සියලු ම හිමිකම් ඇවිරිණි
முழுப் பதிப்புரிமையுடையது
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බස්නාහිර පළාත් අධ්‍යාපන දෙපාර්තමේන්තුව
மேல் மாகாணக் கல்வித் திணைக்களம்
Department of Education - Western Province

තෙවන වාර පරීක්ෂණය
மூன்றாம் தவணைப் பரீட்சை - 2026
Third Term Test

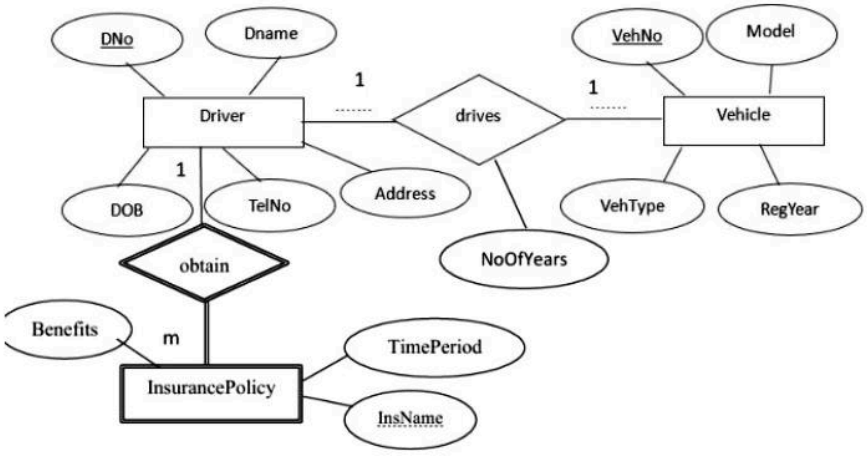
ශ්‍රේණිය தரம் Grade	13	විෂයය பாடம் Subject	Information & Communication Technology	Marking Scheme

Paper I

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	(3)	11	(4)	21	(5)	31	(2)	41	(4)
2	(5)	12	(1)	22	(3)	32	(2)	42	(3)
3	(5)	13	(5)	23	(5)	33	(4)	43	(1)
4	(1)	14	(2)	24	(2)	34	(3)	44	(4)
5	(3)	15	(4)	25	(2)	35	(2)	45	(1)
6	(1)	16	(2)	26	(1)	36	(1)	46	(2)
7	(3)	17	(5)	27	(4)	37	(2)	47	(5)
8	(5)	18	(3)	28	(3)	38	(2)	48	(4)
9	(2)	19	(2)	29	(4)	39	(4)	49	(4)
10	(2)	20	(3)	30	(5)	40	(3)	50	(1)

2 x 50 = 100

Paper II		
Q no	**Answer**	**Marks**
1. a)	Available Courses 1. Information Technology 2. Engineering 3. Business Management o Accounting o Marketing 4. Law Output of <u> tag -> ½ tag -> ½ tag -> ½	½ x 3 = 1 ½ marks
(b) (i)	li { font-family: 'Times New Roman'; }½	½ x 5 = 2 ½ marks
(ii)	ol { color: darkgreen; }½	
(iii)	ul { font-style: italic; }½	
(iv)	ol { border: 1px solid black; }½	
(v)	body { background-color: lightgray; }½	

(c)	action ½ method ½ "text" name ½ "text" name size ½ “radio” name value ½ “radio” name value <select> value ½ </select> "submit" ½ "Register" ½	½ x 8 = 4 marks
(d)	‘mname’ 'memtype' 'notify' 1 'branch' '$mname', '$memtype', '$notify', '$branch' 1	1 x 2= 2 marks
2.(a).(i).	1:1	1mark
(a).(ii). (a).(iii).	 *Correct derived attribute 1 mark *Correct weak entity with 3 attributes and cardinality 2 marks A 1 mark- weak entity with 3 attributes B 1 mark- Correct cardinality	1 mark 2marks

<table>
<tr><td>(b).(i).</td><td>

```
CREATE TABLE Book (
BookId varchar (10) NOTNULL,
BookName varchar (15) NOTNULL,
NoOfCopies int NOTNULL
PRIMARY KEY (BookId)
);
```

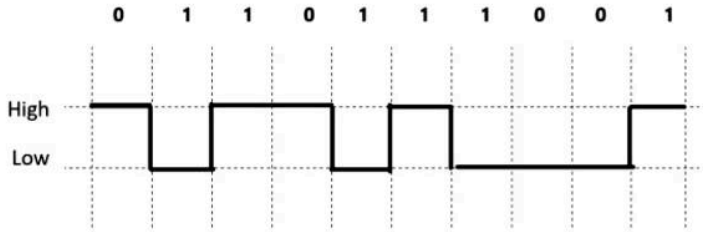
A 1 mark- Complete CREATE statement with fields and datatypes
B 1 mark- Correct syntax and NOT NULL or PRIMARY KEY (---A)
</td><td>2 marks</td></tr>
<tr><td>(ii).</td><td>

```
UPDATE TABLE BooK
SET NoOfCopies = 5
WHERE BookId = 'A003 ';
```

</td><td>1 mark</td></tr>
<tr><td>(iii).</td><td>

StuName	Grade
Sanduni	11B
Kamal	10A

</td><td>1mark</td></tr>
<tr><td>(c).</td><td>



</td><td>1 mark</td></tr>
<tr><td>(d).</td><td>



</td><td>1mark</td></tr>
</table>

3. (a)	A - Input ParkingHrs, VehicleType ½ B - Display "Invalid Parking Duration" ½ C - ParkingHrs > 2 ½ D - Fee = (2 × 100) + ((ParkingHrs − 2) × 150) 1 E - Fee = ParkingHrs × 100 ½ F - Fee = Fee + 500 ½ G - Fee > 5000 ½ H - Fee = Fee − (Fee × 0.05) OR Fee = Fee × 0.95 1	5 marks
(b)	fnum < snum: ½ Break ½ fnum <= snum: ½ fnum % 2 != 0: ½ Fnum ½ fnum += 1 ½	3 marks
(c)	A - "w" ½ B - len ½ C - str ½ D – close() ½	2 marks
4 (a) (i)	P1 : Running → Ready P2 : Blocked → Swapped-out & Blocked / Suspended & Blocked	1 mark (0.5 X 2)
(ii)	A : **0. 5 mark** for any of the following ● Saving the state of P1 into its PCB ● Change P1's state to Ready (and place it back in the ready queue) B : **0. 5 mark** for any of the following ● Allocate a PCB for P3 ● Load the state of P3 from its PCB into the CPU registers ● Change P3's state to running	1 mark

(b)	(i) Start Block Number , Length / No of Blocks / File Size (ii) Start Block Number (iii) Index Block Number	1.5 marks (0.5X3)
(c)	No of clusters needed = 125 / 4 = 31.25 = 32 Space allocated to the file = 4 KB x 32 = 128 KB Space required for the file = 125 KB Amount of internal fragmentation = 128 – 125 = 3 KB 0.5 – workings 0.5 – final answer	1 mark
(d) (i)	= 4 GB / 4 KB = 4 X 1024 X 1024 KB / 4 KB = 1024 X 1024 or = 2^{10} X 2^{10} or = 2^{20}	1 mark
(ii)	(18 + 1 + 8) X 2^{20} m → 27 n → 20	2 marks (1 X 2)
(iii)	The modified bit indicates <u>whether the contents of a page in memory have been changed</u> since it was loaded from disk. It helps the OS to reduce unnecessary disk writes and ensures data consistency.	1 mark
(iv)	1. Load the requested page (missing page in RAM) from hard disk into a free frame in the main memory. 2. Update the Page table. 3. Restart the instruction.	1.5 marks (0.5X3)

5(a).

L.H.S.

$$\underline{A}B + (B \oplus C) + (\underline{B + C}).(\underline{AB})$$

$\underline{A}B + B\underline{C} + \underline{B}\underline{C} + (\underline{B}.\underline{C}).(\underline{A} + \underline{B})$ *Demorgans' law*

$\underline{A}B + B\underline{C} + \underline{B}\underline{C} + \underline{B}.\underline{C}.\underline{A} + \underline{B}.\underline{B}.\underline{C}$ *Distributive Law*

$\underline{A}B + B\underline{C} + \underline{B}\underline{C} + \underline{B}.\underline{C}.\underline{A} + \underline{B}.\underline{C}$ *Idempotent Law*

$\underline{A}B + B\underline{C} + \underline{B}\underline{C} + \underline{B}.\underline{C}.(\underline{A} + 1)$ *Distributive Law*

$\underline{A}B + B\underline{C} + \underline{B}\underline{C} + \underline{B}.\underline{C}.(1)$ *Identity Law*

$\underline{A}B + B\underline{C} + \underline{B}\underline{C} + \underline{B}.\underline{C}$ *Identity Law*

$\underline{A}B + B\underline{C} + \underline{B}(C + \underline{C})$ *Distributive Law*

$\underline{A}B + B\underline{C} + \underline{B}(1)$ *Inverse Law*

$\underline{A}B + \underline{C} + \underline{B}$ *Redancancy Law*

$\underline{A}B + \underline{B} + \underline{C}$

$\underline{A} + \underline{B}$
$+ \underline{C}$ *Redancancy Law*

R.H.S.

$$\underline{ABC}$$

$\underline{A} + \underline{B} + \underline{C}$ *Demorgans' law*

$$L.H.S. = R.H.S$$

A 3 marks : 0.5 Mark each for each correct line in LHS with a simplification

B 1 mark : For the RHS simplifications

4 marks

5(b).i.

X	Y	Z	P	Q	R	F
0	0	0	1	1	1	1
0	0	1	1	1	1	1
0	1	0	1	0	0	0
0	1	1	1	1	0	1
1	0	0	0	1	0	0
1	0	1	0	1	0	0
1	1	0	0	0	0	0
1	1	1	0	1	0	0

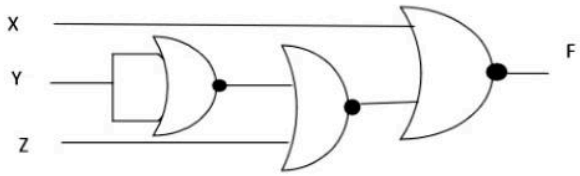
3 Marks

ii.

$$F_{SOP} = \underline{X}\,\underline{Y}\,\underline{Z} + \underline{X}\,\underline{Y}\,Z + \underline{X}\,Y\,Z$$

$F_{POS} = (X + \underline{Y} + Z).(\underline{X} + Y + Z).(\underline{X} + Y + \underline{Z}).(\underline{X} + \underline{Y} + Z).(\underline{X} + \underline{Y} + \underline{Z})$

2 Marks

<table>
<tr><td>iii.</td><td>
<table>
<tr><td>X \ YZ</td><td>00</td><td>01</td><td>11</td><td>10</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>
$F = \underline{X}.(\underline{Y} + Z)$
</td><td>3 marks</td></tr>
<tr><td>iv.</td><td>

There can be used only 3 NOR gates for design simplified expression</td><td>3 marks</td></tr>
<tr><td>06 (a) (i)</td><td>Method A:
Confidentiality – Only Hiran can read the message since only he has the private key.

Method B:
Authentication (and Integrity) – Confirms that the message was sent by Gayan and has not been altered.</td><td>2 marks
(1 X 2)</td></tr>
<tr><td>(ii)</td><td>First, encrypts (or signs) the message with Gayan’s private key. (1 mark)
Then encrypts the result with Hiran’s public key. (1 mark)
This provides:
Confidentiality (only Hiran can decrypt it)
Authentication (proves it came from Gayan) / Integrity (message has not been changed)</td><td>2 marks</td></tr>
</table>

(b) (i)

3 marks

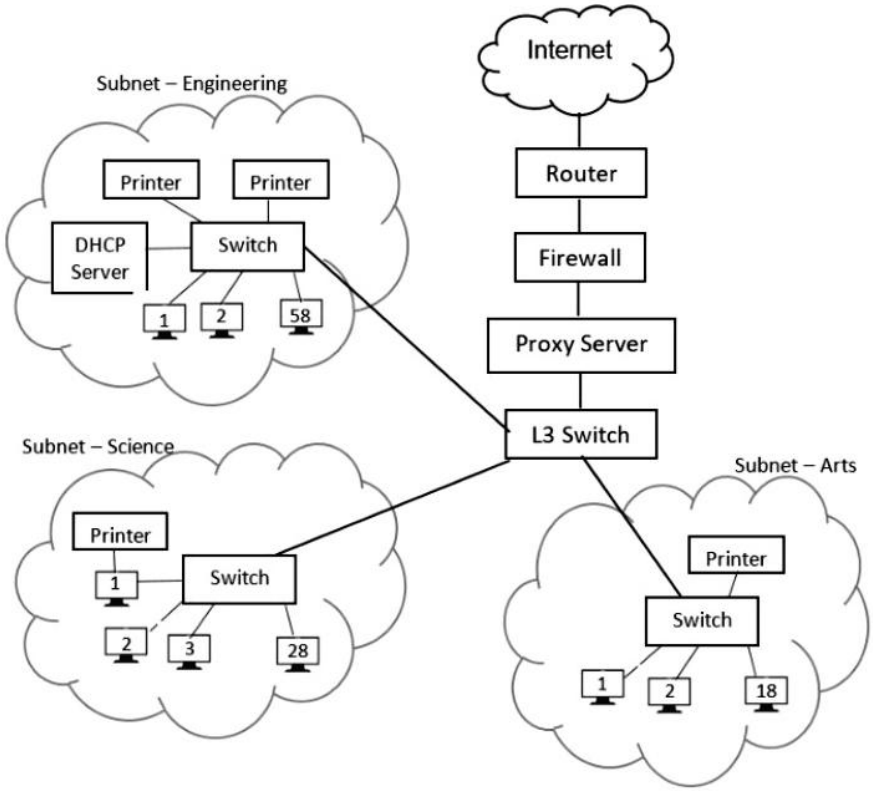
Faculty	Network Address	Broadcast Address	Subnet Mask	Usable IP Address Range
Engineering	172.30.54.0	172.30.54.63	255.255.255.192	172.30.54.1 - 172.30.54.62
Science	172.30.54.64	172.30.54.95	255.255.255.224	172.30.54.65 - 172.30.54.94
Arts	172.30.54.96	172.30.54.127	255.255.255.224	172.30.54.97 - 172.30.54.126

1 mark for each row

(1X 3)

Alternative:

Faculty	Network Address	Broadcast Address	Subnet Mask	Usable IP Address Range
Engineering	172.30.54.64	172.30.54.127	255.255.255.192	172.30.54.65 - 172.30.54.126
Science	172.30.54.0	172.30.54.31	255.255.255.224	172.30.54.1 - 172.30.54.30
Arts	172.30.54.32	172.30.54.63	255.255.255.224	172.30.54.33 - 172.30.54.62

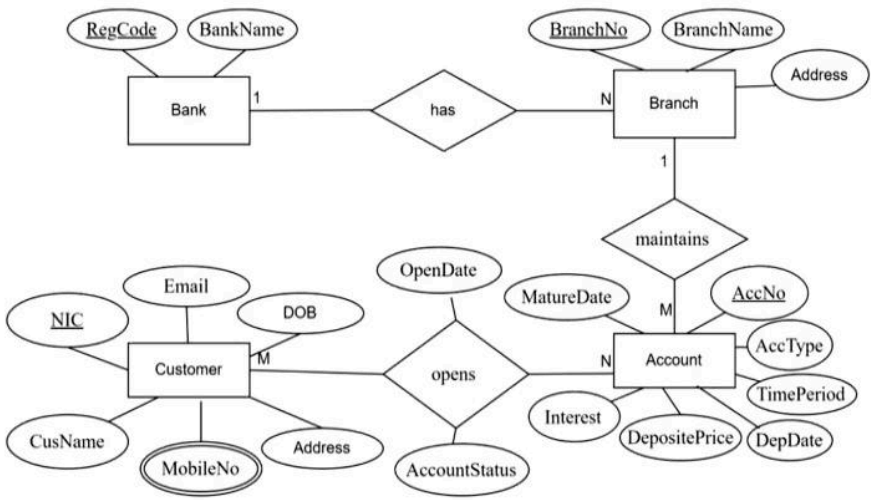
(ii)	 • 1 mark for Internet – Router – Firewall link • 1 mark for properly connecting Proxy server • 1 mark for interconnecting Switches of subnets through a L3 Switch or a Router • 0.5 mark for connecting given no of computers to switches in each subnet • 0.5 mark for connecting 2 network printers to Eng. Switch, 1 network printer to Arts switch and non-network printer to a computer in the Science switch • 1 mark for connecting a DHCP Server to Eng. subnet	5 marks

(iii)	A → UDP Because it requires fast, real-time delivery. Occasional data loss (e.g., skipped frames) is acceptable, but delays are not. B → TCP Because it requires reliable and complete data transfer. All files must be received accurately without loss. C → TCP Because student answers must be delivered correctly and securely with no data loss. 0.5 for the correct Protocol 0.5 for the justification (1 X 3 = 3 marks)	3 marks
7(a)(i)	A - Heart-rate Sensor B - Controller C - Arduino Board with Communication Module	1 ½
(a)(ii)	• the data flow is one-way: the system continuously sends (pushes) real-time heart-rate readings and alerts to the mobile application. • The nurse does not transmit control signals back to the sensor hardware in this setup, so there is no reverse data path. • The communication is purely from the monitoring system to the display/notification device.	1
(b)	X - H_R < 4 OR H_R > 6 Y - Turn Alarm ON (Set Alarm = ON) Z - Turn Alarm OFF (Set Alarm = OFF)	1 ½
(c)	• Room/ward ambient temperature — to ensure it remains within comfortable and safe limits for patients and medical equipment. • Patient body temperature (fever monitoring) — detecting hyperthermia by placing a sensor on/near the patient. • Medical equipment temperature — incubators, refrigerators storing medicines/blood, or sterilization units can be continuously monitored.	1
(d)(i)	The self-autonomous agents are Agent 2 and the Search Agent.	2

(ii)	• Interaction Q (Agent 1 → Agent 2): Agent 1 triggers Agent 2 by passing patient data or a request for analysis. This happens after Agent 1 receives information or instructions from a doctor/nurse. Q represents the delegation of analytical tasks from the communication agent to the analytical agent. • Interaction S (Search Agent → Agent 2): After the Search Agent has retrieved relevant treatment guidelines from the Internet, it sends those results back to Agent 2. S represents the return of external knowledge to the analytical agent so it can update the hospital database and make informed recommendations.	1 x 2 = 2 marks
(iii)	The system loses access to up-to-date medical knowledge from the Internet. Treatment guidelines, drug protocols, and medical research are continuously evolving; the hospital database will gradually become outdated. Without the Search Agent, Agent 2 can only reason from existing, potentially obsolete records, which may lead to missed diagnoses, outdated treatment recommendations, or failure to identify newly recognized medical conditions — potentially compromising patient safety.	2 marks
e (i)	It ensures that the hospital's appointment slots are reserved for patients who can realistically attend in person within a reasonable time. This reduces no-shows and last-minute cancellations, improves resource planning (staff, beds, equipment), and avoids overbooking due to remote patients who cannot reach the hospital quickly.	2 marks
(ii)	The hospital could use SMS/telephone confirmation: after a patient submits an appointment request online, the system sends a unique booking reference via SMS. The patient then pays at the hospital reception on arrival (cash or card) and presents the SMS reference. This ensures appointments are recorded digitally while deferring payment to the point of service until the online payment gateway is ready.	2 marks

8(a).	[1200.0, 850.0, 650.0, 1300.0] 4000.0	1x2 = 2 marks
(b).	Assumption: the two lists are of equal length and at least one item exists. def ExpensiveItem(item_names, item_prices): ½ max_price = item_prices[0] ½ max_name = item_names[0] ½ for i in range(1, len(item_prices)): 1 if item_prices[i] > max_price: 1 max_price = item_prices[i] ½ max_name = item_names[i] ½ return max_name ½	5 marks

(c)	Temp = [[180, 200, 190], [210, 205, 195], [175, 185, 220]] ½
	# Find the highest temperature
	highest = Temp[0][0] ½
	for row in Temp: 1
	for temp in row: 1
	if temp > highest: 1
	highest = temp ½
	# Display highest temperature
	print("Highest Temperature:", highest) 1
	# Determine kitchen safety status
	if highest <= 220: 1
	print("Kitchen Status: Safe") ½
	else: ½
	print("Kitchen Status: Danger") ½
		8 marks

9(a).(i).		5marks
(ii).	Bank (<u>RegCode</u>, BankName) Branch (<u>BranchNo</u>, BranchName, Address, RegCode) Account (<u>AccNo</u>, AccType, DepositePrice, TimePeriod,Interest, DepDate, MatureDate, BranchNo) Customer (<u>NIC</u>, CusName, DOB, Address, Email) CustMobile (<u>NIC</u>, <u>MobileNo</u>) Opens(<u>NIC</u>, <u>AccNo</u>, OpenDate, AccountStatus)	3marks (0.5x6)
(b).(i).	1. Update Anomaly 2. Insertion Anomaly 3. Deletion Anomaly **1. Update Anomaly** If the manager **Yasantha (E002)** changes his name or phone number, it must be updated in multiple rows (LK120, LK170, UK57). If one row is missed, inconsistent data will exist. **2. Insertion Anomaly** A new department or manager cannot be added unless there is a project record associated with it. For example, a new department cannot be stored without creating a project . **3. Deletion Anomaly** If project **NZ78** is deleted, the information about manager **Kumara (E006)** and department details associated with that project may also be lost. 3 anomalies -1mark Explanation-1mark	2marks

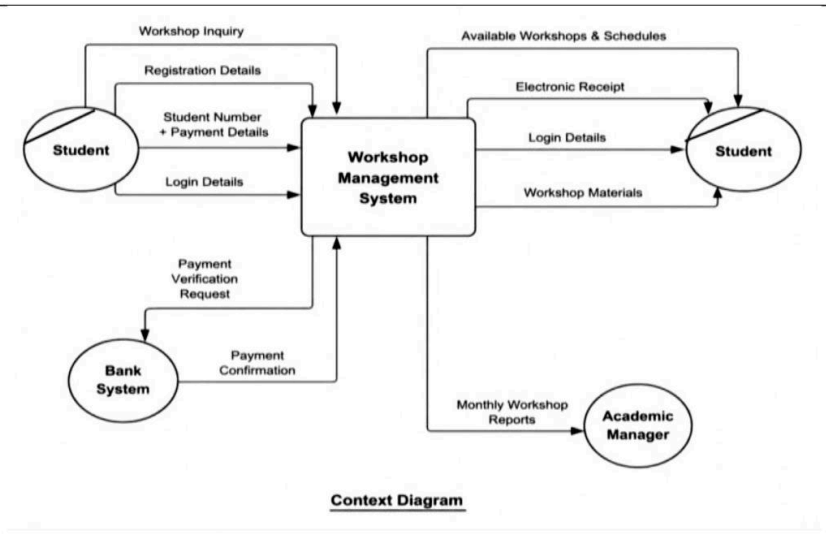
<table>
<tr><td>(ii).</td><td>First Normal Form (1NF).

● All attributes contain atomic (single-valued) data.
● There are no repeating groups or multivalued attributes.
● Each row represents a unique project record.

However, the table is not in 2NF because some non-key attributes depend only on part of the key rather than the whole key. There for the relation contains partial dependencies, so it is only in 1NF.

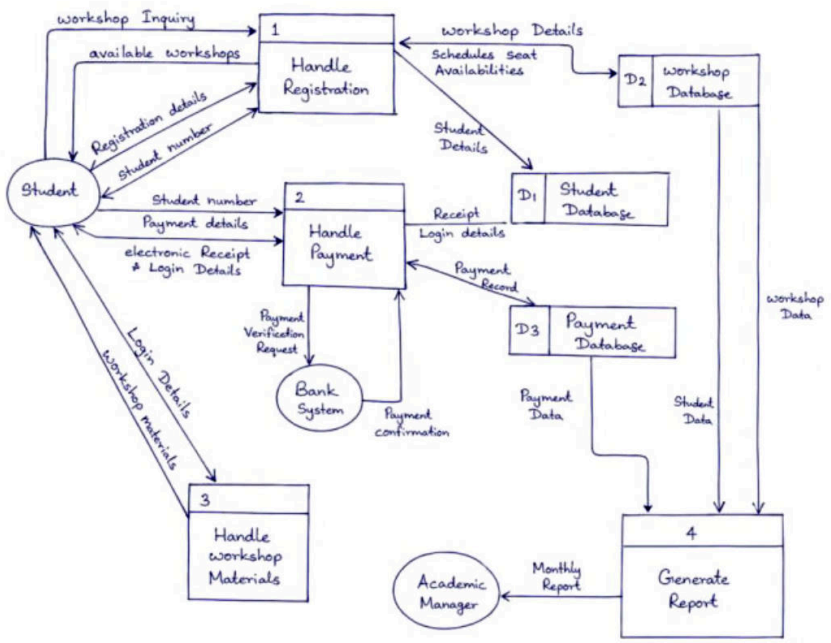
Normal form -1mark
Explanation-1mark</td><td>2marks</td></tr>
<tr><td>(iii).</td><td>Project(PCode, PTitle, M_ID, MName, Budget)

Employee(Empno, Empname, MobileNo, Depno, Depname)

Project_Employee(PCode, Empno)</td><td>3marks</td></tr>
<tr><td>10 (a) (i)</td><td>

Context Diagram

<table>
<tr><th>Item</th><th>Marks</th></tr>
<tr><td>System Name</td><td>1</td></tr>
<tr><td>Student Entity</td><td>0.5</td></tr>
<tr><td>Bank System Entity</td><td>0.5</td></tr>
<tr><td>Academic Manager Entity</td><td>0.5</td></tr>
<tr><td>Student-System Flows</td><td>2</td></tr>
<tr><td>Bank-System Flows</td><td>1</td></tr>
<tr><td>Academic Manager Flow</td><td>0.5</td></tr>
<tr><td>Total</td><td>6</td></tr>
</table>
A student should receive marks only when:
1. Correct DFD symbol is used.
2. Correct name is given.
Relevant data flows are connected correctly</td><td>6 marks</td></tr>
</table>

<table>
<tr>
<td>(ii)</td>
<td>


<table>
<tr><th>Component</th><th>Marks</th></tr>
<tr><td>Processes Relevant Data Flows (4 × 1 Mark)</td><td>4 Marks</td></tr>
<tr><td>Process 1.0 – Handle Registration</td><td>1</td></tr>
<tr><td>Process 2.0 – Handle Payments</td><td>1</td></tr>
<tr><td>Process 3.0 – Manage Workshop Materials</td><td>1</td></tr>
<tr><td>Process 4.0 – Generate Reports</td><td>1</td></tr>
<tr><td>Data Stores + Relevant Data Flows (3 × 1 Mark)</td><td>3 Marks</td></tr>
<tr><td>D1 Student Database + correct connections</td><td>1</td></tr>
<tr><td>D2 Workshop Database + correct connections</td><td>1</td></tr>
<tr><td>D3 Payment Database + correct connections</td><td>1</td></tr>
<tr><td>Total</td><td>7 Marks</td></tr>
</table>
</td>
<td>7 marks</td>
</tr>
<tr>
<td>(b).</td>
<td>(i) Organizational Feasibility

(ii) Technical Feasibility

(iii) Operational Feasibility

(iv) Economic Feasibility</td>
<td>½ x 4 = 2 marks</td>
</tr>
</table>