

# MODERN COLLEGE

SUCCESS DEPENDS ON THE PROPER USE OF TIME

Form: Grade 13 main

Subject: Computer

Paper: 3

Page No: 1

## MARK SCHEME for April Examinations 2019

### Question 1

Question	Answer	Marks
1(a)	= 100.1 (conversion to binary) [1] = $0.1001 \times 2^3$ (evidence of shifting binary point appropriately) [1] = 010010000000 0011 (stored as mantissa and exponent) [1]	3
1(b)	101101111111 (one's complement of 12 bit mantissa) [1] 101110000000 (two's complement of 12 bit mantissa) [1] 101110000000 0011 (stored as mantissa and exponent) [1]	3
1(c)	= $0.0011 \times 2^5$ (exponent is 5) = 110 or $(1/8 + 1/16) \times 32$ (calculation using mantissa and exponent) = 6 (denary value)	3
1(d)(i)	Not normalised	1
1(d)(ii)	First two bits of the mantissa should be different for normalised number // because the mantissa starts with 00	1
1(e)	For <b>each</b> effect <b>One</b> mark for effect and <b>one</b> mark for reason  Reduction in precision ... [1] ... as the number of bits in the mantissa has decreased [1]  Increase in range ... [1] ... as the number of bits in the exponent has increased [1]	4

### Question 2.

(a) Decide which process ...

Gets next use of the processor (low level scheduler)

// is next loaded into memory (high level scheduler)

maximise system resources

[2]

(b) (i) Running

The process currently has the use of the processor

Runnable/Ready

The process would like to use the processor but the processor is currently in use by another process

Suspended/Blocked

The process is not capable of using the processor / the process is currently occupied doing I/O

[6]

(ii) Maintain a separate 'data structure' for the processes in each state

one field of the Process Control Block will store the current state

[1]

# MODERN COLLEGE

SUCCESS DEPENDS ON THE PROPER USE OF TIME

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Form: Grade 13 main

Subject: Computer

Paper: 3

Page No: 2

(c)

Maximise the use of the computer system  
Be fair to all users  
Provide a reasonable response time to all users  
Prevent system failure due to overloading  
Provide consistency to users  
(1 per point, max 3)

(d)

First come/first served  
First to enter ready Q is first to enter running state  
Favours long jobs  
Shortest job first  
Jobs in ready Q are in order, shortest job first  
Means that jobs are seen to be completed but favours shorter jobs  
Round Robin  
Each job given time slice  
When time slice over, job goes to back of ready Q  
Shortest remaining time  
The job that requires the least job to complete is done first  
Long jobs may never be started  
Multi-level feedback queues  
Queues with different priorities  
Jobs can change Q dependent on amount of time already given  
(2 per type, max 2 types, max 4) **(4)**

(e) max – 2 marks

(Each job given separate priority according to:)  
importance of job/type of job  
amount of time already waited  
size of job  
amount of peripheral time  
(I/O job high priority)  
Amount of processor time already given  
Necessary response time

[2]

# MODERN COLLEGE

SUCCESS DEPENDS ON THE PROPER USE OF TIME

Form: Grade 13 main

Subject: Computer

Paper: 3

Page No: 3

Question 3. (a)

(i)	Peer-to-peer	1
(ii)	File sharing	1
(iii)	Any <b>four</b> points from (max 4): BitTorrent client software made available A computer joins a swarm by using this to load a Torrent descriptor file A server called a tracker that keeps records of all the computers in the swarm ... ... and shares their IP addresses allowing them to connect to each other One computer in the swarm must have a complete copy of the torrent to be shared Torrent is split into small pieces Pieces of the torrent are both downloaded and uploaded Once a computer has a piece it can become a seed and upload Leeches download much more than they upload	4

(b)

Question	Answer	Marks
	<b>One</b> mark for each correct layer in the correct row  <ul style="list-style-type: none"> <li>• Transport (layer)</li> <li>• Internet (layer)</li> <li>• Network (access layer)</li> </ul>	<b>3</b>

(c)

- HTTP/ HTTPS/ SMTP/ POP3/ Telnet / SSH;
- The above are only the most common examples.
- Students may provide alternatives and these should be
- checked.

[1]

(d)

Network (layer);

A IP (layer)

[1]

# MODERN COLLEGE

SUCCESS DEPENDS ON THE PROPER USE OF TIME

---

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Form: Grade 13 main

Subject: Computer

Paper: 3

Page No: 4

Question 4. (a)

i.  $X+Y$   
A  $X \text{ OR } Y$

ii.  $Y$

iii.  $X$

iv.  $X$

# MODERN COLLEGE

SUCCESS DEPENDS ON THE PROPER USE OF TIME

Form: Grade 13 main

Subject: Computer

Paper: 3

Page No: 5

## Question 5

1(a)	Example: Speed of access Just used as a look-up file No need for any serial or sequential processing 1 mark for any valid point	1										
(b)(i)	<table><tr><th>Customer ID</th><th>RecordKey</th></tr><tr><td>802139</td><td>2139</td></tr><tr><td>700004</td><td>4</td></tr><tr><td>689998</td><td>89998</td></tr><tr><td>102139</td><td>2139</td></tr></table>	Customer ID	RecordKey	802139	2139	700004	4	689998	89998	102139	2139	1
Customer ID	RecordKey											
802139	2139											
700004	4											
689998	89998											
102139	2139											
b)(ii)	Minimum value: 0 Maximum value: 99999	1 1 2										
b)(iii)	<pre>PROCEDURE InsertRecord(CustomerID : INTEGER)   RecordKey ← CustomerID MOD 100000   Success ← FALSE   // Find position for new record and insert it   REPEAT     IF record at position RecordKey is <u>empty</u>       THEN         Insert new record at position RecordKey         Success ← TRUE       ELSE         IF RecordKey = <u>99999</u>           THEN             RecordKey ← <u>0</u>           ELSE             RecordKey ← <u>RecordKey</u> + 1           ENDIF         ENDIF       UNTIL Success = TRUE     ENDPROCEDURE</pre>	4										

## Question 6.

V	W	X
0	1	1
1	1	0
1	0	1
1	0	1
;	;	;

1 mark for each correct column

# MODERN COLLEGE

SUCCESS DEPENDS ON THE PROPER USE OF TIME

Form: Grade 13 main

Subject: Computer

Paper: 3

Page No: 6

Question 7.

(a)(i) 1 mark per bullet, max 1 benefit, max 1 drawback

## Benefits

- Signals only go to destination//secure
- Easy to connect/remove nodes or devices/trouble shoot.
- Centralised management helps in monitoring the network.
- Failure of one node or link doesn't affect the rest of network.
- Performance does not degenerate under load
- Connections may use different protocols
- Fewer collisions

## Drawbacks

- If central device fails then whole network goes down.
- Performance is dependent on capacity of central device.

(a)(ii) 1 mark per bullet, max 1 benefit, max 1 drawback

## Benefits

- Easier to set-up/extend.
- Less cable required

## Drawbacks

- If the main cable breaks, network performance badly degraded.
- Difficult to detect and troubleshoot fault at an individual station.
- Efficiency reduces as the number of devices connected to it increases.
- Collisions // not suitable for networks with heavy traffic.
- Security is lower (because several computers receive the sent signal from the source.)

# MODERN COLLEGE

SUCCESS DEPENDS ON THE PROPER USE OF TIME

Form: Grade 13 main

Subject: Computer

Paper: 3

Page No: 7

(b) 1 mark for each correct pair of letters in the right order max 3

1	Computer X sends a connection request to Computer Y.
2	Computer Y sends ready or busy signal.
3	If busy, Computer X waits and then resends the connection request to Computer Y.
4	<b>D</b>
5	<b>A</b>
6	<b>C</b>
7	<b>B</b>

Question 8

(a)

- ID number input
  - Read next record from TF
  - Compared to ID number from record
  - If a match found then record details are output
  - If not end of TF then repeat from second mark point
  - If no matches then report error
- (1 per -, max 4)

[4]

(b)

- Flag created/Boolean variable/condition statement in loop
  - set to 1 or true when match found
  - no further comparisons carried out/search would end as soon as one match was found
- (1 per -, max 2)

[2]

(c)

- Compares centre record with input value
  - If no match, half of remaining file is removed
  - Repeat until ID number is found
  - Need to compare above and below found record because of multiple records
- (1 per -, max 3)

[3]