(3 Hours) **Total Marks: 80**

N.B: (1) Question No.1 is compulsory and solves ant three questions from remaining questions.
(2) Assume suitable data if necessary.
(3) Draw neat and clean figures.

1.	Answer any four:	
	(a) Explain trade off in Analog design with the help of analog design octagon	5
	(b) For N channel MOSFET draw i) small signal model ii)small signal model with channel length modulation iii)small signal model with body effect	5
	(c) Explain importance of Miller theorem	5
	(d) Explain input output characteristic of Phase detector circuit	5
	(e) Compared performance of op-amp topologies	5
2.	(a) Derive voltage gain of diode connected load CS amplifier	10
	(b) Derive equation of differential gain, common mode gain, CMRR of differential amplifier	10
3.	(a) Explain in detail how to generate temperature independent reference	10
	(b) Explain concept of switched capacitor circuit and explain switched capacitor amplifier in detail.	10
4	(a) Design an amplifier that meet the following specification with a phase margin of 60.assume the channel length is to be 1µm Av>5000v/v ,Vdd=2.5 ,Vss= -2.5v ,GB=5MHz , CL=10pf , SR>10v/µsec, Vout range=+/- 2V, ICMR= -1 to 2V, Pdiss≤ 2mw.	20
5	(a) List down the performance parameter of VCO and explain trade off between them	10
	(b) Give comparison of full custom design and semi custom design	10
6	Write short notes(any three) (a) White and flicker noise in MOSFET (b) AMS design flow (c) Clock feed through in MOSFET (d) Band gap reference	20

****

(3 hours) Total Marks: 80

N.B. 1. Question **No. 1** is compulsory

2. Attempt any **three** questions from remaining five questions

3. Assume suitable data if **necessary** and justify the assumptions

4. Figures to the **right** indicate full marks

Q.1 Attempt any **four** from the following questions

A Explain different image file formats. 05

B Explain image Sampling and Quantization process in brief. 05

C With the help of example explain skeletonization. 05

D List and explain different type of data redundancies in digital image. 05

E State the properties of Discrete Cosine Transform 05

Q.2 A Given below 3×3 image. Operate on the 3×3 pixels by low pass and high pass masks and obtain output. 10

15	4	10
12	13	10
3	10	8

B With the help of block diagram explain JPEG encoder and decoder. 10

Q.3 A Perform histogram equalization and plot the histogram before and after equalization. 10

4	7	5	4	1
2	1	5	3	0
4	2	7	0	7
1	5	4	0	6
6	4	3	0	7

B Explain in detail image smoothing using Gaussian low pass filter. 10

Q.4 A Chain codes can be made invariant to translation. Justify. 10

B Explain region filling with the help of example. 10

Q.5 A Explain Dilation and Erosion with the help of an example. 10

B Why Laplacian is not generally used in its original form as an edge detector. Also derive the expression for Laplacian of Gaussian (LoG). 10

Q.6 A For the following 4X4 image determine its forward transform (Use 2D-DFT) 10

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

B Write a note on 4-adjacency, 8-adjacency, m-adjacency. 10

Duration: 3hrs **[Max Marks:80]**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

Q.1		**Answer any four questions**	**20**
	i.	Draw and explain IoT Level 5.	
	ii.	What are the technological issues in RFID IoT system design	
	iii.	Differentiate between MQTT and HTTP Protocol.	
	iv	What are the Features of constrained environment for IoT/M2M?	
	v	Justify the statement with suitable example "IoT systems have to be self - adapting and self configuring"	
Q2	A	Explain the first four steps of IoT Design Methodology with a suitable example.	10
	B	Explain data acquiring and storage process of data handling in IoT.	10
Q3	A	Describe REST based Communication API. What are architectural constraints of REST.	10
	B	Explain NB-IoT and LoRaWAN .	10
Q4	A	Examine and discuss the use of GPIO pins and what is the use of SPI and I2C interfaces on Raspberry Pi.	10
	B	Draw the process diagram, domain model and services for any home automation system.	10
Q5	A	Explain the ACID Rules and CAP Theorem.	10
	B	Explain how the following electrical parameters are used as a part of sensing Technology: a) Capacitance and b) reverse saturation current of PN Junction	10
Q6		Write Short Notes on	20
	A	CoAP Protocol.	
	B	Features in Xively cloud platform.	
	C	Compare IPv4 and IPv6	
	D	Cloud deployment models.	

****

(3 Hours) **[Total Marks: 80]**

N.B: 1. Q. l is compulsory.
2. Attempt any three out of remaining questions.
3. Assume suitable data wherever required and justify the same

Q.1 Attempt **any four** **20 M**

a) What is MEMS? What is significant difference between Microelectronics and Microsystem?

b) Explain "silicon as a substrate material" for MEMS devices.

c) State different actuation mechanisms and explain any one.

d) List the different techniques of Die protection of Pressure Sensor from Environmental Effects and explain any one in detail.

e) Define TCR & Stiffness and explain its significance with respect to MEMS.

Q.2 **a)** What do you understand by a clean room? Explain the steps with the help of flowchart in a standard RCA cycle during wafer cleaning. 10 M

b) Discuss the selection of material based on applications. Support your answer by considering suitable example. 10 M

Q.3 **a**) With the help of schematic diagrams explain the operation of linear and rotary Micro motor 10 M

b) What is MEMS micromachining? Explain with the help of block diagram fabrication process flow of LlGA. Why electroplating is necessary in LlGA process? 10 M

Q.4 a) Draw and explain working principle of Cantilever. Show basic quantitative behavior of Cantilever. Also discuss process steps for fabrication of cantilever using surface micromachining. 10 M

b) Explain working principle of DMD with diagram. Draw and explain the step by step fabrication process of DMD. 10 M

Q.5 a) What do you mean by wafer bonding? Explain with neat diagram any four wafer bonding techniques in detail. 10 M

b) Define reliability. Draw and explain bath-tub-curve, describing MEMS device reliability. 10M

Q.6 Write Short note on 20 M

a) MEMS packaging & its challenges.

b) Sensors in Biomedical Applications

c) DRIE etch stop technique.

d) MEMS micro accelerometer

(3 Hours) **(80 marks)**

N.B.: (1) Q. No. 1 is compulsory
(2) Answer any THREE questions from the remaining questions.
(3) Figures to the right indicate full marks.
(4) Illustrate answers with neat sketches where ever required.

1. Write short note on. **(Any Four)** 20
   (a) Triple constraints
   (b) Work Breakdown structure (WBS)
   (c) Scope creep
   (d) GANTT chart
   (e) Goldratt's critical chain
   (f) Lessons learned analysis

2. (a) Describe PM knowledge areas as per Project Management Institute (PMI) in brief. 10
   (b) Explain process for Project portfolio and Project Charter. 10

3. (a) The time estimates in weeks for the activities of a PERT network are given in Table below: 10

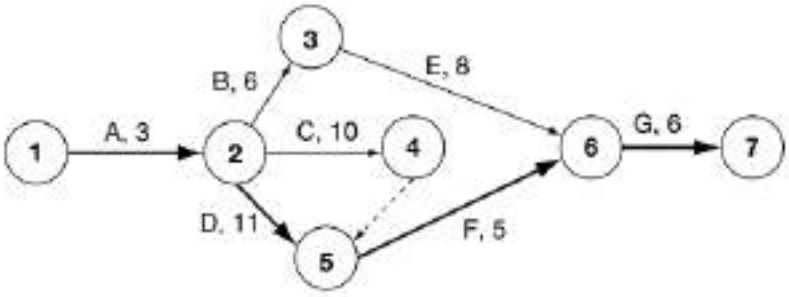
Activity	Optimistic time (to)	Most likely time (tm)	Pessimistic time (tp)
A-B	1	1	7
A-C	2	5	8
A-D	2	2	8
C-E	3	6	15
D-E	1	4	7
E-F	2	5	14
B-F	2	5	8

(i) Draw the network diagram.
(ii) Calculate the earliest start (ES) and latest start (LS) for all the activities.
(iii) Determine the project completion time.
(iv) Calculate the standard deviation and variance of the project.

   (b) Explicate the Top down and bottoms up budgeting approach for a large project. 10

4. (a) Tabulate with example, the Risk response strategies for positive and negative risks in project management. 10

   (b) The total normal direct cost of a project is Rs 450 and its indirect cost is Rs 400. By crashing the activities, the indirect cost decreases by Rs 50 per day. The normal and crash costs with time are given in Table and the network diagram in Figure given below. Find the optimum project duration. 10



Activity	Normal		Crash	
	Time	Cost	Time	Cost
A	3	50	2	70
B	6	80	4	160
C	10	60	9	90
D	11	50	7	150
E	8	100	6	160
F	5	40	4	70
G	6	70	6	70

5. (a) Explicate Earned Value Management techniques for measuring value of work completed in the concerned project. 10

   (b) How ethics in projects are looked upon for successful government's project completion? Illustrate with suitable example. 10

6. (a) What are the four stages for team development and growth? Enlist the barriers for effective team management. 10

   (b) Discuss the reasons of project termination. Describe Process of project termination. 10
