Registration No : | | | | | | | | | | |

Total Number of Pages : 02

Course: BTech
Sub Code: RME7D001

7th Semester Regular/Back Examination: 2022-23
SUBJECT: Power Plant Engineering
BRANCH(S): Mechanical Engineering

Time : 3 Hour

Max Marks : 100

Q.Code : L129

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** **(2 x 10)**

a) What are conventional and non conventional energy sources?
b) Enlist the various types of losses taking place in a steam turbine.
c) What do you understand by (i) nozzle (ii) diffuser
d) What is the function of economizer?
e) Define velocity coefficient in case of a nozzle.
f) Define the "Vacuum efficiency" as applied to a condenser.
g) What is the function of a cooling tower in a modern steam power plant?
h) What are the main difficulties in handling the radio-active waste coming out from the nuclear power stations?
i) What is "half-life" of nuclear fuels?
j) Mention the various types of tariffs

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Give the layout of a modern steam power plant and explain it briefly.
b) What is the function of a steam generator? Enlist its basic components.
c) Explain with neat sketch, the construction and working of any one type boiler.
d) How does a cooling tower operate? Mention its merits and demerits.
e) What is a fusible plug? Why is it used?
f) What is the need of makeup feed water treatment? Discuss various methods of feed water treatment techniques commonly used in modern power plants.
g) What is a bubbling fluidized bed combustor? What are its merits?
h) Why are steam turbines compounded? What are the different methods of compounding?
i) What is a surface condenser? Why does cooling water flow inside the tubes and steam condense outside the tubes?
j) Describe with the help of a neat sketch the construction working of a pressurized water reactor. What are the advantages and disadvantages?
k) Discuss about the safety measures adopted in modern nuclear power plants.
l) Explain the function of a moderator. What is the criterion of its effectiveness?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) Mention the merits and demerits of fire-tube boilers. **(8)**

b) What is circulation? What is the difference between natural circulation and forced circulation? **(8)**

Q4 a) Dry saturated steam at a pressure of 11 bar enters a convergent-divergent nozzle and leaves at a pressure of 2 bar. If the flow is adiabatic and frictionless, determine: **(10)**

i) The exit velocity of steam.

ii) Ratio of cross-section at exit and that at throat.

Assume the index of adiabatic expansion to be 1.135.

b) Explain briefly about the economizer and air preheater. **(6)**

Q5 An impulse steam turbine is supplied with steam at 35 bar, 350^0C, the condenser pressure being 0.07 bar. The first stage of the turbine is velocity compounded with two rings of moving blades separated by a ring of fixed guide blades. The isentropic enthalpy drop for this stage is ¼ th of that for the whole turbine. The nozzle angle is 20^0 and the nozzle efficiency is 88%. The mean blade velocity of both the moving rings of blades is 0.2 of the velocity of steam leaving the nozzle. The exit blade angles for both fixed and moving blades are 30^0 and the blade friction coefficient for all blades is 0.9. If the internal efficiency of the turbine is 75% , calculate the efficiency of the first stage and the percentage of the total power developed by the turbine in this stage. **(16)**

Q6 a) Calculate the cost of generation per kWh for a power station having the following data: **(8)**

Installed capacity of the plant: 200 MW
Capital cost: Rs. 400 crore
Rate of interest and depreciation: 12%
Annual cost of fuel, salaries and taxation: Rs. 5 crore
Load factor: 50%

Also calculate the saving in cost per kWh if the annual load factor is raised to 60%.

b) A 300 MW thermal power station is to supply power to a system having maximum and minimum demand of 240 MW and 180 MW respectively in a year. Assuming the load duration curve to be a straight line, estimate (i) the load factor, (ii) the capacity factor **(8)**

Registration No:

Total Number of Pages: 02

Course: BTech
Sub_Code: REC7D001

7th Semester Regular/Back Examination: 2022-23
SUBJECT: Digital Image Processing
BRANCH(S): AE&I, CSE, CSEAIME, CST, ECE, ETC
Time: 3 Hour
Max Marks: 100
Q.Code: N052

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** (2 x 10)

a) If all the pixels in an image are shuffled, will there be any change in the histogram? Justify your answer.
b) Write the expressions for 2D DCT forward and inverse transform.
c) Why filtering in frequency domain is required in image processing?
d) What is the role of Wiener filtering in image restoration?
e) Obtain the negative of the following sub image.

39	205	105
41	52	199
201	115	176

f) Write the expression to find number of bits required to store a digital image. Give an example.
g) Mention the steps of digital image processing.
h) What do you mean by connected set?
i) Why image compression is required?
j) Write the expression for wavelet transform.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) An 8×8 image is given.
Use 8 connectivity to find shortest path between pixels (1,1) with value 10 and (8,8) with value 106, if v = {0,10, 50, 54, 60, 63, 75, 106, 110}

10	143	210	0	0	10	110	170
110	54	60	0	111	211	139	102
60	63	111	71	161	105	10	70
10	11	255	0	0	15	255	70
0	50	190	0	112	0	6	200
0	130	10	0	115	175	75	200
60	0	150	10	200	61	255	50
255	105	111	41	211	113	201	106

b) Explain the components of image processing.
c) Give the practical limitations in sampling and reconstruction of images.

d) Consider the 2-bit/pixel image of size 5×5: Compute the equalized histogram.

0	0	1	1	2
1	2	3	0	1
3	3	2	2	0
2	3	1	0	0
1	1	3	2	2

e) What do you mean by spatial filtering? Explain.

f) In the 5×5 gray image given, what will be the value of the marked pixel (5) after applying a

(i) 3×3 mode filter,
(ii) 3×3 median filter.
(iii) Comment on the answer.

1	2	3	1	2
4	5	2	3	3
3	3	(5)	4	4
1	3	2	3	5
2	1	3	1	3

g) Differentiate image enhancement and image restoration.

h) Explain the various types of noise models discussed in image processing.

i) Derive the DCT coefficients from the definition of DFT.

j) Explain the Image restoration/degradation model with suitable block diagram.

k) What are the different types of image smoothing filters? Discuss their disadvantages.

l) Generate the Huffman code for the sequence {a3, a2, a3, a1, a3, a2, a1, a2, a4} with following probabilities P(a1) = 0.25, P(a2) = 0.35, P(a3) = 0.3, P(a4) = 0.1.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Write an expression for the two dimensional DFT. Also, find the DFT of the given image. **(16)**

1	2	3	4
4	3	2	1
1	2	3	4
4	3	2	1

Q4 Consider the sub image. Perform **(16)**
Mean filtering,
Low pass filtering,
Median filtering, and
High pass filtering. Compare the results.

0	5	4
7	120	5
4	3	7

Q5 What do you mean by color model? Explain the various color models. **(16)**

Q6 Explain the various image compression methods with necessary block diagrams. **(16)**

Total Number of Pages : 03

Course: B Tech
Sub Code: REL7D001

7th Semester Regular/Back Paper Examination: 2023
SUBJECT: Advanced Control Systems
BRANCH(S): EEE, ELECTRICAL
Time : 3 Hour
Max Marks : 100
Q.Code : L125

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** **(2 x 10)**

a) Define the concepts of state and state variables.

b) The System matrix of a continuous time system, described in the state variable form is

$$A=\begin{bmatrix} x & 0 & 0 \\ 0 & y & -1 \\ 0 & 1 & -2 \end{bmatrix}$$

Determine the range of x and y so that the system is stable.

c) What is stable node? Draw the phase portrait of a stable node.

d) Explain the sufficient conditions of stability of non-linear autonomous system.

e) Define asymptotic stability in the large in the sense of Liapunov.

f) Explain what do you understand by limit cycle?

g) Bring out the differences between Liapunov"s stability criterion and Popov"s stability criterion.

h) Use Jury's test to show that the two roots of the digital system $F(Z)=Z^2+Z+0.25=0$ are inside the circle.

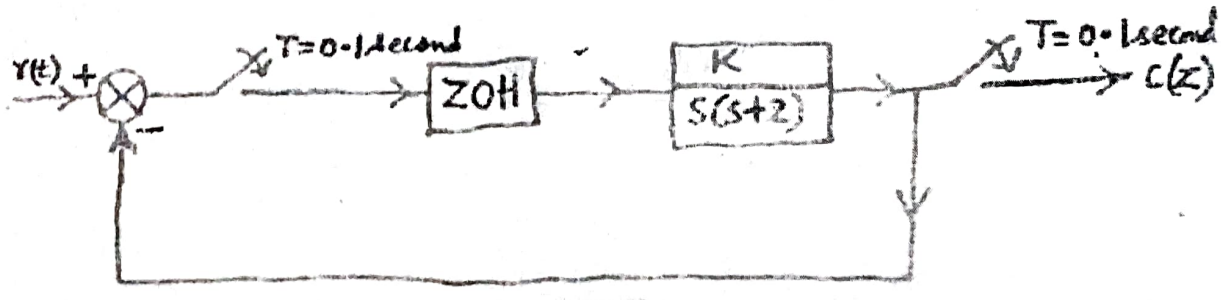
I) State Sylvester's expansion theorem.

j) What are the conditions for asymptotic stability at the origin?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Find out the range of values of gain ***k*** for which the closed loop system shown in Fig. given below remains stable.



b) A two input two output linear dynamic system is governed by

$$\dot{X}(t)=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}X(t)+\begin{bmatrix}2 & 1\\ 0 & 1\end{bmatrix}U(t)$$

$$Y(t)=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}X(t)$$

Assuming X(0)=0, find the output response Y(t) if $U(t)=\begin{bmatrix}0\\ e^{-3t}\end{bmatrix}$ for $t\geq 0$.

c) Derive the necessary expression for describing functions.

d) Draw the phase trajectory for the system described by the following differential equation

$$\frac{d^2X}{dt^2}+0.6\frac{dX}{dt}+X=0$$

With X(0)=1 and $\frac{dX}{dt}(0)=0$.

e) Clearly explain how stability of sample data control system is assessed by Jury"s stability test.

f) Determine the kind of singularity for each of the following differential equations

$$\ddot{y}+3\dot{y}+2y=0$$

$$\ddot{y}-8\dot{y}+17y=34$$

g) Convert the following state model into canonical form

$$A=\begin{bmatrix}1 & -4\\ 3 & -6\end{bmatrix},\quad B=\begin{bmatrix}0\\ -1\end{bmatrix},\quad C=\begin{bmatrix}1 & 0\end{bmatrix},\quad D=\begin{bmatrix}0\end{bmatrix}$$

h) Find the describing function of an ideal on off relay.

i) A discrete time system is described by the difference equation

$$y(k+2)+5y(k+1)+6y(k)=u(k)$$

$$y(0)=y(1)=0,\ u(k)=1\ \ for\ \ k\geq 0$$

Find the output y(k).

j) With a neat circuit diagram, explain the principle of operation of sample and hold device.

k) Explain aliasing in linear discrete data system with example.

l) The origin is an equilibrium point for the pair of equations

$$\dot{X}_1=aX_1+bX_2$$

$$\dot{X}_2=cX_1+dX_2$$

Using Liapunov's theory find sufficient conditions on a, b, c, d such that the origin is asymptotically stable.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four

Q3 **(a)** Obtain the state space representation of the system **(8)**

$$\frac{C(s)}{U(s)} = \frac{10(s+2)}{s^3+3s^2+5s+15}$$

(b) A linear system is represented by **(8)**

$$\dot{x} = \begin{bmatrix} -6 & 4 \\ -2 & 0 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} x$$

Find the complete solution for y(t) when u(t)=1, $x_1(0)=1$, $x_2(0)=0$.
Determine the transfer function and draw a block diagram representing the system.

Q4 **(a)** State and Prove Liapunov's theorem for asymptotic stability of the system **(12)**

$\dot{x} = Ax$.

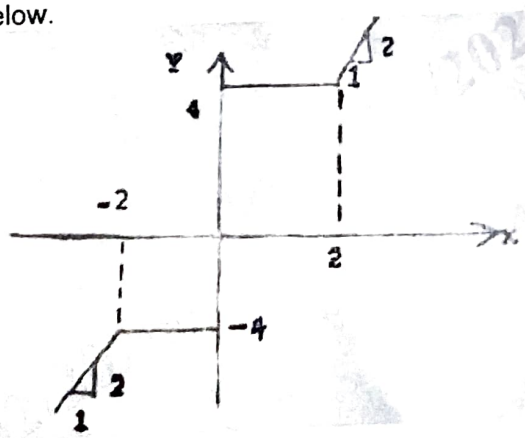
Hence show the following linear autonomous model $\dot{x} = \begin{bmatrix} 0 & 1 \\ -k & -a \end{bmatrix} x$ is asymptotically stable if

a>0, k>0.

(b) Use Jury's test to show that the two roots of the digital system **(4)**
$F(z) = z^2 + z + 0.25 = 0$ are inside the circle.

Q5 **(a)** Define (i) positive definiteness (ii) Negative definiteness (iii) Indefiniteness **(6)**

(b) Derive the expression for describing function of the following non-linearity as shown in Fig. below. **(10)**



Q6 **(a)** Determine whether or not following quadratic form is positive definite **(10)**

$$Q = 10x_1^2 + 4x_2^2 + x_3^2 + 2x_1x_2 - 2x_2x_3 - 4x_1x_3$$

(b) Sometimes non-linear elements are intentionally introduced into control system. Give an example stating clearly the reason for introduction of non-linear elements. **(6)**

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Total Number of Pages : 02

Course: B.Tech
Sub Code: RCL7E004

7th Semester Regular/Back Examination: 2022-23
SUBJECT : Cyber Law and Ethics
BRANCH(S): CSE, CSIT, EEE,EEE,IT
Time : 3 Hour
Max Marks : 100
Q.Code : L071

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) What is Cyber Ethics?
b) Explain the main objective behind cyber crime.
c) What is Internet?
d) Name five type of Intellectual property rights.
e) What is piracy and privacy?
f) Differentiate between paper and paperless contact.
g) What are the ethical issues in information society?
h) What is a Domain Name? List the various types of domain name available.
i) What are the various Ecommerce models?
j) What is trademark security problem?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) What is DoS attack? What are the methodologies to handle DoS attack?
b) Define the term 'Cyber Squatting' and what kinds of protection available to the consumers in the Cyber World against it?
c) What is the necessity of corporate finance? Explain the regulations related to corporate finance.
d) Explain the historical background, Object, Extent, Scope and Commencement of the Information Technology Act.
e) Explain the powers of cyber appellate tribunal.
f) Define the term hacking and explain its essentials.
g) Explain cyber terrorism with suitable illustrations.
h) Explain the various challenges faced for cybercrime trials and investigations.
i) Classify cybercrimes and categorize cyber criminals?
j) What is cyber fraud and cyber cheating? Describe various types of cyber fraud and cheating.
k) What are the various ethical issues related to AI?
l) What is doctrinal approach? How is it different from consensual approach?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Discuss various International Conventions and Treaties on Cyber Crime. **(16)**

Q4 What is digital signature? How is it issued? Discuss the powers and functions of the controller of certifying authority and the certifying authorities **(16)**

Q5 What are the amendments made by IT Act 2000 in the Evidence Act, 1872? **(16)**

Q6 What is the functional equivalent approach? Discuss how it is adopted in the Act with respect to the digital signature and electronic records. Do you think that the electronic records satisfy the test of reliability, traceability and inalterability in the same way as the paper based records? **(16)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

Course: B.Tech
Sub Code: RCS7D002

7th Semester Regular/Back Examination: 2022-23
Subject: Cyber Security and Privacy
BRANCH(S):CSE
Time : 3 Hour
Max Marks : 100
Q.Code : L121

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) What is IPSec? Name the two modes in which IPSec works.
b) Differentiate between a session and connection with respect to transport layer of network.
c) Differentiate between PGP and S/MIME.
d) How a worm is different from a trojan horse from cyber attack point of view?
e) What is computer hacking?
f) Distinguish between role and privileges.
g) What is one time pad? Why it cannot be used in practical situations?
h) What is steganography?
i) How digital signature is different from a paper signature?
j) What is cryptographic hash function? In Blockchain which hash algorithm is used.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Describe the role pf "The Information Technology act 2000" in addressing cyber crimes.
b) Write about any three of the following topics: Free Internet, Hacking, Pharming, Phishing, Phreaking, Vishing.
c) What do you understand by confidentiality, Integrity, Non-repudiation? How cryptography can be used to achieve these security goals?
d) Explain the term "Cyber terrorism". Describe the types of cyber terror capabilities.
e) What is biometric authentication? What are the use cases for biometric authentication? What are the various biometric authentication techniques available?
f) What is RBAC in OS security? Explain it providing an example.
g) What do you understand by penetration testing? What are the various methods available for penetration testing?
h) What are the security issues at different layers of Internet of things and mention methods to prevent these attack?

i) What is heap over flow attack? State and explain two mechanisms to mitigate this attack.

j) What is cyber security awareness? Why is it important? What are the methods to create cybersecurity awareness?

k) What is digital forensic? What are the various branches of digital forensic? What tools do the forensic examiners use for investigation?

l) What is IPR act in India? What are the various types of IPR? Why IPR is important?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 What is cyber security audit? How is it beneficial? What are the basic steps followed in a cyber security audit. Name few tools used for security auditing. **(16)**

Q4 What is cloud computing? What are the security risks in cloud computing? What methods can be used to address security issues in cloud computing? **(16)**

Q5 What is a computer virus? Explain the various techniques used by antivirus software to detect the viruses. **(16)**

Q6 What is an Intrusion detection system? What are the types of IDS available in the market? What are the techniques used by IDS? **(16)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

Course: B. Tech.
Sub Code: REC7D001

7th Semester Regular / Back Examination: 2022-23
SUBJECT: DIGITAL IMAGE PROCESSING
BRANCH(S): AEIE/CSE/ECE/EEE/EIE/ETC
Time: 3 Hour
Max Marks: 100
Q.Code: L056

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I **(2 x 10)**

Q1 **Answer the following questions:**

a) What do you mean by a grey scale image?
b) A grey image is having intensity range from 10-16. It is necessary to transform this image to another image, whose range should be 120-180. What should be the grey level transformation function?
c) What is Gamma correction? Why such correction is required?
d) What information is conveyed by histogram of an image?
e) What are the gray level transformation functions used in image processing?
f) Derive the Laplacian spatial filtering mask for image processing applications?
g) Explain the working of a mean filter on an image.
h) What is image restoration? How it is different from contrast enhancement?
i) What are the various sources of degradation in the image formation process?
j) Write down the properties of a Metric (Distance) function between two discrete points p and q.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) What is city-block distance? Explain with a suitable example.
b) Write down the expressions for two dimensional DFT pair and DCT pair for a 4×4 sub-image.
c) A 3-bit image of size 64×64 pixels have intensity distributions shown in table. Obtain the intensity transformation after histogram equalization. How many pixels in the equalized image have the intensity 5?

Gray levels	0	1	2	3	4	5	6	7
No. of pixels	790	1023	850	656	329	245	122	81

d) Explain RGB, CMY and HSI color models emphasizing on their respective application & significance.
e) Find the output after applying Median filter to the sub-image. What type of noise is removed by this filter? Explain. $\begin{bmatrix} 6 & 4 & 2 \\ 3 & 5 & 5 \\ 4 & 2 & 4 \end{bmatrix}$
f) Exemplify and contrast the redundancy reduction in run length coding.

g) What is homomorphic filtering? Summarize the steps involved in it.

h) Show that the scaling function given below does not satisfy the second requirement of a multiresolution analysis.

$$\varphi(x) = \begin{cases} 1; & 0.25 \le x \le 0.75 \\ 0; & elsewhere \end{cases}$$

i) Discuss the basic operations involved in geometric transformation of an image.

j) Discuss the concept, structure and applications of image pyramids.

k) What is the objective of image compression? Explain with an example of a high definition (HD) digital video data. What are the various Image Compression Standards?

l) Discuss about wavelet transforms in one and two dimensions.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Describe the fundamental steps in image processing using suitable block diagrams. **(16)**

Q4 Explain the smoothing and sharpening filters in the context of spatial filtering. Use suitable examples. **(16)**

Q5 What is noise? Differentiate between Gaussian noise and impulsive noise? **(16)**

Q6 Explain the chromaticity diagram using a labeled diagram. Reason the statement: "The color gamut of a monitor can be displayed as a triangular region within the CIE diagram, whereas the color gamut of a high quality printing device is displayed as the irregular region inside the triangle." **(16)**

Registration No :

Total Number of Pages : 02

Course: B.TECH
Sub Code: REC5D006

7th Semester Regular/Back Examination: 2022-23
SUBJECT: Digital VLSI Design
BRANCH(S): AEIE,CSE,CSIT,EEE,ELECTRICAL,MECH
Time: 3 Hour
Max Marks: 100
Q.Code: L164

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) Which is the most critical step in the fabrication of MOSFETs?
b) Give the various color coding used in stick diagram.
c) Explain Punch through and hot electron effect.
d) What are the various capacitances associated with an MOSFET?
e) Show what is the effect of increasing trans-conductance ratio (K_R) on VTC of CMOS inverter.
f) Draw the voltage transfer characteristics for a CMOS inverter and define noise margin.
g) Design an XOR gate using minimum number of NAND gates.
h) What is latch up in CMOS design and ways to prevent it?
i) Hierarchical decomposition of a large system in VLSI design is known as _____.
j) What do you mean by Programmable logic plane?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 x 8)

a) Draw the stick diagram for a CMOS 3- input NOR gate.
b) What is the oxide capacitance value for linear and saturation operation mode of the NMOS transistor?
c) Derive T_{PLH} and T_{PHL} for a CMOS inverter.
d) What are the various ways to reduce clock insertion delay in the design?
e) What is the effect of constant voltage and constant field scaling of MOSFET upon gate oxide capacitance?
f) Implement the circuit level realization of one transistor DRAM cell.
g) Explain Ad hoc testable design techniques.
h) What is a multiplexer? Realize a 2X1 MUX using CMOS transmission gate logic.

i) An nMOS with the following parameters is scaled by a factor 1.4. Calculate how the current will be scaled. Assume full scaling.
Given, $\mu_n C_{ox}$=20 μA/V^2, W/L =3, V_{GS}=1V, V_{DS}=1.5V, V_{TO}=0.6V

j) Draw and explain on chip clock generation and distribution.

k) What is the difference between a normal buffer and clock buffer?

l) Draw the schematic of positive edge-triggered master-slave D flip-flop

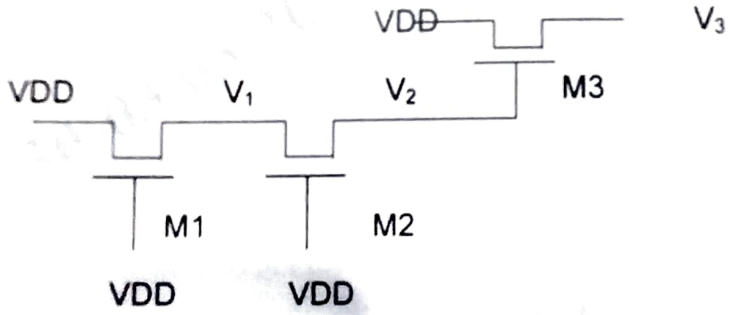
Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **(a)** With neat sketches explain the twin tube process. **(08)**

(b) Prove that $(W/L)_P \cong 2.5(W/L)_n$, in an ideal symmetrical CMOS inverter. **(08)**

Q4 **(a)** **(08)**



Find the voltages at V_1, V_2 and V_3 if the threshold voltage of M_1, M_2 and M_3 is V_T.

(b) What is noise margin. Calculate it for one CMOS inverter. **(08)**

Q5 **(a)** Calculate the switching threshold voltage of CMOS NAND2 gate, if $k_n = k_p$ and $V_{T,n} = |V_{T,P}| = 0.6$ V. Given that the supply voltage is 3.3 V. **(08)**

(b) Design a T Flip Flop using JK Flip Flop and implement it using CMOS. **(08)**

Q6 **(a)** What are the various Design constraints used, while performing synthesis for a design **(08)**

(b) Draw and explain architecture of FPGA. **(08)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

Course: BTech
Sub Code: REV5D004

7th Semester Regular / Back Examination: 2022-23
SUBJECT: Disaster Management
BRANCH(S): AE,AERO,BIOTECH,CIVIL,CSE,ECE,EEE,EIE, ELECTRICAL,ELECTRICAL,ETC,IT,MECH,METTA,MINERAL,MINING
Time : 3 Hour
Max Marks : 100
Q.Code : L101

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) What do you mean by epidemic?
b) What are various types of environmental hazards?
c) What is an earthquake?
d) When a hazard becomes an emergency?
e) What are the disasters caused by extreme temperatures?
f) What is called stampede?
g) State about the disaster management act implemented in India.
h) What are different types of cyclonic disasters?
i) What is NDRF?
j) What kind of disaster is Bhopal gas tragedy?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Write about different characteristics of disaster.
b) What is vulnerability? Explain its different kinds.
c) Write a short note on anthropogenic hazards.
d) What is hazard zoning?
e) Explain various disasters affecting the environment.
f) Distinguish between hazard and disaster giving suitable examples.
g) Write short note on capacity building and assessment.
h) Explain the role of media in disaster management.
i) What are the pre disaster measures taken to prevent loss of life due to flood?
j) What is the SOP for industrial safety?
k) Explain different types of climatological disasters.
l) Mention causes of draught and the mitigation measures.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	Explain the principles of disaster management. Discuss about vulnerabilities to earthquake hazards.	**(16)**
Q4	Explain the various principles of preparedness. Discuss the importance of logistical readiness in disaster preparedness.	**(16)**
Q5	Explain the various approaches in the disaster management.	**(16)**
Q6	Explain the disaster mitigation strategies. Discuss the importance of communication in disaster mitigation.	**(16)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

Course: B.Tech
Sub Code: RED7E001

7th Semester Regular/Back Examination: 2022-23
SUBJECT: Entrepreneurship Development
BRANCH(S): AERO,AUTO,BIOMED,BIOTECH,CHEM,CIVIL,CSE,CSIT,ECE,EEE,EIE, ELECTRICAL,ENV,ETC,IT,MANUTECH,MECH,METTA,MINERAL,MINING,MME,PE,PLASTIC,PT
Time : 3 Hour
Max Marks : 100
Q.Code : L006

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) What is the role of DIC in entrepreneurship development?
b) What is Break Even Analysis?
c) What is LLP?
d) Who is a Drone Entrepreneur?
e) What is motivation?
f) How does advertising help an entrepreneur?
g) Name two private sources of debt finance.
h) What is motivation?
i) What is a cash flow statement?
j) Write 4 ways to control air pollution.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) What are the uses of provisional registration certificate?
b) What is a start-up? Illustrate making of a start-up.
c) Why are small businesses important for India's economic growth? Explain with examples.
d) Distinguish between entrepreneur and intrapreneur.
e) Explain various laws regulating SSIs.
f) What kind of labour issues can an entrepreneur face? How can those be solved?
g) Explain the steps involved in an entrepreneurial process.
h) What is ancillary industry? Give examples.
i) What are the various skills needed to be an entrepreneur? Explain.
j) What is the importance of entrepreneurial environment in the growth and sustenance of enterprises?
k) What do you understand by bankability of a business project? Elucidate.
l) Write a short essay on "factors to be considered for selecting a location for a business".

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	Prepare a sample Business Plan. Enumerate your key considerations while preparing the plan.	**(16)**
Q4	What are the major causes of failure of an MSME? Explain with examples.	**(16)**
Q5	Write Short Notes on: a) Seed Capital b) Project feasibility study c) Environmental Pollution, hazards and solutions.	**(16)**
Q6	Elucidate the traits and skills needed to become an entrepreneur. Do you think a formal training is must for an entrepreneur? Justify.	**(16)**

Registration No :

Total Number of Pages : 04

Course: B.Tech
Sub Code: RCI7D003

7th Semester Regular/Back Examination: 2022-23
SUBJECT: Estimating, Costing and Professional Practice
BRANCH(S): CIVIL
Time : 3 Hour
Max Marks : 100
Q.Code : L070

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) What is work charge establishment cost?
b) Define plinth area estimate.
c) How to calculate the total float?
d) Define milestone chart.
e) How to calculate additional length of reinforcement bar for 45^0 bent?
f) What is the difference between nominal cover and clear cover
g) What is out-turn work?
h) Define Lump sum contract.
i) What is earnest money deposit?
j) Define Dummy in network diagram.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Find out the quantity of concrete and steel of a rectangular column having size of 350 mm x 300 mm and height 3.0 m. The column is having 6 nos. of 20 mm dia. bar as main longitudinal reinforcement. The column stirrups are provided with 8 mm dia. bar @ 100 mm c/c. The overall cover for column is 40 mm.

b) A beam made of R.C.C is having size of 300 mm width and 500 mm depth. The beam is having 4 nos. of 20 mm dia. bar as main reinforcement at bottom. Out of 4 bars, 2 bars are straight and 2 bars are bent up. In addition, at the top, 2 anchor bars are there of 16 mm dia. Stirrups are provided with 8 mm dia. bar @ 125 mm c/c. The overall cover of the beam is 20 mm. Consider the length of the beam is 5000 mm. Calculate the quantity of concrete, steel and prepare the bar bending schedule

c) Calculate the concrete quantity and amount of reinforcement of slab. The lengths of the two sides of the slab are 5.5 m and 3 m. The depth of the slab is 175 mm. The 12 mm dia. main bars are provided @ 150 mm c/c with alternate bent up. The distribution bars of 10 mm dia. are provided @ 200 mm c/c. Take overall cover of 15 mm.

d) Describe the methods of calculating earthwork by prismoidal formula method and trapezoidal method

e) Estimate the materials for 10 cu m volume for Cement Concrete (1:2:4) for RC work excluding reinforcement.

f) Estimate the materials (i.e. nos. of bricks, sand and cement quantity) for 10 cu m volume for First class brickwork in super structure with cement mortar (1:5).

g) Write down the detailed specification for damp proof course (D.P.C.).

h) Prepare the network diagram (step by step) for the highway project following the data given in the table below.

Activity name	Activity	Immediate Successor	Immediate Predecessor	Time duration in weeks
A	Move in	B	-	1
B	Clear land part I	C, D	A	3
C	Clear land part II	E	B	5
D	Drainage structure Part I	E, F	B	6
E	Drainage structure Part II	G	C, D	6
F	Earthwork part I	G	D	6
G	Earthwork part II	H	E, F	6
H	Concrete pavement	I	G	8
I	Clean up	J	H	1
J	Move out	-	I	1

i) Write down a short note on Work Breakdown Structure.

j) Write down the difference between PERT and CPM method.

k) Describe the Fulkerson's rule for numbering the events of a network with an example.

l) What is retention money? What are the tender documents need to be provided along with the tender forms to enable contractors to bid for the job?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Calculate the quantity of earthwork by mean-sectional area method from the given data as follows: I) Formation width of the road is 12 m. II) Downward gradient of 1 in 60. III) The formation level of starting chainage is 470.0 m. IV) Side Slope is 2H:1V for banking and 1.5H:1V in cutting. **(16)**

Chainage in m.	0	30	60	90	120	150
R.L. of G.L. in m.	466.5	467.2	468.1	468.2	469.7	469

Q4 Find out the Earliest expected time, Latest occurrence time and slack values for each event for the network shown in **Fig. 1.** Then determine the critical path for the network using PERT. The Numbers in the figure indicate time in weeks. **(16)**

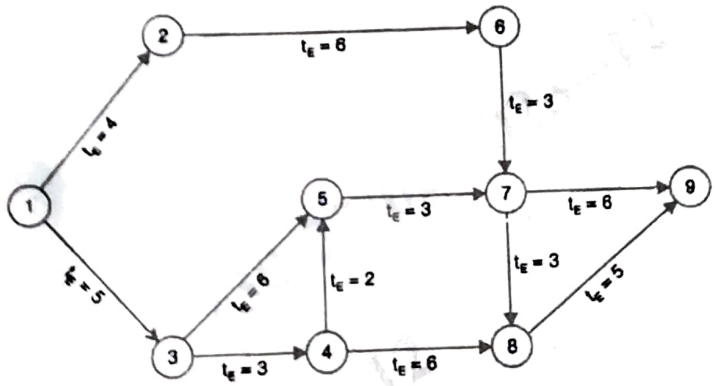


Fig. 1

Q5 The network for a certain project is shown below in **Fig. 2**, along with the estimated time of completion of each activity marked. Compute the activity times and total float for each activity. Locate the critical path on the network using CPM. **(16)**

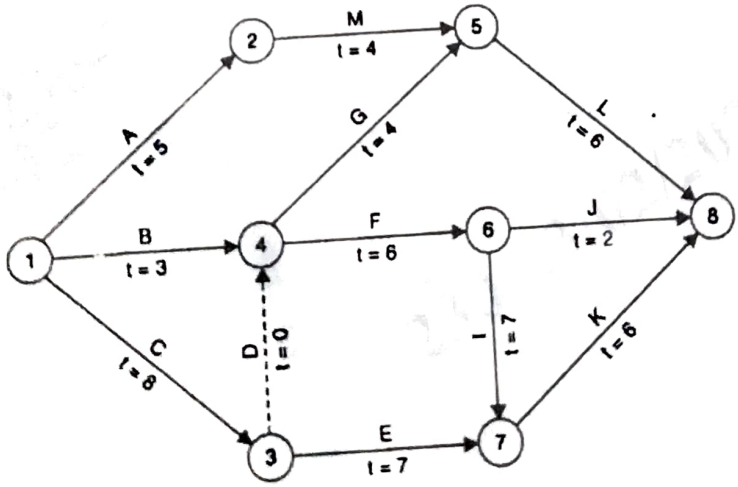


Fig. 2

Q6 The plan of a building and the section of a wall are shown in **Fig.3**. Work out the quantities of each item given below by long wall and short wall method and enter them in a standard measurement sheet with description of the items. **(16)**

A. Excavation in foundation

B. P.C.C (1:4:8) in foundation

C. U.C.R masonry in foundation and plinth with cement mortar (1:6)

D. D.P.C

E. Brick masonry in superstructure with cement mortar (1:5)

F. Mosaic tile flooring.

G. Internal plaster with cement mortar (1:4)

H. R.C.C work in lintel.

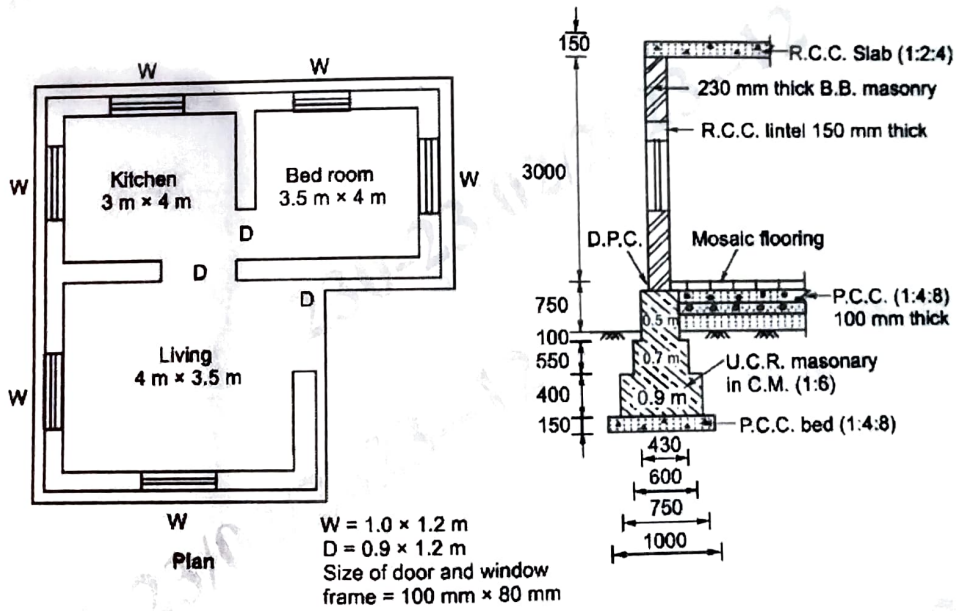


Fig. 3

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

Course: B.Tech
Sub Code: RGT6A003

7th Semester Regular / Back Examination: 2022-23
SUBJECT: Green Technology
BRANCH(S): AUTO,BIOMED,BIOTECH,CIVIL,CSE,ECE,EEE,EEE, ELECTRICAL,ELECTRICAL,ETC,IT,MECH,METTA,MME
Time : 3 Hour
Max Marks : 100
Q.Code : L114

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) What are the major green house gases?
b) What is bio-fuel?
c) What is zero energy building?
d) What are the renewable sources of energy? Give examples.
e) What is photosynthesis?
f) What is net accumulation of green house gases?
g) Write about MRV debate.
h) What is Carbon Tax?
i) Which gases cause depletion of ozone layer?
j) What is Global Warming Potential?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) What are fossil fuels? Give a brief account of application of fossil fuels.
b) What are the advantages of solar energy?
c) Briefly describe about the causes and effects of Green House Effect.
d) Discuss the aim & objective of GRIHA rating system guideline.
e) List the energy sources available at present and compare the cost of a few typical systems for power generation.
f) Discuss about various effects and impacts of climate change.
g) What are the various factors of green industries?
h) Write short note on Kyoto Protocol and its significance.
i) What are the concepts of green technologies for transport?
j) What are different steps for control of carbon emissions?
k) Write a short note on Long Half-life.
l) How can you as an individual contribute to the environment?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	Why green technology is very important now a days? Explain in detail the factors affecting green technologies.	(16)
Q4	Explain the basic principle of solar PV panels. Describe about typical solar energy systems.	(16)
Q5	What are the various effects of climate change and global warming? Write about India's National Action Plan on Climate Change.	(16)
Q6	What is the scope and need for construction of Green Building? Explain all its salient features.	(16)

Registration No:

Total Number of Pages: 02

Course: B.Tech
Sub Code: RIS7B001

7th Semester Back Examination: 2022-23
SUBJECT: Industrial Safety Engineering
BRANCH(S): AUTO,CHEM,CIVIL,CSE,EEE,EEE,IT,MANUTECH,MECH, METTA,MINING,MME,PE,PLASTIC,PT

Time: 3 Hour
Max Marks: 100
Q. code: L031

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

(2 x 10)

Q1 **Answer the following questions:**

a) What is the primary function of maintenance department?
b) What are different types of maintenance?
c) What are the methods of fire prevention?
d) What are the types of accident in industrial safety?
e) What are the causes and effects of industrial accidents?
f) What are 4 methods for preventing corrosion of metals?
g) What are different types of wear?
h) Describe the importance of fault tracing.
i) What are the merits and demerits of preventive maintenance?
j) What are the two differentiations between the maintenance and repair?

Part-II

(6 x 8)

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**

a) What are the types of accident in industrial safety?
b) Examine some of the common source of mechanical hazards.
c) Organize the classification of pressure vessels.
d) Describe fault tree analysis.
e) What is the corrosion and its prevention?
f) What are the different types of wear and causes?
g) Enlist the points to be considered for safety in industries as per The Factories Act, 1948.
h) What is lubrication and method of lubrication?
i) What is the concept and importance of fault tracing?
j) How do you draw a decision tree diagram?
k) What is periodic maintenance?
l) What are the steps in making preventive maintenance procedure?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Illustrate about mechanical and electrical hazards to humans and the effect of current on human body for different dosage. **(16)**

Q4 Explain the different types of lubrication systems in detail. **(16)**

Q5 Draw decision tree for following machines **(16)**

I. Any one machine tool Pump
II. Air compressor
III. Internal combustion engine
IV. Boiler
V. Electrical motors.

Q6 Steps for periodic and preventive maintenance of: **(16)**

I. Machine tools
II. Pumps
III. Air compressors
IV. Diesel generating (DG) sets.

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

Course: B. Tech
Sub Code: RIT7D001

7th Semester Regular/Back Examination: 2022-23
SUBJECT: Internet of Things
BRANCH(S): AEIE,AERO,AUTO,BIOMED,BIOTECH
Time : 3 Hour
Max Marks : 100
Q.Code : L099

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) Why do IoT systems have to be self-adapting and self-configuring?
b) What are the differences between machines in M2M and things in IoT?
c) What are the architectural constraints of REST?
d) Differentiate between physical entity and virtual entity in IoT system.
e) Differentiate between 6LOWPAN and IEEE 802.15.4-LR WPAN.
f) What is big-data and why we are using big-data in IOT?
g) What is "things" in IoT? Explain with examples.
h) State and explain in brief the network layer protocols.
i) Why is python one of the suitable languages from an IoT perspective?
j) Give operational view specifications of services for home automation IoT system.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Discuss the following capabilities in an IoT data platform. - Connectivity - Actionable data - Device management.
b) What is IoT middleware? Explain MTC/M2M middleware with a neat sketch diagram.
c) Discuss about agility in IOT.
d) What is Industry 4.0? What are the main characteristics? Discuss various challenges and solutions of Industry 4.0.
e) What is 5-any in the context of device intelligence? What is the role of device intelligence in order to make IoT a reality? Explain.
f) Draw the block diagram of the RFID reader and explain its operation.
g) Draw the typical architecture of a sensor node and explain all its components.
h) Explain the hadoop file structure.
i) Explain the following terms in the context of the identification of IoT objects and services. - Object IDs - Radio-frequency identification - Uniform resource identifier.
j) What is 5-any in the context of device intelligence? What is the role of device intelligence in order to make IoT a reality? Explain.
k) Explain HTTPS protocol.
l) Explain modified OSI model for IOT system.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	What are the different layers of IoT protocols? Explain functions of all the layers?	**(16)**
Q4	What are the different communication models of IoT? Explain publish-subscribe communication model &request-response communication model?	**(16)**
Q5	Compare and contrast between M2M and IoT with respect to different technologies, system architectures, and types of applications used in both the cases.	**(16)**
Q6	Explain how weather monitoring IoT system work. Also, provide a suitable diagram for controller service and deployment design in this case.	**(16)**

Registration No :

Total Number of Pages : 02

Course: BTech
Sub Code: REI7D003

7th Semester Regular/Back Examination: 2022-23
SUBJECT : Mechatronics
BRANCH(S): ECE, EEE, ELECTRICAL, ETC
Time : 3 Hour
Max Marks : 100
Q.Code : L160

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) Define Mechatronics. Enlist Key elements of a Mechatronics system.
b) Draw the schematic block diagram of a typical control architecture using mechatronics.
c) Define discrete signal? Distinguish between analog and discrete signal.
d) Subtract 17 from 8 using 1's complement method of subtraction.
e) Convert decimal number 81 into equivalent binary and hexadecimal number.
f) Enlist the applications of Z-Transform.
g) What do you mean by a 'filter'. For what purpose is it used?
h) Distinguish between serial and parallel data transfer.
i) What is the differences between the microprocessor and microcontroller?
j) What are the instructions of 8085 instruction set for data transfer from memory to the microprocessor?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) Distinguish between Distributed Control Systems and Centralised Control Systems.
b) Find the inverse Z-transform, of the following.

$$X(z) = \frac{2z}{z^2 - 0.7z + 0.1}$$

c) Find out the Laplace Transform of the following functions. (i) Unit step function (ii) Ramp function.
d) Distinguish between conductors, semiconductors and insulators.
e) Plot the following time domain signal in the frequency domain.

$$v(t) = A_1 \sin 2\pi f_1 t + A_2 \sin 2\pi f_2 t + A_3 \sin 2\pi f_3 t$$

Assume $A_1 > A_2 > A_3$ and $f_1 < f_2 < f_3$

f) Realize AND, OR gates using NAND and NOR.
g) Distinguish between drift and diffusion. Explain the formation of depletion layer in a p-n junction.

h) What are the notable features of a pneumatic actuator?

i) Explain the principle of operation of Hall-effect transducers using neat sketches.

j) What do you mean by subroutines and nested subroutines? What is their use?

k) What is photoelectric effect? Discuss the transduction principle in photoemissive, photoconductive and photovoltaic transducers.

l) Describe the working principle of piezoelectric pressure sensor.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** Find the Fourier Transform of the gate function and plot its amplitude of spectral density. **(8x2)**

b) Draw the CB input characteristics of a p-n-p transistor. What is early effect? How can it account for the CB input characteristics?

Q4 **a)** Simplify the following expressions and draw the logic circuits using basic gates. **(8x2)**

(i) $AB + \bar{A}C + A\bar{B}C(AB + C)$

(ii) $AB\bar{C}\bar{D} + AB\bar{C}D + ABC\bar{D} + ABCD$

b) With a neat diagram explain the operation of RS flip-flop. Write its characteristic table.

Q5 **a)** What are the application of bimetallic strip? Discuss their types and principle of operation respectively. **(8x2)**

b) Explain the components of the PLC with suitable block diagram.

Q6 **a)** What is a thermistor? Write down the relationship between resistance and temperature for the thermistors. Draw the temperature resistance curve. **(8x2)**

b) Discuss the architecture of Intel's 8085 microprocessor in detail with neat sketch.

Registration No :

Total Number of Pages : 02

Course: BTech
Sub Code: REI6D001

7th Semester Regular/Back Examination: 2022-23
SUBJECT : Micro Electronic Mechanical Systems
BRANCH(S): MECH
Time : 3 Hour
Max Marks : 100
Q.Code : L057

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions** : (2 x 10)

a) Define machining and micromachining processes
b) Briefly discuss about the process of photolithography
c) What do you mean by a wafer? What kind of material is commonly used for wafer?
d) Distinguish between wet etching and dry etching.
e) What are the advantages of sputtering based thin film deposition?
f) Briefly describe the anisotropic etching and isotropic etching in the wet etching process
g) What is the elastic potential energy of the spring when a 20 millinewtons force is required to stretch a spring to a distance of 40 micrometer?
h) What is a phase shifter? Mention the applications of phase shifters
i) Briefly explain the working of the piezoresistive pressure sensor
j) How do polymers are used in the area of microsystem design?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 x 8)

a) What is RF-MEMS? Enlist some application of RF MEMS
b) Discuss about the various types of the sensors in MEMS
c) What is the role of spin-coating and how is it performed?
d) What do you understand from microfluidic system? Enlist important building blocks of microfluidic systems.
e) Find out the desired viscosity to density ratio of a photoresist solution to be prepared for the spin coating by using a vacuum chunk. The allowed time of rotation of the chunk within a production process is 2 minutes and the desired height of photoresist is 75 microns. The rotor rotates at 8,000 rpm. Assume that the original height is 500 microns.
f) Discuss the process of Evaporation and Sputtering with suitable diagrams.
g) How many basic elements exist in case of a thermal system? Define thermal capacitance and thermal resistance.
h) What do you understand by macrofluidics and microfluidics?

i) Briefly describe the working principle and types MEMS resonator using neat sketches.

j) What do you mean by impurity doping? Give an example with respect to semiconductor device.

k) How does an MEMS gyroscope work? Define coriolis force and coriolis acceleration.

l) What is CVD? Explain the different parameters that influence CVD.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 (a) Discuss the following lithography methods. (a) X-ray lithography (b) E-beam lithography **(8x2)**

(b) Discuss in detail the need of the actuators and the type of the actuators typically used for the active optical MEMS applications using suitable diagrams.

Q4 (a) Discuss in detail about the PECVD technique for thin film deposition with neat schematic diagram. **(8x2)**

(b) What is the role of a photomask in a typical photolithography process? How are photomasks prepared?

Q5 (a) Describe the Young's modulus (E), Bulk modulus (K), Shear modulus (G) and Poisson's ratio and discuss about their relationship. **(8x2)**

(b) Explain in detail about the basic modeling elements of a mechanical elements with necessary equations and diagrams.

Q6 Write short answer on following: **(8x2)**

(a) LIGA.

(b) MEMS micromirror.

Registration No : | | | | | | | | | | |

Total Number of Pages : 02

Course: B.Tech
Sub Code: REC7D007

7th Semester Regular/Back Examination: 2022-23
SUBJECT: Radar and TV Engineering
BRANCH(S): ECE/ETC
Time : 3 Hour
Max Marks : 100
Q.Code : L074

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** (2 x 10)

a) What are the parameters that can be changed to enhance the ranging capability of pulsed radar?
b) What type of CW radar can measure both range and velocity of a moving target?
c) What is glint in radar terminology?
d) What do you mean by probability of false alarm and missed detection?
e) Why interlaced scanning is used in Television system?
f) What do you mean by R-Y, B-Y and Y signal?
g) What is colour circle diagram?
h) What is digital terrestrial TV?
i) What is the advantage of digital format of video signal?
j) Which type of modulation schemes are used for Terrestrial Digital TV?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) What is scanning? Why interlaced scanning is used in television stem?
b) With neat diagram explain the working of a TV transmitter.
c) Enumerate the performance characteristics of a TV camera pick-up device.
d) With block diagram differentiate between Duplexer and Diplexer.
e) How MTI radar detects the direction of radial velocity of a target?
f) Why simply radar range equations do not adequately predict the range performance of actual radar?
g) Why CW radar cannot measure range? What modifications are made to do so and how?
h) Explain the principle of LORAN.
i) Explain any two digitization formats if one wants to digitize an analog signal of bandwidth F_{max}.
j) Write down principle of JPEG decoding.
k) Make a general discussion on the modulation of a carrier by digital signals.
l) Explain briefly different video display technologies.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Draw the block diagram of side band super heterodyne CW radar. Why the super heterodyne principle adopted here? Does such radar suffer from blind speeds? Describe a scheme to determine the sign of the radial velocity of the target for this radar if IF filter bank is not used? **(16)**

Q4 With neat sketch explain different blocks of a monochrome TV receiver operating in CCIR-B standard. **(16)**

Q5 With neat sketch explain the different signals of Composite Colour Video Signal (CCVS). **(16)**

Q6 Draw and explain the simplified view of the complete DVB transmission/reception chain. **(16)**

Registration No : | | | | | | | | | | |

Total Number of Pages : 04

Course: BTech
Sub Code: RME7D005

7th Semester Regular/Back Examination: 2022-23
SUBJECT: Refrigeration and Air Conditioning
BRANCH(S): AG, MECH
Time : 3 Hour
Max Marks : 100
Q.Code : L081

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** **(2 x 10)**

a) State elements of refrigeration system.
b) State merits and demerits of air refrigeration system.
c) Draw p-v and T-s plot for Bell-Coleman cycle.
d) What are the advantages of compound compression with intercooler over single stage compression?
e) Define the terms "volumetric efficiency" and "clearance volumetric efficiency".
f) State the functions of the following components in an absorption system:
   i) Absorber
   ii) Rectifier
g) What do you mean by by-pass factor for cooling coils?
h) What are the desirable properties of an ideal refrigerant?
i) Define sensible heat factor.
j) Explain the difference between winter air conditioning and summer air conditioning.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) An air refrigeration system operating on Bell-Coleman cycle, takes in air from cold room at -6^0C and compresses it from 1.04 bar to 6.2 bar. The index of compression being 1.28. The compressed air is cooled to 25^0C. The ambient temperature is 18^0C. Air expands in the expander where index of expansion is 1.38. Determine:
   i) C.O.P of the system
   ii) Quantity of air circulated per minute for production of 1500 kg of ice per day at 0^0C from water at 18^0C
   iii) Capacity of the plant
   Take c_{pw} = 4.18 kJ/kg.K (for water): c_{pa} = 1.005 kJ/kg-K and latent heat for ice = 335 kJ/kg.

b) A Bell-Coleman refrigerator operates between pressure limits of 1 bar and 8 bar. Air is drawn from the cold chamber at 90^0C, Compressed and then it is cooled to 290^0C before entering the expansion cylinder. Expansion and compression follows the law $PV^{1.35}$ = constant. Calculate the theoretical COP of the system. For air take $\gamma = 1.4$, $C_p = 1.003$ kJ/kg.K.

c) Describe multistage compression system with inter-cooling with neat sketch and T-s, h-s diagrams.

d) A single compressor using R-12 as refrigerant has three evaporators of capacity 10 TR, 20 TR and 30 TR. All the evaporators operate at -10^0C and the vapors leaving the evapoartors are dry and saturated. The condenser temperature is 40^0C. The liquid refrigerant leaving the condenser is subcooled to 30^0C. Assuming isentropic compression, find

i) The mass of refrigerant flowing through each evaporator;
ii) The power required to drive the compressor; and
iii) The C.O.P of the system.

e) The operating conditions for a water-lithium bromide chilled-water plant for air conditioning are as follows:

Generator temperature: 97^0C
Condenser temperature: 40^0C
Chilled water temperature: 10^0C
Absorber temperature: 40^0C

Find the temperature of the solution entering generator assuming hot solution is cooled to the saturation temperature at absorber pressure. Determine for one ton refrigeration capacity, the following:

(i) The thermodynamic conditions at all points
(ii) Coefficients of performance.

f) Explain with neat sketch, the working of Thermoelectric Refrigeration. Define figure of merit.

g) Explain the following:

i) absolute humidity
ii) relative humidity
iii) degree of saturation

h) Prove that relative humidity, ϕ is given by

$$\phi = \frac{\mu}{1 - (1 - \mu)\left(\frac{p_{vs}}{p_t}\right)}$$

Where, μ = Degree of saturation,

p_{vs} = Saturation pressure of vapor in moist air, and

p_t = Total pressure of moist air.

i) What is the difference between "wet bulb temperature" and "thermodynamic wet bulb temperature"?

j) Explain the difference between comfort air-conditioning and industrial air-conditioning.

k) The humidity ratio of atmospheric air at 28^{0}C DBT and 760 mm of mercury is 0.016 kg/kg of dry air. Determine

1. Partial pressure of water vapor
2. Relative humidity
3. Dew point temperature
4. Specific enthalpy
5. Vapor density

l) In an air conditioning system, the inside and outside conditions are dry bulb temperature 25°C, relative humidity 50% and dry bulb temperature 40°C, wet bulb temperature 27 °C respectively. The room sensible heat factor is 0.8. 50% of the room air is rejected to atmosphere and an equal quantity of fresh air added before air enters the air conditioning apparatus. If the fresh air added is 100 m^3/min, determine;

a) Room sensible and latent heat load
b) Sensible and latent heat load due to fresh air
c) Apparatus dew point
d) Humidity ratio and dry bulb temperature of air entering air conditioning apparatus

Assume by-pass factor as zero, density of air as 1.2 kg/m^3 at a total pressure of 1.01325 bar.

Part-III
Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) The atmosphere air at pressure 1 bar and temperature -5°C is drawn in the cylinder of the compressor of a bell-coleman refrigerating machine. It is compressed isentropically to a pressure of 5bar. In the cooler, the compressed air is cooled to 15°C, pressure remaining the same. It is then expanded to a pressure of 1 bar in an expansion cylinder, from where it is passed to the cold chamber. Find: 1. The work done per kg of air, and 2. C.O.P of the plant. For air assume law of expansion, $pv^{1.2}$=constant; law for compression, $pv^{1.4}$=constant and specific heat of air at constant pressure=1KJ/kgK. **(10)**

b) Explain the working of aircraft cooling system (any one type) with schematic and T-s diagram **(6)**

Q4 a) State the advantages and disadvantages of Electrolux refrigerator over conventional refrigerators. **(8)**

b) Explain the working of Thermostatic Expansion valve with neat sketch. Write its advantages and disadvantages **(8)**

Registration No:

Total Number of Pages : 01

Course: B.Tech
Sub Code: REL7D003

7th Semester Regular/Back Examination 2022-23
SUBJECT: SMART GRID
BRANCH: CSE/EEE/EE/IT
Max Marks: 100
Time : 3 Hours
Q.CODE : L077

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 **Only Short Answer Type Questions (Answer All-10)** **(2 x 10)**

a) Why is it called a Smart Grid?
b) State two features of a Smart Meter.
c) What is an IED?
d) What is a PMU?
e) Name two storage systems used in Smart Grid.
f) What are the advantages of using a micro turbine?
g) Briefly explain demand response.
h) State the importance of IP v6 in Smart Grid.
i) What is V_2G and G_2V?
j) What is the necessity of a power quality audit?

Part- II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Distinguish between conventional grid and smart grid.
b) Explain power quality issues of grid connected renewable energy resources.
c) Write short note on wind energy conversion system with suitable block diagram.
d) Write a note on protection and control of micro-grid.
e) Explain details about feeder automation in smart grid.
f) Explain the WAMS component used in smart grid communication.
g) Write the various opportunities and changes of smart grid.
h) What are the functions of intelligent electronic devices as smart grid components?
i) Explain web based power quality monitoring system.
j) What is GIS and explain its components?
k) Explain the different storage system used in smart grid in details.
l) Write a short note on smart home management system.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Write the various components of smart grid and its function details with block diagram. **(16)**

Q4 Explain concept of Micro-grid and issues related with utility grid. What is DG and write the advantages and disadvantage of distribution generation. **(16)**

Q5 Explain the importance of power quality in smart grid and issues related to integration of renewable energy to main grid. **(16)**

Q6 Describe the driving elements of substation automation and functions of substation automation system. Explain about features of smart meters. **(16)**

Registration No :

Total Number of Pages : 02

Course: B.Tech
Sub Code: RCS7D007

7th Semester Regular/Back Examination: 2022-23
SUBJECT : Soft Computing
BRANCH(S): B. Tech
Time : 3 Hour
Max Marks : 100
Q.Code : L015

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) How does soft computing differ from hard computing?

b) State the laws of crisp logic which are violated by fuzzy logic?

c) Define Cartesian product of two fuzzy sets with an example.

d) State the drawbacks of single layer perceptron. Name a problem which cannot be solved by the above neural model.

e) What are GMP and GMT?

f) What do you understand by 'Annealing Schedule' in simulated annealing?

g) Name the different crossover operators used in GA.

h) Differentiate between derivative based and derivative free optimization?

i) Mention the principle of adaptive resonance theory.

j) List different selection mechanisms in GA.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 × 8)**

a) Consider two fuzzy set A= {1/2, 0.3/4, 0.5/6, 0.2/8} B= {0.5/2, 0.4/4, 0.1/6, 0.9/8}
Find the following:
AUB, A∩B, A', B', A'∩B', A'UB'

b) What is ANN? Compare artificial neural network with biological neural network.

c) What is self-organizing map and discuss the algorithm and features of Kohenen's map?

d) With a neat sketch explain the training and testing of recurrent neural network.

e) Define and discuss mathematical extension principle of a fuzzy set?
Let A= {(-1, 0.4) (0, 0.7) (2, 0.8) (3, 0.3)}. Apply the extension principle find B=ψ(A), where $\psi(x)=X^2-2$

f) A neuron with three inputs has the weight vector w= [0.1 0.2 -0, 3]. The activation function is binary sigmoidal. If the input vector is [0.6 0.8 0.4], then find the output of the neuron?

g) Compare and contrast Takagi and Sugeno architectures in Fuzzy control system.

h) A budget airline company operates 3 planes and employs 5 cabin crews. Only one crew can operate on any plane on a single day and each crew cannot work for more than two days in a row. The company uses all planes every day. A genetic algorithm is used to work out the best combination of crews on any particular day,
Suggest i) Chromosome ii) Alphabet iii) fitness function for this problem

i) Suppose a genetic algorithm uses chromosomes of the form x = abcdefgh with a fixed length of eight genes. Each gene can be any digit between 0 and 9. Let the fitness of individual x be calculated as: $f(x) = (a + b) - (c + d) + (e + f) - (g + h)$, and let the initial population consist of four individuals with the following chromosomes:
x1 = 6 5 4 1 3 5 3 2
x2 = 8 7 1 2 6 6 0 1
x3 = 2 3 9 2 1 2 8 5
x4 = 4 1 8 5 2 0 9 4
Evaluate the fitness of each individual, showing all your workings, and arrange them in order with the fittest first and the least fit last.

j) Explain the various phases of GA to control a nonlinear time delay system.

k) How is stability ensured in Fuzzy control system? Analyse with reference to global network computation.

l) Using the linear separability concept, obtain the response for OR function. Take bipolar inputs and bipolar targets.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Enlist and explain properties of Fuzzy sets. What is de-fuzzification? Why is it needed? Explain with example. **(16)**

Q4 What are different types of neural networks based on architecture? Explain the working of back propagation neural network with neat architecture and flow chart. **(16)**

Q5 What do you mean by learning? Distinguish between supervised and unsupervised learning with suitable examples. **(16)**

Q6 What is Genetic algorithm? Explain with flow chart. Describe various operators of Genetic algorithm. **(16)**

Registration No :

Total Number of Pages: 03

Course: B.Tech
Sub Code: RCI7D006

7th Semester Regular/Back Examination: 2022-23
SUBJECT: Water Resource Engineering
BRANCH(S): CIVIL
Time: 3 Hours
Max Marks: 100
Q.Code: L119

Answer Question No.1 (Part-1), which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I (2 x 10)

Q1 Answer the following questions :

a) What type of rainfall data is recorded in the Tipping-bucket and Weighing-bucket type rain gauge?

b) Rainfall of intensity of 25 mm/h occurred over a watershed of 100 ha for an 8hr. The measured direct runoff volume in the stream draining the watershed was 40,000m^3. Calculate the precipitation not available for runoff.

c) A 90 km^2 catchment has a 4-h unit hydrograph which can be approximated as a tringle. Calculate the time base if this unit hydrograph's peak ordinate is 10m^3/s?

d) What is the flow duration curve and flow mass curve?

e) Define basin lag and attenuation of a hydrograph.

f) Classify different types of droughts.

g) Draw velocity profile curve along the depth of open channel flow and pipe flow.

h) A rectangular channel has a bottom width of 5m and a normal depth of 1.0 m. A depth of 0.8m and discharge=20m^3/s in a GVF in this channel is a part of which flow profile.

i) What is the difference between normal flow depth and critical flow depth

j) The Froude number of a flow in a rectangular channel is 0.73. If the depth of flow is 1.50 m, find the specific energy.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 × 8)

a) Describe the commonly used procedures for determining the infiltration characteristics of a plot of land.

b) The mass curve of an isolated storm in a 500ha watershed is as follows:

Time from start (h)	0	2	4	6	8	10	12	14	16	18
Cumulative Rainfall (cm)	0	0.8	2.6	2.8	4.1	7.3	10.8	11.8	12.4	12.6

If the direct runoff produced by the storm is measured at the outlet of the watershed as $0.34Mm^3$, estimate the phi–index of the storm and duration of rainfall excess.

c) With a neat sketch, show the different components of a flood hydrograph and explain all factors that affect the flood hydrograph.

d) What methods are available to estimate evaporation losses from surfaces and large water bodies? Discuss any one approach suitably.

e) In a 300 ha watershed, the CN value was estimated as 70 under the AMC-III condition. Estimate the value of direct runoff volume for the following 5 days of Rainfall. The AMC on 18 May 2000 was of category III. Use standard SCS-CN equations.

Date	18 May	19 May	20 May	21 May	22 May
Rainfall (mm)	38	21	22	10	30

f) What is the return period, and what is its significance of it?
A one-day rainfall of 20.0 cm at place X was found to have a period of 100 years. Calculate the probability that a one-day rainfall of magnitude equal to or larger than 20.0 cm:
(i) It will not occur at station X during the next 50 years.
(ii) It will happen in the next year.

g) Briefly Explain IUH and synthetic unit hydrograph.

h) Explain different types of droughts.

i) If y_1 and y_2 are alternate depths in a rectangular channel, show that

$$y_c^3 = \frac{2y_1^2y_2^2}{(y_1 + y_2)}$$

and hence the specific energy,

$$E = \frac{y_1^2 + y_1y_2 + y_2^2}{(y_1 + y_2)}$$

j) A 3.6-m wide rectangular channel of bed slope 0.0005 had badly damaged surfaces and had Manning's n = 0.030. As a first repair phase, its bed was lined with concrete (n = 0.015). If the flow depth remains the same at 1.2m before and after the repair, what is the increase in discharge obtained due to the repair?

k) Determine the dimensions of a concrete-lined (n = 0.012) trapezoidal channel of efficient proportions to carry a discharge of 12.5 m^3/s. The bed slope of the channel is 0.0005 and side slope = 3:4.

l) Describe the Gradually varied flow (GVF) profile classifications with neat sketches.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** Observed values of inflow and outflow hydrographs at the end of a reach of a river are given below. Determine the best deals of K and x for use in the Muskingum flood routing method. **(10)**

Time (h)	0	6	12	18	24	30	36	42	48	54	60	66
Inflow (m^3/s)	20	80	210	240	215	170	130	90	60	40	28	16
Outflow (m^3/s)	20	20	50	150	200	210	185	155	120	85	55	23

b) Describe the Sequent Peak Procedure of reservoir storage estimation. **(6)**

Q4 **a)** The following Table shows the Gumbel method's estimated flood peaks and corresponding return periods. **(10)**

Peak flood (m^3/s)	Return period (Years)
35,500	60
51,250	120

Find out the amount of peak flood corresponding to a 500-year return period.

b) Distinguish between (i) Field capacity and permanent wilting point and (ii) recording and non-recording rain gauge. **(6)**

Q5 **a)** The following are the ordinates of the hydrograph of flow from a catchment area of 800 km^2 due to a 6-h rainfall. Derive the ordinates of the 6-h unit hydrograph. Make suitable assumptions regarding the base flow. **(10)**

Time (h)	0	6	12	18	24	30	36	42	48	54	60	66	72
Discharge (m^3/s)	40	65	215	360	400	350	270	205	145	100	70	50	42

b) With neat sketches describe different methods of water harvesting **(6)**

Q6 **a)** In a 4.0-m wide rectangular channel (n = 0.017), the bed slope is 0.0006. When the channel is conveying 10.0 m^3/s of flow, estimate the nature of GVF profiles at two far away sections, P and R, in this channel where the depth of flow is measured as 1.6 m and 2.1 m, respectively. **(8)**

b) At the bottom of a spillway the velocity and depth of flow are 18.0 m/s and 2.5m respectively. Estimate the tail water depth to form the jump. Determine the type and length of the jump formed. **(8)**