in detail. Explain the classification of images and interpretation.
Q. No.4 (b) What do you understand by orbital characteristics? Explain in detail with neat diagrams. What is data processing in ArcGIS? Discuss.

Q. No.5 What are different components of GIS? Explain. What is geo-referencing and digital representation of geographic data? Discuss.

OR

Q. No.5 (a) Write down the applications of GIS in civil engineering in detail. Write at least 15 applications.
Q. No.5 (a) What is DGPS? Explain hyperspectral remote sensing and its application in detail.

Central University of Haryana
EVEN Semester Term End Examination June 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 206A
Course Title: Geomatics Engineering

Max Time: 3 hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1 Define the following terms:- (2x7=14)

a) EMR
b) Ideal Remote Sensing System
c) Swath
d) Overlap
e) Zenith
f) Pixel
g) Map Design

PART –II

Q. No.2 Explain GCS in detail. Also, explain different elements of GPS. 14

OR

Q. No.2 (a) What are satellite constellations and signal? What do you understand by GCS and PCS? Discuss. 7

Q. No.2 (b) Differentiate between GPS and GIS. Write down the applications of coordinate system in various branches of civil engineering. 7

Q. No.3 What is the principle of remote sensing? Explain the process of remote sensing in detail with a neat diagram. 14

OR

Q. No 3 (a) What is spectral reflectance curve? Also, explain interaction of earth surface with EMR in different regions. 7

Q. No 3 (b) Explain energy interactions in detail with suitable examples. 7

Q. No.4 Explain spatial resolution and spectral resolution in detail. What are geometric corrections? Discuss. 14

OR

Q. No.4 (a) Explain different types of sensors used in remote sensing systems in detail. Explain the classification of images and interpretation. 7

Q. No.4 (b) What do you understand by orbital characteristics? Explain in detail with neat diagrams. What is data processing in ArcGIS? Discuss. 7

Q. No.5 What are different components of GIS? Explain. What is geo-referencing and digital representation of geographic data? Discuss. 14

OR

Q. No.5 (a) Write down the applications of GIS in civil engineering in detail. Write at least ten applications. 7

Q. No.5 (a) What is DGPS? Explain hyperspectral remote sensing and its application in detail. 7

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme: B.Tech (Civil Engineering)
Semester: Sixth
Course Title: Project Cost Analysis
Course Code: BTCE 623A

Session: 2021-22
Max. Time: 3 Hours
Max. Marks: 70

Instructions:

1. Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (7X2=14)

a) What are different types of the estimates? Explain any two briefly.

b) Differentiate between supplementary and Revised Estimate.

c) State four factors which affects rate analysis.

d) Enumerate the different methods to calculate the earthwork.

e) What is Rate analysis?

f) Explain the following term i) Salvage Value ii) Scrap Value iii) Obsolescence

g) What is Depreciation and methods of calculating depreciation?

Q 2. (2X7=14)

a) What do you mean by estimate? Also explain the different method of estimates in detail.

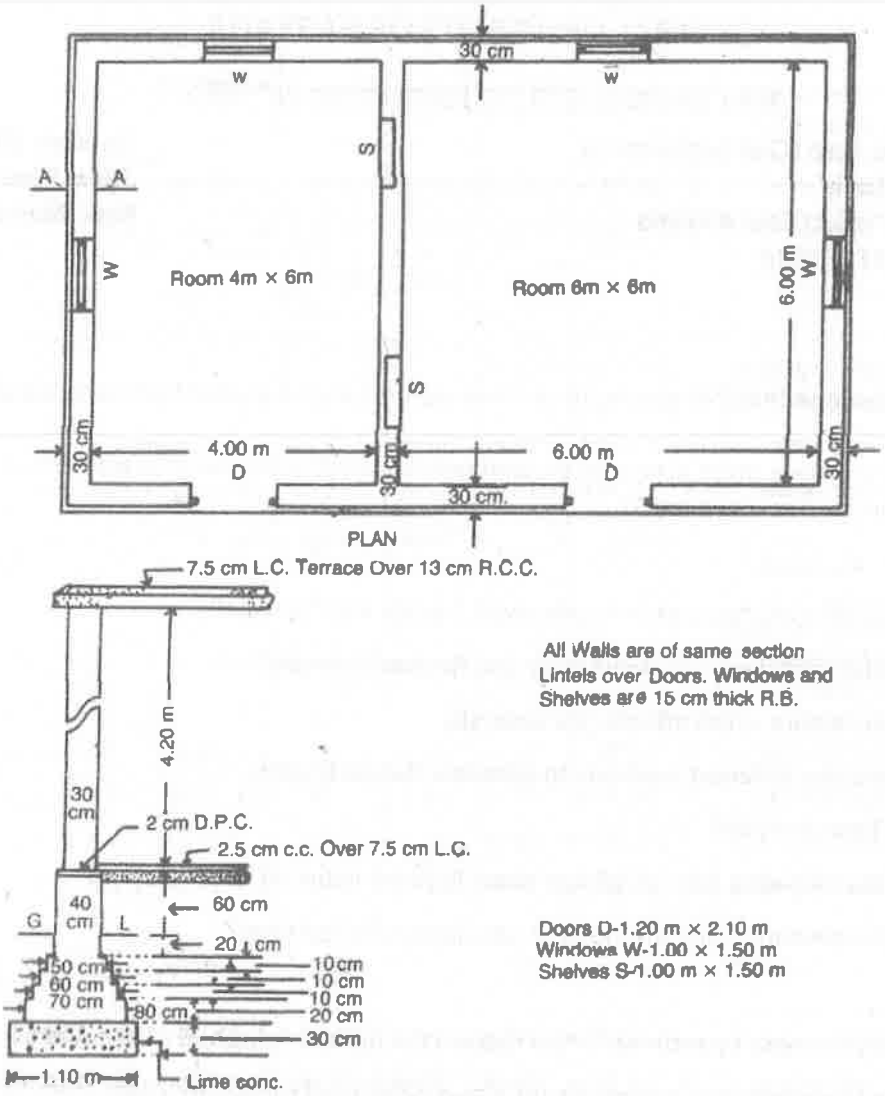
b) Estimate the quantity of earthwork for a portion of road for 400 m length from following data.

Formation width of the load is 10 metre. Side slopes are 2:1 banking, 1.5:1 in cutting.

Station	Distance in metre	R.L. of Ground	R.L. of formation
25	1000	51.00	52.00
26	1040	50.90	‖
27	1080	50.50	‖
28	1120	50.80	‖
29	1160	50.60	‖
30	1200	50.70	‖
31	1240	51.20	Downward gradient
32	1280	51.40	of 1 in 200
33	1320	51.30	‖
34	1360	51.00	‖
35	1400	50.60	‖

c) Estimate the quantities of the following items for a two room building as shown in figure i) Earthwork in excavation ii) Lime concrete in Foundation iii) 1st class brickwork in cement mortar 1:6 in foundation and plinth 4) 2.5 cm c.c damp proof course

TWO ROOMED BUILDING



Q3. (2X7=14)

a) Write the specification for different class of buildings.

b) Write the detail specifications of the following items. i. Plastering ii. Brickwork

c) Write down the detailed specifications of the Road work.

Q 4. (2X7=14)

a) Find the Rate analysis for 10 cu.m. RCC work of Cement concrete 1:2:4

b) Find the rate analysis for 100 sq.m. of DPC 2.5 cm thick.

c) Find the Rate analysis for 100 sq.m. 12 mm Plastering 1:6

Q 5. (2X7=14)

a) Briefly explain the following terms
i) Valuation ii) Sinking Fund iii) Annuity iv) Outgoings

b) A two storied RCC building is located on 250 sq m plot, having plinth area of 100 sq m. The building life may be taken as 60 years. The building fetches a gross rent of Rs 25000/month. Work out the capitalized value of the property on the basis of 6% net yield. For sinking fund 3% compound interest may be assumed. Cost of land may be taken as Rs 50,000 per sq m. Other data may be assumed suitably.

c) What are the different methods of Valuation? Explain briefly.

Central University of Haryana
Bachelor of Technology- Civil Engineering
Forth Semester Examination – June 2022
Subject Name: Fluid Mechanics II
Course Code: BTCE -402
(Reappear question paper)

Time: 3 Hours **Maximum Marks: 70**

Note: This question paper has two sections : Section A, Section B .
Attempt all Questions from Sec.-A.
Attempt any two parts from each questions in Sec.-B. All the questions are compulsory.

Section –A 7X2 = 14

(Each question carries 2 marks)

1(a) Write down minor losses in pipes.

1 (b) Derive an equation for critical depth in open channel flow.

1(c) What is a Specific energy curve? Draw a neat sketch for specific energy curve.

1(d) Define subsonic and supersonic flow with the help of Mach number.

1(e) What do you mean by drag and Lift force.

1(f) Discuss about reciprocating pump.

1(g) What do you understand Cavitation in pumps?

Section B (56)

Question no. 2

2(a) Derive an equation for the laminar flow through circular pipe. (7)

2(b) Derive an equation for parallel pipes with the help of neat sketch. (7)

2© A piping system consists of three pipes arranged in series

	Pipe	Length	Diameter
a.	AB	1800m	50 cm
b.	BC	1200m	40 cm
c.	CD	600m	30 cm

Transform the system to (i) an equivalent length of 40 cm diameter pipe (ii) an equivalent diameter for the pipe 3600 m long. (7)

Question no. 3

3(a) Derive an equation for the hydraulic jump for the rectangular channel. (7)

3(b) In a rectangular channel of 0.5 m width, a hydraulic jump occurs at a point where depth of water of flow is 0.15 m and Froude number is 2.5. Determine

(i) The specific energy (ii) The critical depth and subsequent depths
(ii) Loss of head (iv) Energy Dissipated (7)

3© A trapezoidal channel has a bed width of 3.0 m and side slopes of 1:1. The bottom slope of the channel is 0.0036. If a discharge of 15 m^3/s passes in this channel at a depth of 1.25 m, estimate the value of Chezy coefficient C. (7)

Question no. 4

4(a) Derive Bernoulli's energy equation for compressible fluids for isothermal and adiabatic processes. (7)

4(b) If the temperature and pressure at sea level are 288 K and 101.3 kN/m^2 respectively, find the atmospheric pressure at a height of 10 km above sea level by taking the linear temperature lapse rate as 6.35 K/km. Take density of air at sea level as 1.205 kg/m^3. (7)

4© Assuming the cross sectional area of a passenger car to be $2.7m^2$ with a drag co efficient of 0.6,estimate energy requirement at a speed of 60km/hr. Assume weight of car to be 30kN and coefficient of friction 0.012.assume ρ =1.208kg/m^3 (7)

Question no. 5

5(a) Write down working of Francis turbine with neat sketch. (7)

5(b) A single jet pelton wheel runs at 300 rpm under a head of 510 m. The jet diameter is 200 mm, its deflection inside the bucket is 165^0 and its relative velocity is reduced by 15% due to friction. Determine:

(i) Water Pressure
(ii) Resultant force on the bucket
(iii) Overall efficiency
Take Cv = 0.98 and Ku = 0.46 (7)

5© List the main component parts of a centrifugal pump and explain them briefly. (7)

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations June, 2022

Programme:	**B Tech Civil Engineering**	**Session: 2021-22**
Semester:	**IVth**	**Max. Time: 3 Hours**
Course Title:	**Fluid Mechanics II**	**Max. Marks: 70**
Course Code:	**BTCE 204A**	

Instructions:

1. 1 Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub-Question carries two Marks).
2. Question No. 2 to 5 have three parts and student need to answer any two parts of each question.

Each part carries seven marks.

Question 1. **(7X2 = 14)**

a) Derive an equation for head loss in pipes due to friction - DarcyWeisbach equation
b) Derive a relation in between Manning's Coefficient and Chezy's Coefficient.
c) Differentiate between Supercritical and Sub critical flow.
d) A 5m wide rectangular channel conveys $10m^3$/sec of water with a velocity of 10 m/s. Is there a condition of Hydraulic jump to occur?
e) How will you calculate length and height of Hydraulic jump?
f) Differentiate between HGL and TGL.
g) An oil of viscosity 9 poise and specific gravity 0.9 is flowing through a horizontal pipe of 60 mm diameter. If the pressure drop in 100m length of pipe is $1800kN/m^2$. Determine the rate of flow of oil.

Question 2 **(7x2 = 14)**

a) A canal is formed with side slopes of 2 horizontal: 1 vertical and a bottom width of 3.0 m. The longitudinal slope is 1 in 5000. Using Manning's formula and assuming Manning's n = 0.025, calculate the depth of water for a discharge of 3.1 m^3/s in uniform flow.
b) Derive Chezy's equation for the uniform flow in open channel.
c) Derive an equation for Most Economical Circular channel section.

Question 3 **(7x2 = 14)**

a) For a constant specific energy of 1.8 N.m/N, calculate the maximum discharge that may occur in a rectangular channel 5.0 m wide. Also find out critical velocity.
b) What is meant by Hydraulic jump? Derive an expression for the hydraulic jump.

c) A stationary hydraulic jump occurs in a rectangular channel with the initial and sequent depth being equal to 0.20 m and 1.20 m respectively. Estimate (i) the discharge per unit width and (ii) the energy loss.

Question 4 **(7x2 = 14)**

a) Derive dynamic equation of Gradually Varied flow in wide rectangular channel.

b) Classify water surface profiles M_3, M_2, S_1, C_3, H_2, H_3 & A_2 with neat diagram.

c) A short reach of a 2 m wide rectangular open channel has its bed level rising in the direction of flow at a slope of 1 in 10000. It carries a discharge of $4m^3/s$ and its Manning 's coefficient is 0.016. The flow in this reach is gradually varying. At a certain section in this reach, the depth of flow was measured as 0.5m. Find out the rate of change of the water depth with distance, dy/dx?

Question 5 **(7x2 = 14)**

a) Derive an expression for shear stress on the basis of Prandtl Mixing Length Theory.

b) Two reservoirs are connected by a pipeline consisting of two pipes, one of 15 cm diameter and length 6 m and other diameter 22.5 cm & 16 m length. It the difference of water levels in the two reservoirs is 6 m, calculate the discharge & draw the energy gradient line. Take f = 0.04.

c) Show that two pipes described by (L, D_1, f_1), (L, D_2, f_2) are connected in series there are equivalent pipe (L, D_e, f_e) is related as

$$f_eL_e/D_e^5 = f_eL_e/D_1^5 + f_2L_2/D_2^5$$

CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations June 2022

Programme: B. Tech. Programmes (Civil branch) Reappear **Session: 2021-22**
Semester: IInd **Max. Time: 3 Hours**
Course Title: Chemistry **Max. Marks: 70**
Course Code: BT CH 102A

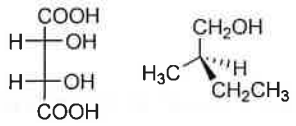
Instructions:

Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

Part-1

Q 1.

a. Absolute configuration for the given compounds are:



b. Calculate the wavenumber in cm^{-1} for IR radiation of 10 μm.

c. What is Auxochrome?

d. What are extrinsic semiconductors? Give examples.

e. How many fundamental modes of vibrations do you expect from CO_2 molecule?

f. Differentiate between temporary and permanent hardness.

g. When does a real gas obey the ideal gas equation closely? (7×2=14)

Part-2

Q 2.

a. What is Schrodinger Equation? Explain its application for the term Particle in a box solutions.

b. What is meant by "Effective nuclear charge"? Calculate Z_{eff} experienced by a 2p electron in nitrogen atom?

c. Construct the Pi-molecular orbitals for 1,3-butadiene. (5,4.5=14)

OR

Q 2.

a. Report the magnetic behaviour of the given complex ions with the help of CFT:
(i) $[Fe(CN)_6]^{3-}$ (ii) $[Ni(F)_6]^{4-}$

b. On the basis of MOT explain that the bond order of O_2^+ is more than O_2 molecule.

c. What are first second and third ionization energies of an element? What are the factors on which ionization energy of an element depends? (5.5.4=14)

Q 3.

a. Give the pictorial presentation of conformational analysis in butane considering rotation about C2-C3 bond?

b. Differentiate between racemic mixture and meso compound with example.
c. Discuss SN1 and SN2 reactions with mechanistic details. (5,4,5=14)

OR

Q 3.

a. What is chirality? Is chiral center, the necessity condition for a molecule to be chiral?
b. Explain following reactions with examples
   i) Reduction carbonyl compounds with metal hydrides ii) Addition in alkene
c. What is the Difference between Enantiomers & Diastereomers? Give examples. (5,6,3=14)

Q 4.

a. Calculate the electrode potential of a copper wire dipped in 0.1 *M* $CuSO_4$ solution at 25 °C. The standard electrode potential of copper is 0.34 V.
b. What do you mean by "Dry and Wet corrosion"? Explain with examples.
c. What is the equation of state for real gas? How do you derive a real gas equation? (4,5,5=14)

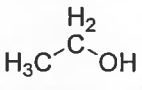
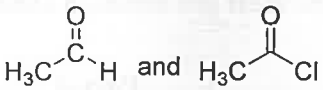
OR

Q 4.

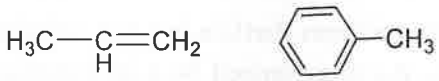
a. Calculate the pH and pOH of 0.03 M solution of HCl at 25°C.
b. What is entropy? Why the change in entropy in a system is not a suitable criteria to define spontaneous change?
c. What is Nernst Equation? Describe the application of Nernst equation. (5,4,5=14)

Q 5.

a. How you will differentiate following pair of compounds from their IR spectra?

   i) H_3C-NH_2 and  ii) 

b. Draw the finer NMR spectrum (with splitting) for following compounds.



c. What is a surface characterization technique? Explain SEM in detail. (5,5,4=14)

OR

Q 5.

a. What is the application of UV-visible spectroscopy? Assign the λ_{max} and Epsilon (Ɛ) values for benzene and aniline.
b. What is IR spectroscopy? List three factors that influence the intensity of an IR absorption band?
c. What is chemical shift in NMR spectroscopy? Explain the delta scale. (5,4,5=14)

CENTRAL UNIVERSITY OF HARYANA

Even Semester Term End Examinations June 2022

Programme:	**B.Tech (Civil) Reappear**	**Session: 2021-22**
Semester:	**3rd**	**Max. Time: 3 Hours**
Course Title:	**Strength of Material**	**Max. Marks: 70**
Course Code:	**BT CE 201 A**	

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) A steel rod 1 m long and 20 mm x 20 mm in cross section is subjected to a tensile force of 40 kN. Determine the elongation of the rod, if the modulus of elasticity for the rod material is 200 GPa

b) Define Beam and Classify the beam

c) Differentiate between ordinary and pure bending.

d) How will you find the strength of a solid shaft?

e) Describe the assumption in Euler's column theory

f) State Mohr's I^{ST} and II^{nd} theorem.

g) Define Conjugate beam and give the relation between actual beam and conjugate beam.

Q 2. (2X7=14)

a) Discuss the stress-strain diagram for ductile and brittle material in detail.

b) A simply supported beam 6 m long is carrying a uniformly distributed load of 5kN/m over a length of 3 m from the right end. Draw the shear force and bending moment diagram for the beam and also calculate the maximum bending moment of the section.

c) The stresses at point of a machine component are 150 MPa and 50 Mpa both tensile in nature. Find the intensities of normal, shear and resultant stresses on a plane inclined at an angle of 55° with the axis of major tensile stress. Also find the magnitude of the maximum shear stress in the component.

Q3. (2X7=14)

a) A circular beam of 100 mm diameter is subjected to a shear force of 30 kN. Calculate the value of maximum shear stress and sketch the variation of shear stress along the depth of the beam.

b) Derive an expression for shear stress distribution for the rectangular section and show that $\tau_{max} = 1.5\ (\tau_{avg})$.

c) Define the term bending stress and prove the Prove the Relation,

$$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$$

Where M is bending moment, I is moment of Inertia of the section, σ is bending stress, E, is Young's Modulus of Elasticity, R is radius of Curvature.

Q 4. (2X7=14)

a) Explain the term Torque and Polar modulus. Also determine the diameter of the shaft when a hollow shaft is to transmit 200 kW at 80 r.p.m. if the shear stress is not to exceed 60 MPa and internal diameter is 0.6 of the external diameter.

b) A solid shaft of mild steel 240 mm diameter is to be replaced by a hollow shaft of alloy steel for which allowable shear stress is 22 percent greater than solid shaft. Thc power to be transmitted is to be increased by 20 percent and speed of rotation is increased by 5 percent. Determine the maximum internal diameter of the hollow shaft.

c) What do you mean by Column and Strut? Distinguish clearly between Long Column and Short Column. Also discuss the failure mechanism of long column and short column.

Q 5. (2X7=14)

a) State the relationship between slope, deflection and radius of curvature of a simply supported beam. Also find the expression for slope of a beam at the support A and deflection of the beam at its centre if a simply supported beam AB of span L and stiffness EI carries a concentrated load P at its centre.

b) With the help of moment area method, find the deflection of the cantilever beam at its free end if a cantilever beam of span 2.5 m is subjected to gradually varying load from zero at the free end to 40 kN/m over fixed end. Take EI for the cantilever beam as 13 x 10^{12} N-mm^2

c) A beam ACB of length L, simply supported at the ends has moment of inertia 4I for the length AC and I for the length CB and is loaded with point load W at C. Using Conjugate beam method determine i) slope at end A and ii) deflection at mid span. Also compute the numerical values taking W= 8kN, length of CB portion is 2.5 m and total length (L) of beam ACB is 12.5 m, I = 5000cm4 and E = 2x 105 N/mm2.

Central University of Haryana
ODD Semester Term End Examination April 2022
B.Tech. Programmes
Branch: Civil Engineering

Course Code: BT CE 208A — Max Time: 3 Hrs
Course Title: Transportation Engineering - I — Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question no. 2 to 5 **(PART-II)** have three parts and students need to answer any two parts of each question. Each part carries seven marks.

PART I

Q1. Write short notes on any four of the following: (7 X 2 = 14)

(a) Joints in concrete pavements
(b) Traffic Signs
(c) Cutback Bitumen
(d) Bitumen Emulsion
(e) Traffic Islands
(f) PIEV theory
(g) Skid and Slip of vehicle

PART II

Q2. (a) Derive the expression for determining superelevation "e" for a vehicle moving with a design speed "V" negotiating a horizontal curve with radius "R" provided the coefficient of lateral friction is to be taken as "f". (2 X 7 = 14)
(b) Discuss the properties of an ideal alignment. Further discuss different factors controlling the alignment of road.
(c) Define PCU. Further discuss the concept of Level of Service.

Q3. (a) The speeds of overtaking and overtaken vehicles are 80 and 60 kmph respectively. The average reaction time for driver and acceleration for overtaking vehicle are 2 seconds and $1 m/sec^2$ respectively. Calculate the minimum and desirable lengths of the overtaking zone when the vehicle coming from the opposite direction is moving with speed of 60 kmph. (2 X 7 = 14)
(b) Discuss different methods employed for traffic volume studies. Further discuss various ways to represent traffic volume data.
(c) Identify different layers in flexible and rigid pavements by clean diagrams. Further briefly discuss these layers and materials used for construction.

Q4. (a) Calculate the stresses at interior, edge and corner regions of a cement concrete pavement by Westergaard's stress equations. Given modulus of elasticity of concrete = 3 X 10^5 kg/cm^2, Poison's ratio of concrete = 0.15, thickness of concrete pavement = 18 cm, modulus of subgrade reaction = 8.5 kg/cm^2, wheel load = 5100 kg, radius of loaded area = 15 cm. (2 X 7 = 14)

(b) Define road safety audit. Further discuss various safety concerns in highway projects.

(c) Draw a neat and clean diagram identifying different geometric elements of the road. Further briefly discuss these cross-sectional elements.

Q5. (a) Calculate the length of transition curve as well as the shift of curve with the following data: (2 X 7 = 14)

Design speed = 65 kmph, Radius of curve = 220 m, Pavement width with widening = 7.5 m, allowable rate of introduction of super-elevation = 1 in 150, pavement is rotated about centre line.

(b) List out the factors considered for the design of pavement. Further explain EAL and EWSL and how they are employed in pavement analysis and design.

(c) Explain CBR method for design of flexible pavement.

Central University of Haryana
Semester Term End Examination April 2022
B.Tech. Programmes

Branch: Civil Engineering
Course Code: BTAUD308A
Course Title: Environmental Studies

Max Time: 3 Hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

Q. No.1

(a) Give the details account of Hot Spot of Biodiversity?
(b)What is desert ecosystem discussed in details?
(c) What is rain water harvesting discussed in detail?
(d)Give the details account about environment ethics: issues and possible solutions?
(e)Define the nuclear accident with an example?
(f) Define is nitrogen cycle in environment with proper sketch?
(g)How can you move from unsustainable to sustainable development?

PART –II

Q. No.2 Define the water pollution discuss in the details with source, effect and control measure?
OR
Q. No.2 Give the details about thermal water pollution? Discuss the issues of ground water pollution with sources, effect and control measure?

Q. No.3 Define the air pollution? Give the detailed account about source, effect and control of air pollution?
OR
Q. No 3 What is the land Resources, land degradation, land slide soil erosion and desertification? Discuss the environmental factor and effects on ecosystem?

Q. No.4 What are forest resources? Give the details account about the use and over overexploitation, deforestation, how can we conserve the forest?
OR
Q. No .4 What is the minerals resources? Use and exploitation, environmental effects of mining?

Q. No.5 What is the ecosystem? Structure and functions of ecosystem? Define the energy flow in ecosystem with a model and ecological pyramid?
OR
Q. No.5 What is the food resources? Discussed the world food problems? How affect food issue to the environment and ecosystem?

CENTRAL UNIVERSITY OF HARYANA

ODD Semester Term End Examinations April 2022

Programme: BTech Civil Engineering
Semester: I
Course Title: Mechanics
Course Code: BT PHY 113 A

Max. Time: 3 Hours
Max. Marks: 70

Instructions:

1. **Question Number one (PART-I) is compulsory and carries total 14 marks (Each sub Question carries two Marks).**
2. **Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.**

PART -I

Q 1.

a. Determine the change in acceleration due to gravity of earth at latitude 60°, if the earth stops rotating. Radius of earth is 6370 km.

b. Define Coriolis force. How the Coriolis force affect the weather. Find the displacement due to effect of Coriolis force on a body falling vertically downward on the earth.

c. What are the laws of mechanics? State and explain them.

d. The Potential Energy of a body is given by: $U=(40+6x^2-7xy+8y^2+32z)$ joule. Where x,y,z are in meter. Find the force when the body is at (-2,0,5).

e. What is rigid body. Deduce Euler equation for the motion of a rigid body.

f. Discuss a damped simple harmonic oscillator. Derive the expression for displacement as function of time for the low, critical and over damped conditions. Draw with graphs.

g. Explain the procedure to find forces in members of truss by using method of joints.

PART -II

Q 2. What are rectangular cartesian and spherical polar coordinates. Derive the relation between coordinates of a points in these two systems. Convert the following equation written in Cartesian coordinates into an equation in Spherical coordinates. $x^2+y^2=4x+z-2$

OR

Q 2. State Newton's law of motions. A uniform ladder of weight 800N and of length 7 m rests on a horizontal ground and leans against a smooth vertical wall. The angle made by the ladder with the horizontal is 600. When a man of weight 600N stands on the ladder at a distance 4m from the top of the ladder, the ladder is at the point of sliding. Determine the coefficient of friction between the ladder and the floor.

Q 3. Describe the transformation of displacement, velocity and acceleration vector under rotation. What do you understand by conservative and nonconservative forces. Give examples. Find whether the force $F=x^2i+y^2j+z^2k$ is conservative or not.

OR

Q 3. Explain Central Forces. When a particle moves under the action of central force prove that-(i) Its motion takes place in a plane. (ii) Its angular momentum is constant. If the average distance of Mars from the Sun is 1.524 times the distance from the Earth to Sum, then determine the time period of Mars moving round the Sun.

Q 4. Discuss a damped simple harmonic oscillator. Derive the expression for displacement as function of time for the low, critical and over damped conditions and draw graph. When a body of mass 100gm is suspended from a spring it stretches the spring by 2cm. If relaxation time for the spring is 1 second, then determine the time period of damped oscillator.

OR

Q 4. State and prove the theorem of parallel axis for moment of inertia. Determine the moment of inertia of a solid cylinder about (i) an axis perpendicular to the length of the cylinder and passing through its Centre of mass and perpendicular to its length (ii) a diameter of the end face.

Q 5. State laws of friction. Define the following: (a) Limiting Force of Friction (b) Kinetic Friction (c) Co-efficient of Friction (d) Angle of Friction (e) Angle of Repose. Tania of mass 40 Kg is slipping on the frost. If the coefficient of friction acting is 0.45. Find the frictional force acting between her and frost layer?

OR

Q 5. What is a cantilever truss? How will you find out its reactions? State the assumptions made in the analysis of pin jointed trusses. How method of joint differs from the method of section in the analysis of pin jointed trusses? What is meant by perfect frame? What are the types of vibrations?

CENTRAL UNIVERSITY OF HARYANA

ODD Semester Term End Examinations April 2022

Programme: B.Tech Civil Engineering
Semester: First **Max. Time: 3 Hours**
Course Title: Mechanics **Max. Marks: 70**
Course Code: BT PHY 113 A

Instructions:

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g. Explain the procedure to find forces in members of truss by using method of joints.

PART -II

Q 2. What are rectangular cartesian and spherical polar coordinates. Derive the relation between coordinates of a points in these two systems. Convert the following equation written in Cartesian coordinates into an equation in Spherical coordinates. $x^2+y^2=4x+z-2$

OR

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Q 5. What is a cantilever truss? How will you find out its reactions? State the assumptions made in the analysis of pin jointed trusses. How method of joint differs from the method of section in the analysis of pin jointed trusses? What is meant by perfect frame? What are the types of vibrations?

Central University of Haryana
Semester Term End Examination April 2022
B.Tech. Programmes

Branch: Civil Engineering
Course Code: BTAUD308A
Course Title: Environmental Studies

Max Time: 3 Hrs
Max Marks: 70

Instructions:
Question Number **one (PART-I)** is compulsory and carries total 14 marks (Each sub Question carries two Marks).
Question Numbers 2(two) to 5(five) carry fourteen marks each with internal choice.

PART -I

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(b)What is desert ecosystem discussed in details?
(c) What is rain water harvesting discussed in detail?
(d)Give the details account about environment ethics: issues and possible solutions?
(e)Define the nuclear accident with an example?
(f) Define is nitrogen cycle in environment with proper sketch?
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PART –II

Q. No.2 Define the water pollution discuss in the details with source, effect and control measure?
OR
Q. No.2 Give the details about thermal water pollution? Discuss the issues of ground water pollution with sources, effect and control measure?

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