



Indian Institute of Information Technology Ranchi

Department of Humanities/Management/Social Sciences

B.Tech End Semester Examination - Autumn Semester 2021/22

Semester: 8th

Course Instructor: DR. SHAHID SHAHAB HASSAN

Course Code: HN3001

Course Name: ENTREPRENEURSHIP DEVELOPMENT

QUESTION PAPER

Duration: 3 hrs.

Max Marks: 100

Instructions:

- (1) Please read the questions carefully and answer each component of the question
- (2) Number in [] indicates marks.
- (3) Please read the questions carefully before attempting them and think before you write.

NOTE: Plagiarism from peers will attract a score zero.

Answer ALL the questions.

1	What is a Business Plan? Also, explain why it is important for entrepreneurs and briefly mention the key contents of Business Plan.	[20]
2	What is Entrepreneurship? Briefly explain the roles of entrepreneurs. Also, explain the classification of entrepreneurs by Clarence Danhof.	[20]
3	Define the following forms of Business Organization. Also mention their MERITS and LIMITATIONS: a) Sole Proprietorship b) Partnership	[20]
4	Elucidate the important responsibilities of an entrepreneur. Briefly explain ANY FIVE characteristics of an entrepreneur.	[20]
5	Elaborate the following barriers to entrepreneurship: i) Fear of failure ii) Human Resource Problem iii) Managing Finances iv) Psychological Pressure v) Limited Technical Skills	[20]

Indian Institute of Information Technology Ranchi

Department of Electronics & Communication Engineering

B. Tech End Semester Examination – Autumn Semester 2022-23

Semester: 5th

Course Instructor: Dr. Puja Ghosh

Course Code: EC 3003

Course Name: Microelectronics Circuits

QUESTION PAPER

Duration: 3 hrs.

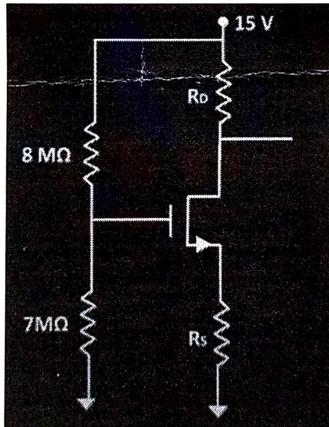
Max Marks: 100

Instructions:

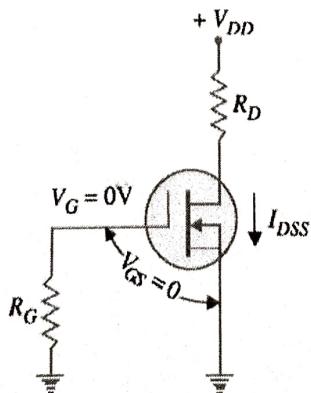
- (1). Number in [] indicates marks.
- (2). Any missing data can be assumed suitably.
- (3). Symbols have their usual meaning.

Section A: Answer all the questions.

- 1 (a) Describe the effect of Drain Induced Barrier Lowering. [10]
- (b) Compare static power dissipation and dynamic power dissipation in CMOS circuits? [10]
- 2 (a) For the given amplifier, the MOSFET is operating in the saturation region. The drain current I_D can be given as $I_D = [(V_{GS} - 1)^2]/2$. If $V_S = 5$ V find the value of R_s to keep the MOSFET in saturation.



- (b) Determine V_{DS} for the MOSFET shown in the figure with $V_{DD} = 18V$, $R_D = 620 \Omega$, [5] $V_{GS(\text{off})} = -8V$ and $I_{DSS} = 12\text{mA}$.

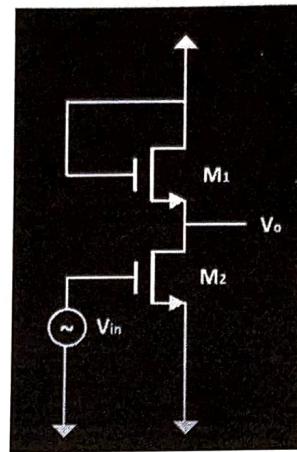


[5]

(c) What is the different scaling techniques in MOSFET?

3 (a) Discuss cascode amplifier with proper diagram. [10]

(b) Draw the small signal model of the given amplifier circuit. [10]



Section B: Answer any **two** questions

4 (a) Discuss switching power using appropriate diagram? [10]

(b) Design CMOS Logic Circuit for the Boolean expression. [10]

$$Y = \overline{\overline{A} + \overline{B}} \cdot C$$

5 (a) Derive the expression of gain of differential amplifier using small signal model. [10]

(b) Discuss the working principle of MOSFET with proper structural diagram. [10]

6 (a) Explain short circuit power? [5]

(b) Compare BJT and MOSFET. [5]

(c) Explain the working of current mirror circuit. [10]

End

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY RANCHI

Semester: Autumn, Session: 2022-23

End Semester Examination: B. Tech. (ECE) V Semester

Course code: EC- 3001

Course Title: Digital Communication

Duration: 3 Hours

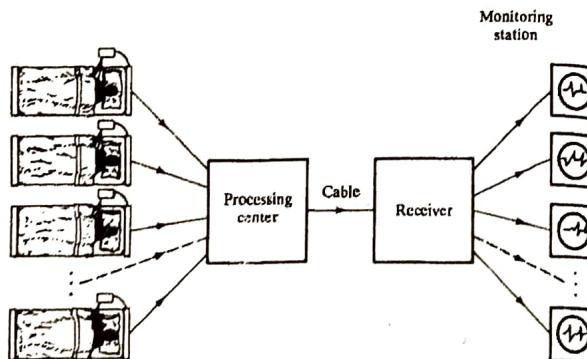
Max Marks: 100

Important Instructions:

- **Section-1 is compulsory. Attempt any four questions from section-2.**
- **Associated marks of questions are mentioned within square brackets i.e. [].**
- **Write all parts of one question at one place only.**

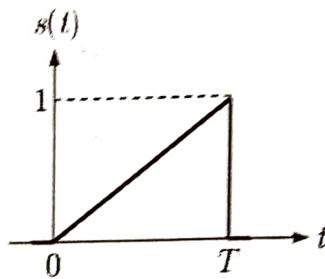
Section-1

1. (a) Amplitude of a signal $m(t)$ is in the range -1 V to 1 V. The maximum frequency in the signal is 4 kHz. It is transmitted using 8-bit/sample PCM. The same signal is transmitted using differential PCM (DPCM) where error signal $d(t)$ ranges from -0.1 V to 0.1 V. In DPCM step size Δv is allowed to be within 25% of that in PCM. Calculate (i) The transmission bit rate in PCM and DPCM. (ii) Bit rate compression ratio. [6]
- (b) Differentiate intersymbol interference (ISI) and noise. Describe the eye pattern for evaluating the effects of ISI in an insightful manner. [6]
2. (a) The amplitude of a random signal is uniformly distributed between -5V and 5V. (i) If the signal to quantization noise ratio required in uniformly quantizing the signals is 43.5dB, calculate the approximate step size of the quantization. (ii) If the positive values of the signal are uniformly quantized with a step size of 0.05 V, and the negative values are uniformly quantized with a step size of 0.1V, calculate the resulting signal to quantization noise ratio. [6]
- (b) It is desired to set up a central station for simultaneous monitoring of the electrocardiograms (ECGs) of 10 hospital patients. The data from the 10 patients are brought to a processing center over wires and are sampled, quantized, binary-coded, and time-division-multiplexed. The multiplexed data are now transmitted to the monitoring station shown in figure. The ECG signal bandwidth is 100 Hz. The maximum acceptable error in sample amplitudes is 0.25% of the peak signal amplitude. The sampling rate must be at least twice the Nyquist rate. Determine the minimum cable bandwidth needed to transmit these data. [6]



3. (a) Consider a PAM wave transmitted through a channel with white Gaussian noise. Plot the following: [6]
(i) Spectrum of sampled signal (ii) Spectrum of LPF (iii) Transmitted spectrum
(iv) Spectrum after receiver filtering (v) Equalizer spectrum.
- (b) Plot the constellation diagram for: (i) binary ASK (ii) binary PSK (iii) 4-ASK (iv) QPSK [6]
(v) 8-PSK (vi) 16- PSK

4. (a) Consider a delta modulated system where δ is the step size and T_s is the sampling period. [6] Prove that assuming a load of 1 ohm the maximum power that may be transmitted without slope overload distortion is $\delta^2/8\pi^2 f_m^2 T_s^2$.
- (b) Twelve delta modulated (DM) signals are to be transmitted using TDM. Each DM signal has a data rate of 32kb/s. What is the data rate of the multiplexed signal? What are the corresponding bit and frame periods? (Ignore synchronization data) [6]
5. (a) Explain the relation between information and probability of event with suitable examples. [6] For a communication system with four symbol alphabet {A, B, C, D}, the probabilities of transmitting these symbols, P_A , P_B , P_C and P_D are 0.4, 0.3, 0.2 and 0.1, respectively. Calculate the source entropy of the system.
- (b) Discuss the corrective measures to combat the effect of aliasing. Consider the pulse shape $S(t)$ as shown in figure. Evaluate the impulse response $h(t)$ of the filter matched to this pulse. [6]



Section-2

6. Describe the process to construct a band pass signal from in-phase and quadrature components. Explain the modulation and demodulation of QPSK signal using suitable diagrams. [10]
7. Discuss delta modulation system with two types of quantization error. How DPCM is different from DM? [10]
8. Describe coherent and non-coherent receiver for the detection of FSK Signal. How is binary FSK modulation scheme different from binary PSK? [10]
9. Describe the uniform and non-uniform quantization and prove that signal to noise ratio for sinusoidal modulating signal is $\frac{3}{2} 2^{2n}$, where n denote number of bits per sample. [10]
10. Explain the difference between phase delay and group delay. Derive an expression for impulse response of the matched filter and prove that except for the scaling factor k , it is a time reversed and delayed version of the input signal $g(t)$. [10]



Indian Institute of Information Technology Ranchi

Department of Computer Science & Engineering/Electronics Communication & Engineering

B. Tech End Semester Examination – Autumn Semester 2022-23

Semester: 5th Sem.

Course Instructor: Dr. Nidhi Kushwaha

Course Code: CS-3001

Course Name: Database Management Systems

Duration: 3 hrs.

QUESTION PAPER

Max Marks: 100

Roll No. 35

Instructions:

- (1). Number in [] indicates marks.
- (2). Any missing data can be assumed suitably.
- (3). Symbols have their usual meaning.

Section A: Answer all the questions.

1 (a) Define application and sophisticated users of DBMS. [4]

(b) A clustering index is defined on the fields of which type? Explain with suitable example. [4]

(c) Demonstrate generalization and aggregation using E-R diagram. [4]

(d) Explain the concurrency control protocol which ensures conflict serializability as well as freedom from the cascading rollback. Justify your answer. [8]

2 (a) Identify highest normal form for following Functional Dependencies, Justify the answer: [5]

ABC->DE, E->GH, H->G, G->H, ABCD->EF

(b) Consider the following relation R(A,B,C,D,E) and FD's A->BC, C->A, D->E, F->A, E->D. Is the decomposition of R into R1(A, C, D), R2(B, C, D) AND R3(E,F,D) lossless? [10]

(c) Write short note on DCL. [5]

3 (a) Explain 5NF with the help of suitable example. [3]

(b) Consider the following relation schema: [9]

Sailors(sid: integer, sname: string, rating: integer, age: real),

Boat(bid: integer, bname: string, color: string),

Reserves(sid: integer, bid: integer, day: date).

Write the following queries in SQL as well as in Relational algebra.

(i) Find the average age of the sailor who are eligible for boating for each rating level.

(ii) Find the name of sailors who have reserved both red and a green boat.

(iii) Find the sailor_id of sailors who have reserved a red boat on 28 Nov 2022.

(c) Explain about domain constraints and Integrity constraints in DBMS with example. [4]

- (d) In a relation scheme $R = (A, B, C, D, E, H)$ on which the following functional dependencies hold: $\{A \rightarrow B, BC \rightarrow D, E \rightarrow C, D \rightarrow A\}$, find the candidate keys of R . [4]

Section B: Answer any two questions

- 4 (a) Discuss the importance of B+ tree over B tree. Insert following elements in the B+ tree of order 4. [10]

1,4,7,10,17,21,31,25,19,20

- (b) Consider a simple hash function as "key mod 7" and a sequence of keys as 50, 700, 76, 85, 92, 73, 101. Insert these elements using Linear Probing open addressing technique of hashing. Discuss disadvantages of Linear Probing method. [10]

- 5 (a) Consider the following transactions with data items P and Q initialized to zero: [10]

```
T1: read (P);  
    read (Q);  
    if P = 0 then Q := Q + 1;  
    write (Q);  
T2: read (Q);  
    read (P);  
    if Q = 0 then P := P + 1;  
    write (P);
```

Explain the output when non-serial interleaving of T1 and T2 for concurrent execution will occur.

- (b) Consider the transactions T1, T2, and T3 and the schedules S1 and S2 given below. [10]

T1: r1(X);r1(Z);w1(X);w1(Z)
T2: r2(Y);r2(Z);w2(Z)
T3: r3(Y);r3(X);w3(Y)

S1: r1(X);r3(Y);r3(X);r2(Y);r2(Z);w3(Y);w2(Z);r1(Z);w1(X);w1(Z)

S2: r1(X); r3(Y); r2(Y); r3(X); r1(Z); r2(Z); w3(Y); w1(X); w2(Z); w1(Z)

Analyze which one of the schedules is conflict-serializable? Check using precedence graph whether this schedule is conflict serializable or not? If yes, show its serializability using topological ordering.

- 6 (a) Discuss when a schedule is called as recoverable schedule. Illustrate with the help of suitable example. Also, name different techniques that are used for recovery of a schedule. [10]

- (b) Find canonical cover of following Functional Dependencies: [5]

AB->C,C->AB,B->C,ABC->AC,A->C,AC->B

- (c) What is view? Explain, whether View exists if the table is dropped from the database? [5]

Indian Institute of Information Technology Ranchi

Department of ECE

B. Tech Mid Semester Examination – Autumn Semester 2022-23

Semester: 5th

Branch: ECE

Course Code: EC 3003

Course Name: Microelectronics Circuits

QUESTION PAPER

Duration: 2 hrs.

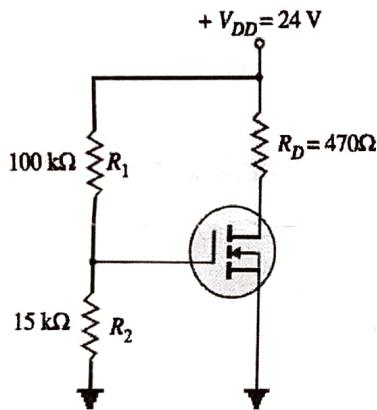
Max Marks: 60

Instructions:

- (1) Answer all the questions. Number in [] indicates marks.
- (2) Scientific calculator is allowed in the examination.
- (3) Any missing data can be assumed suitably.

1 (a) Describe the effect of gate voltage in the working principle of MOSFET. [4]

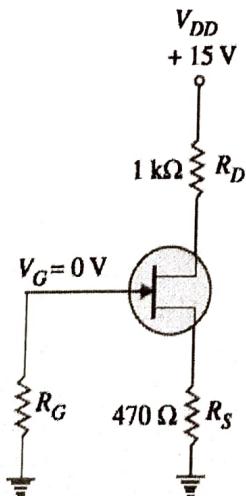
(b) Determine V_{GS} for the MOSFET shown in the figure. [4]



(c) What is the need of scaling in MOSFET? [4]

(d) Discuss the stability of voltage divider biasing with proper diagram. [8]

2 (a) Find V_{DS} for the MOSFET shown in the figure given that $I_D=5\text{mA}$. [5]



- (b) What is channel length modulation effect? [5]
- 3 (a) Derive the drain current expression of MOSFET in saturation region. [10]
- (b) Design a half adder using CMOS logic. [10]
- (c) Discuss the need of biasing by drawing the I_D - V_G characteristics of MOSFET. [10]

End

भारतीय सूचना प्रौद्योगिकी संस्थान राँची

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, RANCHI

Department of Electronics and Communication Engineering

B. Tech END Semester Examination 2022-23

Roll No. 35

Course Code: EC 3005

Course Title: Microwave Engineering

Date: 2.12.2022

Day: Friday

Course Instructor: Dr. Santosh Kumar Mahto

Duration: 3 Hours

Max. Marks: 100

Instructions:

1. Question no. 1 to 3 are compulsory.
2. The figure in the right-hand margin indicates full marks.
3. Missing data, if any, may suitably be assumed.
4. Symbols have their usual meaning.

Section A: Answer all the questions.

1. a. For normal mode EM wave propagation in a hollow rectangular waveguide [2]
- I. The phase velocity is greater than group velocity.
 - II. The phase velocity is greater than velocity of light in free space.
 - III. The phase velocity is less than the velocity of light in free space.
 - IV. The phase velocity may be either greater than or less than group velocity.
- b. A two wire transmission line terminates in a television set. The VSWR measured on the line is 5.8. The reflection coefficient magnitude from the television set is ----- [2]
- c. The magnitudes of the open-circuit and short-circuit input impedances of a transmission line are 50Ω and 50Ω respectively. The characteristic impedance of the line is----- [2]
- d. 1mW in dBm is equal to ----- [2]
- e. TM₀ mode has no cut-off frequency, i.e it can propagate at any arbitrarily small frequency. (True/False) [2]
- f. A transmission line of 50Ω characteristic impedance is terminated with a 100Ω resistance. What is the minimum impedance measured on the line. [3]
- g. The modes in a rectangular waveguide are denoted by TE_{mn}/TM_{mn} where m and n are the Eigen numbers along the larger and smaller dimensions of the waveguide respectively. Which one of the following statements is TRUE? [2]
- i. The TM₁₀ mode of the waveguide does not exist
 - ii. The TE₁₀ mode of the waveguide does not exist
 - iii. The TM₁₀ and the TE₁₀ modes both exist and have the same cut-off frequencies
 - iv. The TM₁₀ and the TM₀₁ modes both exist and have the same cut-off frequencies
- h. What is difference between Transmission line and waveguide? [5]



Indian Institute of Information Technology Ranchi

Department of Humanities/Management/Social Sciences

B.Tech Mid Semester Examination – Autumn Semester 2021-22

Semester: 5th

Course Instructor: DR. SHAHID SHADAB HASSAN

Course Code: HS3001

Course Name: ENTREPRENEURSHIP DEVELOPMENT

QUESTION PAPER

Duration: 2 hrs.

Max Marks: 60

Instructions:

- (1) Number in [] indicates marks.
 - (2) Please read the questions carefully before attempting them and think before you write.
- NOTE:** Plagiarism from peers will attract a score zero.

Answer ALL the questions.

1	(a)	What is Entrepreneurship ? Also, explain the classification of entrepreneurs by Clarence Danhof.	[15]
2	(a)	Elaborate the following barriers to entrepreneurship: i) Managing finances ii) Human Resource iii) Non – strategic planning iv) Lack of practical knowledge v) Fear of failure	[15]
3	(a)	Elucidate the important responsibilities of an entrepreneur.	[15]
4	(a)	Briefly explain ANY FIVE characteristics of an entrepreneur.	[10]
4	(b)	Briefly explain the roles of entrepreneurs.	[5]

भारतीय सूचना प्रौद्योगिकी संस्थान राँची
INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, RANCHI
Jharkhand

Department of Electronics and Communication Engineering
B. Tech MID Semester Examination - Autumn Semester 2022-23

Roll No. 202006EC0358

Course Code: EC3005

Course Title: Microwave Engineering

Date: 28.09.2022

Day: Wednesday

Course Instructor: Dr. Santosh Kumar Mahto

Duration: 2 Hours

Max. Marks: 60

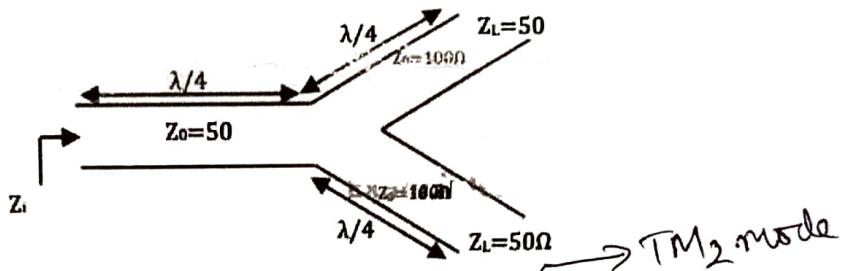
Instructions:

1. Question no. 1 to 3 are compulsory.
2. The figure in the right-hand margin indicates full marks.
3. Missing data, if any, may suitably be assumed.
4. Symbols have their usual meaning.

Answer all the questions.

1. a. For normal mode EM wave propagation in a hollow rectangular waveguide [3]
- I. The phase velocity is greater than group velocity.
 - II. The phase velocity is greater than velocity of light in free space.
 - III. The phase velocity is less than the velocity of light in free space.
 - IV. The phase velocity may be either greater than or less than group velocity.
- b. A two-wire transmission line terminates in a television set. The VSWR measured on the line is 5.8. The percentage of power reflected from the television set is ----- [2]
- c. The magnitudes of the open-circuit and short-circuit input impedances of a transmission line are 50Ω and 50Ω respectively. The characteristic impedance of the line is----- [2]
- d. A line of 300Ω characteristics impedance is terminated in an admittance $0.01+j0.02 \text{ Ohm}^{-1}$. Find [3]
- I. The reflection coefficient at the load end.
 - II. Reflection coefficient at a distance of 0.2λ from the load end.
 - III. Impedance at a distance of 0.2λ from the load end.
- e. The VSWR can have any value between [1]
- I. 0 and 1
 - II. -1 and 1
 - III. 0 and ∞
 - IV. 1 and ∞
- f. A transmission line is distortionless if [1]
- I. $RL = GC$
 - II. $RL = \frac{1}{GC}$
 - III. $LG = RC$
 - IV. $RG = LC$

- g. TM₀ mode has no cut-off frequency, i.e it can propagate at any arbitrarily small frequency. (True/False) [1]
- h. 1mW in dBm is equal to [2]
2. a. What is modal propagation? Determine the cut off frequencies for different TE and TM modes. [3]
- b. What is difference between Transmission line and waveguide? [4]
- c. Derive the electric and magnetic field expression in parallel plane waveguide for transverse electric (TE) mode. [6]
- d. Draw electric field pattern for TE₁ and TE₂ mode. [2]
3. a. An air filled parallel plate waveguide has 10cm height. The maximum electric field measured inside waveguide is 10V. If frequency is 3GHz and wave is excited in TE₁ mode. Find expression for electric and magnetic field inside the waveguide. [6]
- b. Derive the relation between phase velocity and group velocity of the wave. [5]
- c. Explain Transverse Electromagnetic Mode (TEM) does not propagate inside waveguide. [4]
4. a. Derive the mathematical expression for determining input impedance (Z_{in}) at any point from the load end on the lossy and lossless line. [6]
- b. A transmission line terminates in two branches, each of length $\lambda/4$, as shown. The branches are terminated by 50Ω loads. The lines are lossless and have the characteristic impedances shown. Determine the impedance Z_i as seen by the source. [5]



- c. An air filled parallel plane waveguide carries height=20cm. If phase velocity is equal to 1.5 time speed of light. Find the frequency and guided wavelength of the mode. [4]

Indian Institute of Information Technology Ranchi

Department of CSE/ECE

B. Tech Mid Semester Examination – Autumn Semester 2022-23

Semester: 5th

Branch: CSE/ECE

Course Code: CS-3001

Course Name: Database management systems (DBMS)

QUESTION PAPER

Max Marks: 60

Duration: 2 hrs.

Instructions:

(1) Answer all the questions. Number in [] indicates marks.

(2) Any missing data can be assumed suitably.

Roll No. 2020UGE6035R

- 1 (a) A university registrar's office maintains data about the following entities: [5]

- (a) courses, including number, title, credits, syllabus, and prerequisites;
- (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
- (c) students, including student-id, name, and program; and
- (d) instructors, including identification number, name, department, and title.

Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

- (b) List five responsibilities of a database management system. For each responsibility, explain [8] the problems that would arise if the responsibility were not discharged.

- (c) Let R(a,b,c) and S(d,e,f) be two relations in which d is the foreign key of S that refers to [2] the primary key a of R. Consider the following four operations R and S:

- 1) insert into R
- 2) insert into S
- 3) delete from R
- 4) delete from S

Explain, which of the following is true about the referential integrity constraint above?

- a. none of 1, 2, 3 or 4 can cause its violation
- b. all of 1,2,3 and 4 can cause its violation
- c. both 1 and 4 can cause its violation
- d. both 2 and 3 can cause its violation

- 2 (a) Consider the given below relational database, where the primary keys are underlined. Give [6] an expression in the SQL to express each of the following queries:

employee (person-name, street, city)
works (person-name, company-name, salary)
company (company-name, city)

manages (person-name, manager-name)

i). Find the names and cities of residence of all employees who work for First Bank Corporation.

ii). Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than \$10,000 per annum.

iii). Find the names of all employees who live in the same city and on the same street as do their managers.

- (b) Explain the distinctions among the terms primary key, candidate key, and super key with [5] the help of suitable examples.

- (c) What is the difference between WHERE and HAVING in SQL? Explain with the help of suitable example. Can we use HAVING clause without using GROUP BY clause? [4]
- 3 (a) Consider a relational database containing the following schemas. What will be the result [2]

Catalogue			Suppliers		
sno	pno	cost	sno	sname	location
S1	P1	150	S1	M/s Royal furniture	Delhi
S1	P2	50	S2	M/s Balaji furniture	Bangalore
S1	P3	100	S3	M/s Premium furniture	Chennai
S2	P4	200			
S2	P5	250			
S3	P1	250			
S3	P2	150			
S3	P3	300			
S3	P4	250			

Parts		
pno	partname	part_spec
P1	Table	Wood
P2	Chair	Wood
P3	Table	Steel
P4	Almirah	Steel
P5	Almirah	Wood

of the following query?

```
SELECT s.sno, s.sname
FROM Suppliers s, Catalogue c
WHERE s.sno=c.sno AND
cost > (SELECT AVG (cost)
FROM Catalogue
WHERE pno = 'P4'
GROUP BY pno);
```

- 4 (b) Discuss the importance of view in DBMS. Write the syntax of creating and inserting information in view. How updation in view is not possible in all cases? [5]
- (c) Given a relation R(P, Q, R, S, T, U, V, W, X, Y) and Functional Dependency set FD = { PQ → R, PS → VW, QS → TU, P → X, W → Y }, determine whether the given R is in 3NF? If not convert it into 3 NF. [8]
- 4 (a) Consider the following relational database schema consisting of the four relation schemas: [5]

passenger (pid, pname, pgender, pcity)
agency (aid, aname, acity)
flight (fid, fdate, time, src, dest)
booking (pid, aid, fid, fdate)

Answer the following questions using relational algebra.

- a.) Find the passenger names for those who do not have any bookings in any flights.
b.) Get the details of flights that are scheduled on both dates 01/12/2020 and 02/12/2020 at 16:00 hours.
- (b) Explain the result of following relation algebra. [10]
1. Person (SSN, Name, Address, Hobby)
Professor (Id, Name, Office, Phone)
 - $\pi_{Name, address} (Person)$ and $\pi_{Name, office} (Professor)$ are they union compatible?
 - $\pi_{Name} (Person)$ and $\pi_{Name} (Professor)$ are they set difference compatible?
 2. Transcript (StudId, CrsCode, Sem, Grade)
Teaching (ProfId, CrsCode, Sem)
 - $\pi_{StudId, CrsCode} (\sigma_{Grade \neq 'F'} (Transcript)) / \pi_{CrsCode} (\sigma_{Semester='2000'} (Teaching))$
 - $\pi_{StudId} (\sigma_{CrsCode \neq CrsCode2} (Transcript \bowtie Transcript [StudId, CrsCode2, Sem2, Grade2]))$