UNIVERSAL ACADEMY

Icon of Success and Excellence

MOCK CET - 2015

DATE	SUBJECT	TIME
17.04.2015	MATHEMATICS	2.30 PM TO 3.40 PM

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
60	80 MINUTES	70 MINUTES

MENTION YOUR CET NUMBER					QUESTION BOOKLET DETAILS	
					VERSION CODE	SERIAL NUMBER
					B–1	

DOs:

1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the Invigilator after **1st Bell** i.e, after **2.30 p.m**
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should be shaded completely.
5. Compulsory sign at the bottom portion of the OMR answer sheet in the space provided.

DONTs:

1. **The timing and marks printed on the OMR answer sheet should not be damaged/mutilated/ spoiled.**
2. The **2nd Bell** rings at **2.35 p.m.** till then,
   - Do not remove the seal/staple present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 60 questions and each question will have one statement and four distraction (four different options / choices).
2. After the **2nd Bell** is rung at **2.35 p.m**. Remove the seal/staple present on the right hand side of this question booklet and start answering on the OMR answer sheet.
3. During the subsequent 70 minutes:
   - Read each question carefully.
   - Choose the correct answer from out of the four available distracters (options /choices) given under each question/statement.
   - Completely **darken / shade** the relevant circle with a **BLUE OR BLACK INK BALLPOINT PEN against the question number on the answer sheet.**

CORRECT METHOD OF SHADING THE CIRCLE ON THE ANSWER SHEET IS AS SHOWN BELOW:

4. Please note that even a minute unintended ink dot on the answer sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR sheet.
5. Use the space provided on each page of the question booklet for Rough work. Do not use the OMR answer sheet for the same.
6. After the **last bell** is rung at **3.45 pm** stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
7. Hand over the OMR answer sheet to the room invigilator as it is.
8. After separating and retaining the top sheet, (UA copy) the invigilator will return the bottom sheet replica (candidate's copy) to you to carry home for self – evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE week. For results, log on to the website www.uaes.in 5 days after the examination.

MATHEMATICS CET – 1

1. Which one of the family following set satisfies the symmetric property?
   a) Set of family members under the relation "a brother of"
   b) Set of lines in a plane under the relation "Perpendicular to"
   c) Set of family members under the relation "father of"
   d) A = {1, 2, 3}, R = {(1, 2), (2, 1), (2, 3), (3, 1)}
2. Let $f(x) = (x^3 + 2)^{30}$. If $f^n(x)$ is a polynomial of degree 20, where $f^n(x)$ denotes the nth derivative of f(x) with respect to x then the value of n is
   a) 60 b) 40 c) 70 d) 50
3. If $y = (\sin^{-1}x)^2$, then $(1 - x^2)\ \frac{d^2y}{dx^2}$ is equal to
   a) $x\frac{dy}{dx}+2$ b) $x\frac{dy}{dx}-2$ c) $-x\frac{dy}{dx}+2$ d) $-x\frac{dy}{dx}-2$
4. If $f(x) = x^3$ and $g(x) = x^3 - 4x$ in $-2 \le x \le 2$. Then consider the statements:
   (1) f(x) and g(x) satisfy mean value theorem
   (2) f(x) and g(x) both satisfy Rolle's theorem
   (3) only g(x) statisfies Rolle's theorem of these statements
   a) (1) & (2) are correct b) (1) alone is correct
   c) None is correct d) (1) & (3) are correct
5. There exists an even prime number
   a) $\exists x, p(x)$ b) $\forall x, p(x)$ c) $\exists x, p(2x)$ d) $\forall x, p(2x)$
6. If $f(5) = 7 = f'(5)$, then $\lim\limits_{x\to5} \frac{xf(5)-5f(x)}{x-5}$ is given by
   a) – 28 b) 28 c) 35 d) – 35
7. The tangent to the curve given by $x = e^t\cos t$, $y = e^t\sin t$ at $t = \frac{\pi}{4}$ makes with x-axis, an angle equal to
   a) 0 b) $\frac{\pi}{4}$ c) $\frac{\pi}{3}$ d) $\frac{\pi}{2}$
8. If $f(x) = x^n$; then the value of $f(1) - \frac{f'(1)}{1!} + \frac{f^n(1)}{2!} - \frac{f^{n1}(1)}{3!} + ... + \frac{(-1)^n f^n(1)}{n!}$ is
   a) 2^n b) 0 c) 2^{n-1} d) 2^{n-2}
9. If $f(a+b-x) = f(x)$, then $\int_a^b x\, f(x)dx$ is equal to
   a) $\frac{a+b}{2}\int_a^b f(b-x)dx$ b) $\frac{a+b}{2}\int_a^b f(x)dx$ c) $\frac{b-a}{2}\int_a^b f(x)dx$ d) $-\frac{a+b}{2}\int_a^b f(x)dx$
10. If linear function $f(x)$ and $g(x)$ satisfy $\int[(3x-1)\cos x + (1-2x)\sin x]dx = f(x)\cos x + g(x)\sin x + c$, then
    a) $f(x) = 3(x-1)$ b) $f(x) = 3x-5$ c) $g(x) = 3(x-1)$ d) $g(x) = 3+x$
11. Let f be a differentiable function from R to R and let $f(1) = 4$, then $\lim\limits_{x\to1}\int_4^{f(x)} \frac{2t}{x-1}dt =$
    a) $8f'(1)$ b) $4f'(1)$ c) $2f'(1)$ d) $f'(1)$
12. For real numbers x and y, define xRy is and only if $x - y + \sqrt{2}$ is an irrational number. Then the relation R is
    a) reflexive b) symmetric c) transitive d) equivalence

13. $\int \frac{2a\sin x + b\sin 2x}{(b + a\cos x)3} dx$ is equal to

a) $\frac{1}{a^2}\frac{(a^2 - b^2)}{t^2} + \frac{2b}{a^2 t} + c$ b) $\frac{2}{a^2}\frac{(a^2 - b^2)}{t^2} + \frac{2b}{a^2 t} + c$

c) $\frac{2(a^2 - b^2)}{a^2 t^2} + \frac{b}{a^2 t} + c$ d) $\frac{2}{a^2}\frac{(a^2 - b^2)}{t^3} + \frac{2b}{a^2 t} + c$

14. The binary operation '$*$'defined on the set of integers as $a * b = |a - b| - 1$ is
a) commutative b) associative c) non-commutative d) non-associative

15. Let $f(x) = ax + b$ for all $x \in R$, where $a, b \in R$ and $a \neq 0$, then $f^{-1}(x)$

a) is given by $\frac{1}{ax + b}$ b) is given by $\frac{x - b}{a}$

c) does not exist as f is not onto d) does not exist as f is not one-one

16. Suppose $f(x) = (x+1)^2$ for $x \geq 1$. If $g(x)$ is a function whose graph is the reflection of the graph of $f(x)$ in the line $y = x$, then $g(x)$ =

a) $\frac{1}{(x+1)^2}\, x > -1$ b) $-\sqrt{x} - 1$ c) $\sqrt{x} + 1$ d) $\sqrt{x} - 1$

17. Domain of the function $\frac{1}{3x + 2}$ is

a) $\left[-\frac{2}{3}, \infty\right]$ b) $\left[-\frac{2}{3}, \infty\right)$ c) $R - \left\{-\frac{2}{3}\right\}$ d) R

18. If $|x| \leq 1$, then $2\tan^{-1} x + \sin^{-1}\left[\frac{2x}{1 + x^2}\right]$ is equal to

a) 0 b) $\frac{\pi}{2}$ c) π d) $4\tan^{-1} x$

19. In a town of 840 persons, 450 persons read Hindi, 300 read English and 200 read both. Then, the number of persons who read neither is
a) 290 b) 210 c) 50 d) 180

20. The value of $\sin(2\tan^{-1}(\cdot 75))$ is equal to
a) $0 \cdot 96$ b) $0 \cdot 75$ c) $1 \cdot 5$ d) $\sin 1 \cdot 5$

21. If A and B are two matrices of the order 3 x m and 3x n respectively and m = n, then the order of the matrix 5A – 2B is
a) m x 3 b) 3 x 3 c) 3 x n d) m x n

22. The skew-symmetric of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

a) $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 0 & -2 & 2 \\ -2 & 0 & -1 \\ 2 & -1 & 0 \end{bmatrix}$ c) $\begin{bmatrix} 0 & -2 & 2 \\ 2 & 0 & 1 \\ -2 & -1 & 0 \end{bmatrix}$ d) $\begin{bmatrix} -6 & 2 & -2 \\ 2 & -3 & 1 \\ -2 & 1 & -3 \end{bmatrix}$

23. If A is a non-singular matrix of order 3, then adj (adj A) =
a) I b) |A| I c) A d) (det A) A

24. Consider the following statements:-
(1) If any two rows or columns of a determinant are identical, then the value of the determinant is zero
(2) If the corresponding rows and columns of a determinant are interchanged, then the value of determinant does not change
(3) If any two rows (or columns) of a determinant are interchanged, then the value of the determinant changes in sign
Which of these are correct?
a) 1 and 3 b) 1 and 2 c) 1, 2 and 3 d) 2 and 3

25. If a 3 x 3 matrix 'A' has its inverse equal to A, then A^2 is equal to
a) $\begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

26. If $\begin{bmatrix} x & a & a & a \\ a & x & a & a \\ a & a & x & a \\ a & a & a & x \end{bmatrix} = (x+3a)\,f(x)$, then $f(x)$ is equal to
a) $(x-a)^2$ b) $(x-a)^3$ c) $(x+a)^2$ d) $(x+a)^3$

27. The function $f(x) = \dfrac{x^2-2}{x^2-4}$ has
a) no point of local minima b) no point of local maxima
c) exactly one point of local minima d) exactly one point of local maxima

28. The altitude of a cone is 20cm and its semi-vertical angle is 30^O. If the semi-vertical angle is increasing at the rate of 2^O Per second, then the radius of the base is increasing at the rate of
a) 30cm/sec b) 10cm/sec c) $\dfrac{160}{3}$ cm/sec d) 160cm/sec

29. The total revenue `R received from the sale of x units of a product is given by
R(x) = $3x^2$ + 36x + 5. The marginal revenue when x = 5 is (marginal revenue is the rate of change of total revenue with respect to number of items sold at an instant)
a) 66 b) `66 c) 69 d) `69

30. The area of the region bounded by the parabola y^2 = x and straight line 2y = x is
a) $\dfrac{2}{3}$ square units b) 1 square units c) $\dfrac{11}{2}$ square units d) $\dfrac{13}{2}$ square units

31. The area of the circle $x^2 + y^2 = 16$ exterior to the parabola $y^2 = 6x$ is
a) $\dfrac{4}{3}(4\pi - \sqrt{3})$ b) $\dfrac{4}{3}(4\pi + \sqrt{3})$ c) $\dfrac{4}{3}(8\pi - \sqrt{3})$ d) $\dfrac{4}{3}(8\pi + \sqrt{3})$

32. The degree of the differential equation $\dfrac{d^3y}{dx^3} + x\left[\dfrac{dy}{dx}\right]^4 = 4\log\left[\dfrac{d^4y}{dx^4}\right]$ is
a) 1 b) 3 c) 4 d) degree is not defined

33. The general solution of the differential equation $\dfrac{dy}{dx} = y\tan x - y^2\sec x$ is
a) $\tan x = (c+\sec x)y$ b) $\sec y = (c+\tan y)x$ c) $\sec x = (c+\tan x)y$ d) $\sec y = (c-\tan y)x$

34. The distance of (1, 2, 5) from x-axis is
a) $\sqrt{5}$ b) $\sqrt{29}$ c) $\sqrt{26}$ d) $\sqrt{30}$

35. If the equations 2x – 3y + 5z = 7 and kx – 8y – 10z + 14 = 0 represents the same plane then k^2 – k + 1 =
a) – 4 b) 12 c) 21 d) 0

36. Equation of a plane through the line of intersection of planes 2x + 3y – 4z = 1 and 3x – y + z + 2 = 0 and parallel to 12x – y = 0 is 2x + 3y – 4z – 1 + λ (3x – y + z + 2) = 0 then λ is

a) $\frac{1}{2}$ b) 29 c) 4 d) $-\frac{1}{2}$

37. The plane $\frac{x}{2}+\frac{y}{3}+\frac{z}{4}=1$ cuts the axes in A, B, C then the area of the Δ ABC is (squnits)

a) $\sqrt{29}$ b) $\sqrt{41}$ c) $\sqrt{61}$ d) $2\sqrt{61}$

38. The image of the point (1, 3, 4) in the plane x + 2y – z + 3 = 0 is

a) (1, 1, –6) b) (–1, –1, 6) c) (–1, 1, –6) d) (1, 1, 6)

39. The key for a door is in a bunch of 10 keys. A man attempts to open the door by trying keys at random discarding the wrong key. The probability that the door is opened in fifth trial is

a) $\frac{1}{10}$ b) $\frac{2}{10}$ c) $\frac{3}{10}$ d) $\frac{4}{10}$

40. If A and B are two events such that P(A) = $\frac{3}{8}$, P(B) = $\frac{5}{8}$ and P(A$\cup$B) = $\frac{3}{4}$, then P $\left(B \mid \overline{A}\right)$=

a) $\frac{2}{5}$ b) $\frac{3}{5}$ c) $\frac{4}{5}$ d) $\frac{1}{5}$

41. If A and B are two events such that P(A$\cup$B) = $\frac{3}{4}$, P(A$\cap$B) = $\frac{1}{4}$ and P($\overline{A}$) = $\frac{2}{3}$, then P ($\overline{A}\cap B$) =

a) $\frac{1}{12}$ b) $\frac{2}{12}$ c) $\frac{7}{12}$ d) $\frac{5}{12}$

42. Seven balls are drawn simultaneously from a bag containing 5 white and 6 green balls. The probability of drawing 3 white and 4 green balls is

a) $\frac{7}{{}^{11}C_7}$ b) $\frac{{}^5C_3+{}^6C_4}{{}^{11}C_7}$ c) $\frac{{}^5C_2\times{}^6C_2}{{}^{11}C_7}$ d) $\frac{{}^6C_3\times{}^5C_4}{{}^{11}C_7}$

43. If $|\vec{a}|=4, |\vec{b}|=2$ and the angle between $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{6}$ then $(\vec{a}\times\vec{b})^2$ is

a) 48 b) $(\overline{a})^2$ c) 16 d) 32

44. ABCD is a rhombus. If $\vec{AC} = i+(1+\lambda)j+(\lambda-2)k$ and $\vec{BD} = (2\lambda-1)i+j+k$, the λ =

a) 1 b) –19 c) 2 d) –2

45. If $[\vec{a}\vec{b}\vec{c}]=2$ then $\frac{\vec{a}.\vec{b}\times\vec{c}}{\vec{c}\times\vec{a}.\vec{b}}+\frac{\vec{b}\cdot\vec{c}\times\vec{a}}{\vec{a}\times\vec{b}\cdot\vec{c}}+\frac{\vec{c}\cdot\vec{a}\times\vec{b}}{\vec{b}\times\vec{c}\cdot\vec{a}}$ =

a) 3 b) 1 c) –1 d) 0

46. If $x+y\le 2, x\ge 0, y\ge 0$ the point at which maximum value of 3x + 2y at —— will be

a) (0, 2) b) (0, 0) c) (2, 0) d) $\left(1/2, 1/2\right)$

47. If $\cos 5x+1=0$, where $0<x\le\frac{\pi}{2}$, then find the value of x

a) $\frac{\pi}{6},\frac{\pi}{4},\frac{\pi}{7}$ b) $\frac{\pi}{6},\frac{\pi}{4},\frac{\pi}{2}$ c) $\frac{\pi}{3},\frac{\pi}{4},\frac{\pi}{2}$ d) $\frac{\pi}{3},\frac{\pi}{6},\frac{\pi}{8}$

48. If $\sin\theta=-\frac{4}{5}$ and θ lies in the third quadrant, then $\cos\frac{\theta}{2}$ is equal to

a) $\frac{1}{\sqrt{5}}$ b) $-\frac{1}{\sqrt{5}}$ c) $\sqrt{\frac{2}{5}}$ d) $-\sqrt{\frac{2}{5}}$

49. If a $\cos 2\theta + b\sin 2\theta = c$ has α and β as its roots, then $\tan\alpha + \tan\beta$ is equal to

a) $-\frac{2b}{a+c}$ b) $\frac{2b}{a+c}$ c) $\frac{3b}{a+c}$ d) $\frac{4b}{a+c}$

50. The real value of 'a' for which the expression $\frac{1-i\sin a}{1+2i\sin a}$ is purely real is, where $n \in N$

a) $(n+1)\frac{\pi}{2}$ b) $(2n+1)\frac{\pi}{2}$ c) $n\pi$ d) $\frac{n\pi}{2}$

51. Let s = {x : x is a positive multiple of 3 less than 100}
p = {x : x is a prime number less than 20}. Then, n (s) + n (p) is

a) 34 b) 41 c) 33 d) 30

52. If $\frac{1}{6!}+\frac{1}{7!}=\frac{x}{8!}$, then the value of x is

a) 63 b) 64 c) 66 d) 65

53. In how many ways can a student choose a program of 5 courses, if 9 courses are available and 2 specific courses, if 9 courses are available and 2 specific courses are compulsory for every student?

a) 34 b) 36 c) 35 d) 37

54. The sum of the infinity of the series: $1+\frac{2}{3}+\frac{6}{3^2}+\frac{10}{3^3}+...$ is

a) 3 b) 4 c) 6 d) 2

55. The owner of a milk store finds that he can sell 980 L of milk each week at `14 per litre and 1220 L of milk each week at `16 per litre. Assuming a linear relationship between selling price and demand, how many litres could be selling weekly at `17 per litre?

a) 1240 L b) 1340 L c) 1350 L d) 1250 L

56. The centre of a circle is (2, –3) and the circumference is 10π. Then, the equation of the circle is

a) $x^2 + y^2 + 4x + 6y + 12 = 0$ b) $x^2 + y^2 – 4x + 6y – 12 = 0$

c) $x^2 + y^2 – 4x + 6y – 12 = 0$ d) $x^2 + y^2 – 4x – 6y – 12 = 0$

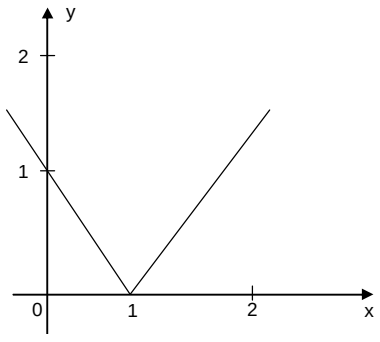
57. The area of the triangle formed by the lines joining the vertex of the parabola $x^2 = 12y$ to the ends of Latus rectum is

a) 20 sq. units b) 18 sq. units c) 17 sq. units d) 19 sq. units

58. If the Co-efficient of variation and standard deviation are 60 and 21 respectively, the arithmetic mean of distribution is

a) 60 b) 30 c) 35 d) 21

59. The function represented by the following graph is



a) Continuous but not differentiable at x = 1 b) Differentiable but not continuous at x = 1

c) Continuous and differentiable at x = 1 d) Neither continuous nor differentiable at x = 1

60. If $f(x)=\begin{cases}\frac{3\sin \pi x}{5x} & x \neq 0 \\ 2k & x = 0\end{cases}$ is continuous at

a) $\frac{\pi}{10}$ b) $\frac{3\pi}{10}$ c) $\frac{3\pi}{2}$ d) $\frac{3\pi}{5}$