MAH MCA CET 2023 Model Question Paper PDF

Mathematics & Statistics

Q. 1. The upper part of a tree broken by the wind makes an angle of $60_\circ$ with the ground and the horizontal distance from the root of the tree to the point where the top of the tree meets the ground is 10 meters. What was the height of the tree before it was broken?
(1) 43.20 m
(2) 20 m
(3) 37.30 m
(4) 39.70 m

Q. 2. Find the length of the major axis of the ellipse $16x_2 + 5y_2 = 400$.
(1) 5
(2) $8\sqrt{5}$
(3) 10
(4) $10\sqrt{5}$

Q. 3. A, B & C are three mutually exclusive & exhaustive events associated with a random experiment. If P (C) = 3/4 P (A), P (A) = 2/3 P (B), then P (B) is _____
(1) 3/2
(2) 4/13
(3) 6/13
(4) 3/13

Q. 4. The average salary of male employees in the firm is Rs.5,000/- and that of female employees is Rs. 4,000/-. The mean salary of all the employees is Rs.4,500/- and If there are 10 male employees, then how many female employees are there in that firm?
(1) 12
(2) 10
(3) 08
(4) 11

Q.5) What is the value of $\int_{0}^{\pi} \dfrac{\cos x}{x^4 \left(\pi - x\right)^4} dx$?

(a) zero

(b) π

(c) $\dfrac{\pi}{4}$

(d) $\dfrac{\pi}{2}$

Q.6) What is the value of $\int_{0}^{100\pi} \left|\sin x\right| dx$?

(a) $100\,\pi$

(b) 100

(c) 200

(d) $200\,\pi$

Q.7) What is the integration of $\dfrac{\left(x - x^3\right)^{\frac{1}{3}}}{x^4}$?

(a) $\dfrac{3}{8}\left(\dfrac{1}{x^2} - 1\right)^{\frac{4}{3}} + c$

(b) $-\dfrac{3}{8}\left(\dfrac{1}{x^2} - 1\right)^{\frac{4}{3}} + c$

(c) $\dfrac{1}{8}\left(1 - \dfrac{1}{x^2}\right)^{\frac{4}{3}} + c$

(d) $\dfrac{\left(x - x^3\right)^{\frac{1}{3}}}{x^4} + c$

Q.8) What is the integration of $e^{\sqrt{x}}$?

(a) $e^{\sqrt{x}}\left(\sqrt{x} - 1\right) + c$

(b) $2e^{\sqrt{x}}\left(\sqrt{x} - 1\right) + c$

(c) $2e^{\sqrt{x}}\left(\sqrt{x} + 1\right) + c$

(d) $e^{\sqrt{x}} + c$

Q.9) Which one of the following equations represents the differential equation of circles, with centres on the x-axis and all passing through the origin?

(a) $\dfrac{dy}{dx} = \dfrac{x^2 + y^2}{2xy}$

(b) $\dfrac{dy}{dx} = \dfrac{x^2 - y^2}{2xy}$

(c) $\dfrac{dy}{dx} = \dfrac{y^2 - x^2}{2xy}$

(d) $\dfrac{dy}{dx} = -\dfrac{x}{y}$

Q.10) What is the degree of the differential equation $\left(\dfrac{d^3 y}{dx^3}\right)^{\frac{2}{3}} - 3\dfrac{d^2 y}{dx^2} + 5\dfrac{dy}{dx} + 4 = 0$?

(a) 3

(b) $\dfrac{2}{3}$

(c) 2

(d) 6

Q.11) If $I_m = \int_1^x (\ln x)^{n1} dx$ satisfies the relation $I_m = x(\ln x)^m - 1 I_{m-1}$, then which one of the following is correct?

(a) $I = m - 1$ (b) $I = m$
(c) $I = m + 1$ (d) $I = m^2 + 1$

Q.12) What is the integration of $e^{x \ln a} e^x$?

(a) $(ae)^x$

(b) $\dfrac{(ae)^x}{\ln(ae)}$

(c) $\dfrac{e^x}{(1+\ln a)}$

(d) $\dfrac{e^x}{(\ln a)}$

Q.13) If $\vec{a}\,\vec{b}\,\vec{c}$ are three mutually perpendicular vectors each of magnitude unity, then what is the magnitude of $\vec{a}+\vec{b}+\vec{c}$?

(a) 3   (b) 1

(c) $\sqrt{3}$ (d) $\dfrac{1}{3}$

Q.14) For what value of k, the points with position vectors $60\hat{i}+3\hat{j}, 40\hat{i}-8\hat{j}$ and $k\hat{i}-52\hat{j}$ collinear?

(a) $k = 40$ (b) $k = -40$
(c) $k = -30$ (d) $k = 20$

Q.15) If $\vec{a}, \vec{b}$ and $\vec{c}$ are three vectors of which every pair is non-collinear and if the vector $\vec{a}+\vec{b}$ and $\vec{b}+\vec{c}$ are collinear with the vectors $\vec{c}$ and $\vec{a}$ respectively, then which one of the following is correct?

(a) $\vec{a}+\vec{b}+\vec{c}$ is a null vector.
(b) $\vec{a}+\vec{b}+\vec{c}$ is a unit vector
(c) $\vec{a}+\vec{b}+\vec{c}$ is a vector of magnitude 2 units
(d) $\vec{a}+\vec{b}+\vec{c}$ is a vector of magnitude 3 units

Q.16) If $|\vec{a}| = |\vec{b}| + |\vec{a}-\vec{b}| = 1$, then what is the angle between vectors $\vec{a}$ and $\vec{b}$?

(a) $\dfrac{\pi}{6}$

(b) $\dfrac{\pi}{3}$

(c) $\dfrac{\pi}{2}$

(d) $\dfrac{\pi}{4}$

Q.17) What is the area of the parallelogram having diagonal $\vec{a} + 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = \hat{i} - 3\hat{j} + 4\hat{k}$?

(a) $5\sqrt{2}$ square units

(b) $4\sqrt{3}$ square units

(c) $5\sqrt{3}$ square units

(d) $10\sqrt{3}$ square units

Q.18) If $\vec{a} = \hat{i} + \hat{j}, \vec{b} = 2\hat{j} - \hat{k}$ and $\vec{r} \times \vec{a} = \vec{b} \times \vec{a}, \vec{r} \times \vec{b} = \vec{a} \times \vec{b}$ then what is the value of $\dfrac{\vec{r}}{|\vec{r}|}$?

(a) $\dfrac{\left(\hat{i} + 3\hat{j} - \hat{k}\right)}{\sqrt{11}}$

(b) $\dfrac{\left(\hat{i} - 3\hat{j} + \hat{k}\right)}{\sqrt{11}}$

(c) $\dfrac{\left(\hat{i} + 3\hat{j} + \hat{k}\right)}{\sqrt{11}}$

(d) $\dfrac{\left(\hat{i} - 3\hat{j} - \hat{k}\right)}{\sqrt{11}}$

Q.19) Which one of the following vectors represents the unit vector parallel to the YZ plane and perpendicular to the vector $3\hat{i} + 4\hat{j} - 2\hat{k}$?

(a) $\dfrac{\left(-2\hat{i} + \hat{j} - \hat{k}\right)}{\sqrt{6}}$

(b) $\dfrac{\left(\hat{j} + 2\hat{k}\right)}{\sqrt{5}}$

(c) $\dfrac{\left(\hat{j} + \hat{k}\right)}{\sqrt{2}}$

(d) $\dfrac{\left(2\hat{i} + 3\hat{j} + 9\hat{k}\right)}{\sqrt{94}}$

Q.20) In an experiment, two variables X and Y are observed on some units. It was recorded that $\sigma_x = 2\sigma_y$. Which one of the following statements is correct?

(a) The regression coefficient of Y on X is four times the regression coefficient of X on Y.

(b) The regression coefficient of Y on X is equal to the regression coefficient of X on Y.

(c) The regression coefficient of X on Y is four times the regression coefficient of Y on X.

(d) The value of correlation coefficient exceeds unity?

Q.21) An electric device consists of two bulbs A and B. From previous testing procedure, the following results are known:

$P[A \text{ is fused}] = 0.20$;

$P[B \text{ is fused alone}] = 0.15$;

$P[A \text{ and } B \text{ are fused}] = 0.15$

What is the probability that bulb *A* is fused alone?
(a) 0.15   (b) 0.20
(c) 0.05   (d) 0.25

Q.22) Which one of the following statistical measures cannot be determined graphically?
(a) Median   (b) Mode
(c) Harmonic Mean   (d) Arithmetic Mean

Q.23) The following relative frequency distribution shows the distribution of 50 members of a country social programme according to their age:

Age (*in years*)	Relative frequency
30-39	0.02
40-49	0.06
50-59	0.16
60-69	0.32
70-79	0.20
80-89	0.16
90-99	0.08

What is the number of members who are older than 50?
(a) 4   (b) 8
(c) 46   (d) 16

Q.24) Match List I with List II and select the correct answer using the codes given below the lists:

List I		List II	
A.	Average shoe size	1.	Geometric Mean
B.	Average speed for equal distances covered	2.	Harmonic Mean
C.	Average speed for equal times spent	3.	Arithmetic Mean
D.	Average rate of population growth	4.	Mode

Codes :

	A	B	C	D
(a)	1	2	3	4
(b)	1	3	2	4
(c)	4	2	3	1
(d)	4	2	1	3

Computer Concept

1) When you are working on a document on a PC, the document is stored in _____
   - ROM
   - RAM
   - Floppy
   - Pen Drive
   - None of these

2) A _____- represent approximately one billion memory location
   - Kilobyte
   - Megabyte
   - Gigabyte
   - terabyte
   - None of the these

3) A 32-bit word computer can access _____bytes at a time
   - 2
   - 4
   - 8
   - 16
   - 32

4) Which of the following is a billion of a second?
   - Gigabyte
   - Terabyte
   - Nanosecond
   - Microsecond
   - Terasecond

5) The analytical engine developed during the first generation of computers used _____ as a memory unit
   - RAM
   - Floppies
   - Cards
   - Counter wheels
   - None of these

6) Which of the following palaces are the common data elements in order from smallest to largest?
   - Character, FIles, Records, Field, Database files

- Character, Records, Field, Database, File
- Character, Field, Record, File, Database
- Bit, Byte, Character, Record, Field, File, database
- None of the above

7) The internal memory consists of
- Primary memory
- Cache memory
- CPU register
- All of the above
- None of the above

8) Which of the following refers to the memory in the computer?
- VGA
- CPU
- RAM
- All of these
- None of these

9) Through _____ information travels between components on the motherboard
- CMOS
- Peripherals
- Bays
- Flash Memory
- None of these

10) Primary memory is more _____ than secondary memory
- Slow
- Fast
- Large
- Huge
- None of these

11) Storage that retains its data after the power is turned off is referred to as
- Volatile Storage
- Non-volatile storage
- Sequential storage
- Direct Storage
- None of these

12) Hard disk drives are considered _____ storage
- Flash
- Non-volatile
- Temporary

- Nonpermanent
- None of these

13) The memory unit is a part of
- Input device
- Control unit
- Output device
- Central processing unit
- None of these

14) Memory is made up of (Allahabad Bank Clerk 2011)
- Set of wires
- Set of circuits
- A large number of cells
- Set of optical fibre
- None of these

15) Memory is characterized on the basis of
- Density
- Access Time
- Capacity
- Both (b) and (c)
- None of these

16) ASCII stands for
- American standard code for information interchange
- All-purpose scientific code for information interchange
- American security code for information interchange
- None of the above

17) In C random access is achieved by using
- Fseek (*fptr, offset, from_where)
- fseek (fptr, offset, from_where)
- Fseek (*fptr, from_where)
- All

18) 8 Binary tree of order n contains at least _____ keys
- (n-1)/2
- n2
- (n-3)/2
- None

19) 11 times taken for the desired sector to rotate to the disk head is called
- Positioning time
- Random access time
- Seek time
- Rotational latency

20) If the resource allocation graph contains no cycles then
- none
- No deadlock
- Deadlock
- May or may not be deadlock

Logical & Abstract Reasoning

Problem figures

A)   B)   ✓C)   D)   E)

Explanation:- *Observing the folded part we find that the fifth figure is same as first figure so the next figure should be same as second figure. Hence option 3.*

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 2

A)   ✓B)   C)   D)   E)

Explanation:-
Everytime a part of petal is added and the figure turns 45° anticlockwise and new petal part is added on the front while moving anticlockwise. Hence 2nd option is the next pattern

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

**Question No. : 3**

Problem figures

A)   ✓B)   C)   D)   E)

Explanation:- *Observing the pattern we see that the second figure is repeated in the fifth figure so third figure gets repeated in the next figure which is option 2.*

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 4

Problem figures
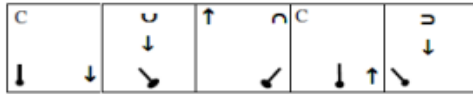
A)   B)   C)   D)   ✔E)

Explanation:-   *Observing the pendulum going we see that firstly it moves one space at a time in clockwise direction and secondly it tilts 45°*

to the right and then 90° to the left and then becomes straight. Now following the same pattern it should be tilting 90° to the left which is only in option 5.

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 5

A) 1   B) 2   ✔C) 3   D) 4   E) 5

Explanation:-

The entire fig. Moves 90° cw. Pic C is the water image of pic 2.
The process restarts with a new pic at D.

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 6
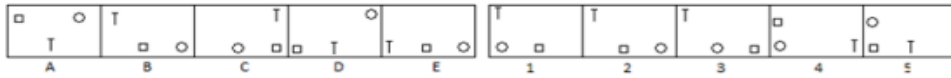
A) 1   B) 2   ✓C) 3   D) 4   E) 5

Explanation:-

Two symbols exchange their positions and the remaining symbol moves CW by one side. From pic 2 to 3, he other two symbols interchange. Then from pic 3 to 4 the remaining combination of the pair swaps. This pattern continues.

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 7

✓A) 1   B) 2   C) 3   D) 4   E) 5

Explanation:-

After the two leftmost symbols swap they both turn 90⁰ ACW, whereas the remaining symbol turns 90 ⁰ CW. The pattern continues with a new pair in each subsequent move.

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 8

Problem figures
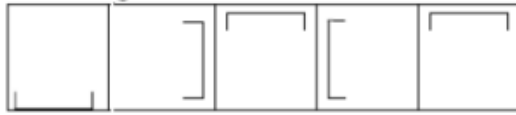
A)   B)   ✓C)   D)   E)

Explanation:- *The square bracket is moving in 90°ACW direction in each step for the first four figures. Now fifth figure onwards it starts moving in the 90° CW direction. Hence the figure second gets repeated which is only in option 3.*

Question No. : 9

In the questions given below which one of the five answer figures on the right should come after the problem figures?

A)   ✓B)   C)   D)   E)

Explanation:-

In 2nd Fig, The Fig at 2 ends interchange their places & Fig in between follow the reverse order. In next Fig last Fig moves to top & all other Fig retain same sequence. Once again Fig at 2 ends interchange & sequence follows. If all Fig are on a line then line is moving 90 degrees forward & backward.

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 10

A) 1   ✓B) 2   C) 3   D) 4   E) 5

Explanation:-
Circles on top face increase by 1, on left face follows 2,-3,-2 pattern & front facing face follows the 3, -4, -3

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 11

Problem figures

✓A)   B)   C)   D)   E)

Explanation:- *Observing the pattern we see that different number of **C**'s get inverted . In the second figure only 1 gets inverted, then next 2 invert and lastly the remaining 3 invert. The process is repeated in the 4th fgure when again 1 gets inverted so following the pattern the next 2 should get inverted which happens only in choice 1.*

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 12

Explanation:-
Figure at the right corner changes to 2 similar figures in the middle, the bottom figure goes to the upper right corner. On this basis, options A, D and E are eliminated. Out of the remaining 2 options, option C is further eliminated beacuse no figure has to be repeated in the answer (square is repeated in option 3). Hence, the only remaining option is (B).

DIRECTIONS for the question: In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?

Question No. : 13

Explanation:-
In every figure the leaves move one place ahead of white and black leaves alternatively and a new white leaf is added to the figure everytime. Also filled element is on the left of empty element in Ist fig and then on the right in IInd figure. Now considering all this logic only option 3 satisfies.

Question No. : 14

Explanation:- The ball gets slided down in a phased manner with every alternate figure it is upside and downside. Now observing the pattern the ball should be downside to the righthand corner which only happens in option 1.

DIRECTIONS for the question: In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?

Question No. : 15
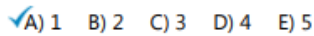
Problem figures

Explanation:- Observing the pattern being followed we see that the number of small lines being removed follow the pattern -2,-3,-2,-4,-2 and so on from figure 2 onwards. Hence the number of lines being removed will be 2 which is only in option 3.

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 16

Problem figures

✓A)   B)   C)   D)   E)
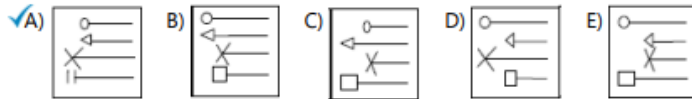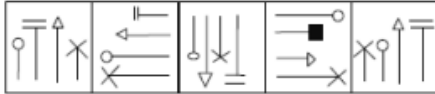
Explanation:- *Checking the pattern we see that firstly the whole figure gets inverted 90° ACW and secondly the symbol on the extreme right is moved to the extreme left and the middle two symbols in the original figure are exchanged. This is only true in option A.*

DIRECTIONS for the question: *Select a figure from the alternatives, which when placed in the blank space of problem figure would complete the pattern.*
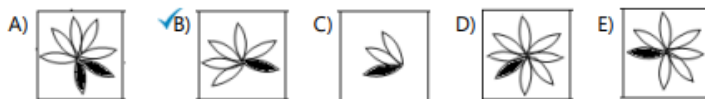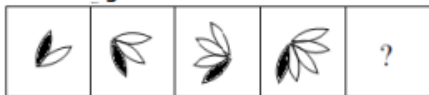
Question No. : 17

✓A) 1   B) 2   C) 3   D) 4   E) 5

Explanation:-
Circle change to Triangles in an anticlockwise direction. In each box 2 circles get replaced by 2 triangles.

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 18

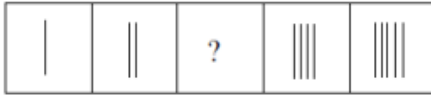**Problem figures**

A)   ✓B)   C)   D)   E)

Explanation:- *The number of petals being added increase by one everytime so the number of petals in the next figure will be 6 which is only in option2.*

DIRECTIONS for the question: *Select a figure from the alternatives, which when placed in the blank space of problem figure would complete the pattern.*
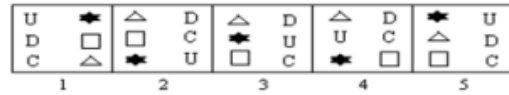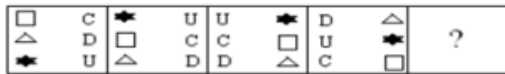
Question No. : 19

Problem figures

A) 　B) 　C) 　✓D) 　E)

Explanation:- *The number of lines being added increase by one everytime so the number of lines in the next figure will be 3 vertical lines which is only in option 4.*

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*

Question No. : 20

A) 1　B) 2　✓C) 3　D) 4　E) 5

DIRECTIONS for the question: *In the question given below which one of the answer figures should come after the problem figures given, if the sequence were continued?*
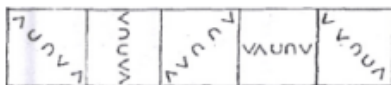
Question No. : 21

A) 　B) 　✓C) 　D) 　E)

Explanation:-
*The picture is moving 45° clockwise and the two middle **U**'s are changing direction one by one so now the answer should have both **U**'s facing left i.e. answer is option 3.*

DIRECTIONS for question: *In the following question, there are two Problem Figures (un-numbered figures) followed by five Answer Figures (numbered as A, B, C, D & E). There are certain common characteristics/properties between the two Problem Figures. Select a figure from amongst the Answer Figures which shows similar characteristics/properties as shown by the Problem Figures.*