UNIVERSAL ACADEMY

Icon of Success and Excellence

MOCK CET - 2015

DATE	SUBJECT	TIME
02.05.2015	**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–3	

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 1^{st} **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 **2^{nd} 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 **2^{nd} 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:

① ● ③ ④

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 – 3

1. If $f: R \to R$ is defined by $f(x) = \dfrac{2x+1}{3}$ then $f^{-1}(x) =$

   a) $\dfrac{x-3}{2}$ b) $\dfrac{3x-1}{2}$ c) $\dfrac{2x-1}{3}$ d) $\dfrac{x-4}{3}$

2. If $f(x) = 2^x$ then $\dfrac{f(x+3)}{f(x-1)} =$

   a) $f(1)$ b) $f(2)$ c) $f(3)$ d) $f(4)$

3. If $f(x+y) = f(x)f(y)$ and $f(5) = 32$ then $f(7)$

   a) 16 b) 32 c) 64 d) 128

4. The domain of $f(x) = \sqrt{25 - x^2}$ is

   a) (–5, 5) b) [–5, 5] c) $(-\infty, \infty)$ d) $(5, \infty)$

5. The value of $\sin(\cot^{-1}(\cos(\tan^{-1} x)))$ is

   a) $\dfrac{x}{\sqrt{x^2+2}}$ b) $\sqrt{\dfrac{x^2+2}{x^2+1}}$ c) $\sqrt{\dfrac{x^2+1}{x^2+2}}$ d) $\dfrac{1}{\sqrt{x^2+1}}$

6. The numerical value of $\tan\left(2\tan^{-1}\dfrac{1}{5} - \dfrac{\pi}{4}\right)$ is

   a) $-\dfrac{7}{17}$ b) $\dfrac{7}{17}$ c) $\dfrac{17}{7}$ d) $-\dfrac{17}{7}$

7. If $\cos^{-1}\left(\dfrac{x}{a}\right) + \cos^{-1}\left(\dfrac{y}{b}\right) = \theta$ then $\dfrac{x^2}{a^2} - \dfrac{2xy}{ab}\cos\theta + \dfrac{y^2}{b^2} =$

   a) $\tan^2\theta$ b) $\cot^2\theta$ c) $\cos^2\theta$ d) $\sin^2\theta$

8. If A is skew-symmetric matrix and n is even positive integer then A^n is

   a) skew-symmetric matrix b) symmetric matrix
   c) unit matrix d) diagonal matrix

9. If Tr(A) = 8, Tr(B) = 6 then Tr(A – 2B) =

   a) 4 b) 2 c) –2 d) –4

10. If AB = A and BA = B then

    a) A = 2B b) B = 2A c) $A^2 = A$ and $B^2 = B$ d) A = B

11. If A is an non-singular matrix of order 3 x 3 then |adj A| =

    a) |A| b) $|A|^2$ c) $|A|^3$ d) 4

12. If the order of A is 4 x 3, the order of B is 4 x 5 and the order of C is 7 x 3 then the order of $(A'B)'C'$ is

    a) 5 x 7 b) 4 x 3 c) 3 x 7 d) 4 x 5

13. $\begin{vmatrix} (2^x+2^{-x})^2 & (2^x-2^{-x})^2 & 1 \\ (3^x+3^{-x})^2 & (3^x-3^{-x})^2 & 1 \\ (4^x+4^{-x})^2 & (4^x-4^{-x})^2 & 1 \end{vmatrix}$ is

    a) $(2^x+2^{-x})^4$ b) $(3^x+3^{-x})^4$ c) $(4^x+4^{-x})^4$ d) 0

14. $\begin{vmatrix} 0 & a-b & b-c \\ b-a & 0 & c-a \\ c-a & a-c & 0 \end{vmatrix}$ is

    a) abc b) a – b – c c) 0 d) –1

15. If $f(x) = \begin{cases} \dfrac{\log x}{x-1} & if\ x \neq 1 \\ k & if\ x = 1 \end{cases}$ is continuous at x = 1 then k =

a) e b) 1 c) –1 d) 0

16. If $f(x) = \begin{cases} x\sin\left(\frac{1}{x}\right) & if\ x \neq 0 \\ 0 & if\ x = 0 \end{cases}$ then at x = 0, the function is

a) continuous but not differentiable b) differentiable but not continuous
c) continuous and differentiable d) not continuous

17. Let $f(x) = e^x, g(x) = \sin^{-1} x$ and $h(x) = f(g(x))$ then $\frac{h'(x)}{h(x)}$

a) $e^{\sin^{-1} x}$ b) $\sin^{-1} x$ c) $\frac{1}{\sqrt{x^2-1}}$ d) $\frac{1}{\sqrt{1-x^2}}$

18. If $\sin y = x\sin(a+y)$, then $\frac{dy}{dx}$ =

a) $\frac{\sin a}{\sin^2(a+y)}$ b) $\sin\cdot a\sin^2(a+y)$ c) $\frac{\sin^2(a+y)}{\sin a}$ d) $\frac{\sin y}{\sin^2(a+y)}$

19. $\frac{d}{dx}\left[\sin^2 \cot^{-1}\sqrt{\frac{1+x}{1-x}}\right]$ =

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

20. If the function $f(x) = x^3 + e^{\frac{x}{2}}$ and $g(x) = f^{-1}(x)$ then the value of $g(x) = f^{-1}(x)$ is

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

21. A point on the parabola y^2 = 18x at which the ordinate increases as twice the rate of the abscissa is

a) $\left(-\frac{9}{8}, \frac{9}{2}\right)$ b) $\left(\frac{9}{8}, \frac{9}{2}\right)$ c) $\left(\frac{9}{2}, \frac{9}{8}\right)$ d) $\left(\frac{9}{2}, -\frac{9}{8}\right)$

22. The equation of the normal to the curve $y^4 = ax^3$ at (a, a) is
a) 4x + 3y = 7a b) 4x – 3y = a c) 4x – 3y = 0 d) x + 2y = 3a

23. The minimum value of $f(x) = \sin^4 x + \cos^4 x \quad 0 \leq x \leq \frac{\pi}{2}$ is

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

24. If $f(x) = \frac{1}{x+1} - \log(1+x)$, x > 0 then f is

a) a decreasing function b) an increasing function
c) both increasing and decreasing function d) neither increasing nor decreasing function

25. $\int \cos x \log\left(\tan\frac{x}{2}\right)dx$ =

a) $\sin x \cdot \log\tan\left(\frac{x}{2}\right) + c$ b) $\sin x \log\left(\tan\frac{x}{2}\right) - x + c$

c) $\sin x \log\left(\tan\frac{x}{2}\right) + x + c$ d) none of these

26. $\int \frac{dx}{x(x^n+1)}$ =

a) $\log\left(\frac{x^n}{x^n+1}\right) + c$ b) $\log\left(\frac{x^n+1}{x^n}\right) + c$ c) $\frac{1}{n}\log\left(\frac{x^n+1}{x^n}\right) + c$ d) $\frac{1}{n}\log\left(\frac{x^n}{x^n+1}\right) + c$

27. $\int \frac{dx}{\cos + \sqrt{3}\sin x}$ =

a) $\frac{1}{2}\log\tan\left(\frac{x}{2}+\frac{\pi}{12}\right)+c$ b) $\frac{1}{2}\log\tan\left(\frac{x}{2}-\frac{\pi}{12}\right)+c$

c) $\log\tan\left(\frac{x}{2}+\frac{\pi}{12}\right)+c$ d) $\log\tan\left(\frac{x}{2}-\frac{\pi}{12}\right)+c$

28. If $\int e^{x}(1+x)\sec^{2}(xe^{x})dx = f(x)+c$ then $f(x)$ =

a) $\sec(xe^{x})+c$ b) $-\sec(xe^{x})+c$ c) $\tan(xe^{x})+c$ d) $\tan(e^{x})+c$

29. $\int_{0}^{\frac{\pi}{4}}(\sin^{100}x-\cos^{100}x)\,dx$

a) $\frac{1}{100}$ b) 100 c) $\frac{\pi}{100}$ d) 0

30. $\int_{0}^{\frac{\pi}{4}}\log(1+\tan x)dx =$

a) $\frac{\pi}{8}\log\left(\frac{1}{2}\right)$ b) $\frac{\pi}{8}\log 2$ c) $\frac{\pi}{4}\log\frac{1}{2}$ d) $\frac{\pi}{4}\log 2$

31. $\int\left[\sin\left(\log_e^x\right)+\cos\left(\log_e^x\right)\right]dx$ =

a) $x\cos\left(\log_e^x\right)+c$ b) $x\sin\left(\log_e^x\right)+c$ c) $\sin\left(\log_e^x\right)+c$ d) $\cos\left(\log_e^x\right)+c$

32. The area bounded by y = x^2 + 2,
x-axis, x = 1 and x = 2 is

a) $\frac{16}{3}$ b) $\frac{17}{3}$ c) $\frac{13}{3}$ d) $\frac{20}{3}$

33. The area enclosed between the curves y = x^3 and and y = $\sqrt{x}$ is

a) $\frac{5}{12}$ b) $\frac{12}{5}$ c) $\frac{5}{4}$ d) $\frac{4}{5}$

34. Area enclosed between the curves y = ax^2 and x = ay^2 (a > 0) is 1sq.units then a =

a) $\frac{1}{3}$ b) $\frac{1}{\sqrt{3}}$ c) 3 d) $\sqrt{3}$

35. Degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^{\frac{3}{4}}-y=0$

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

36. The differential equation $y\frac{dy}{dx}+x=c$ represents

a) a family of hyperbolas b) a family of ellipses

c) a family of circles whose centres on x-axis d) a family of circles whose centres on y-axis

37. The integrating factor of the differential equation $\cos\frac{dy}{dx}+y\sin x=1$ is

a) $\tan x$ b) $\cot x$ c) $\sec x$ d) $\cos x$

38. If A and B are two sets then $A\cap(A\cup B)$ =

a) ϕ b) A c) B d) $A\cap B$

39. The value of tan1^{O} tan2^{O}….. tan89^{O} is

a) 1 b) 0 c) $\frac{1}{2}$ d) not defined

40. Let P(n) : "2" < (1 x 2 x 3 x ….. x n) Then the smallest positive integer for which P(n) is true is
a) 1 b) 2 c) 3 d) 4

41. If $\left(\frac{1+i}{1-i}\right)^x = 1$, then x is (where n$\in$N)
a) 2n b) 2n + 1 c) 4n d) 4n + 1

42. The number of triangles that are formed by choosing the vertices from a set of 12 points, seven of which lie in the same line is
a) 175 b) 185 c) 158 d) 220

43. The total number of terms in the expansion of $(x + a)^{51} – (x – a)^{51}$ after simplification is
a) 26 b) 25 c) 51 d) 102

44. The minimum value of the expression $3^x + 3^{1-x}$, $x \in R$ is
a) 0 b) 3 c) $2\sqrt{3}$ d) $\frac{1}{3}$

45. The equation of the straight line passing through the point (3, 2) and perpendicular to the line y = x is
a) x – y = 5 b) x + y = 5 c) x + y = 1 d) x – y = 1

46. The area of a circle centred at (1, 2) and passing through (4, 6) is
a) 25 b) 25π c) 5 d) 5π

47. $\lim_{x\to 0} \frac{\cos ecx - \cot x}{x}$ is
a) 1 b) –1 c) $\frac{1}{2}$ d) $-\frac{1}{2}$

48. The negation of the statement "It is raining and weather is cold" is
a) It is not raining or weather is not cold
b) It is not raining and weather is not cold
c) It is raining or weather is cold
d) It is not raining or weather is old

49. A line makes angles α, β, γ with the x, y and z axes respectively then $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$ =
a) 1 b) 2 c) –1 d) 0

50. The vector $\overrightarrow{AB} = 3\hat{i} + 4\hat{k}$ and $\overrightarrow{AC} = 5\hat{i} + 2\hat{j} + 4\hat{k}$ are the sides of a triangle ABC. The length of the median through A is
a) $\sqrt{72}$ b) $\sqrt{18}$ c) $\sqrt{33}$ d) $\sqrt{288}$

51. If $[\vec{a}\vec{b}\vec{c}] = 2$ then $\frac{\vec{a}\cdot(\vec{b}\times\vec{c})}{(\vec{c}\times\vec{a})\cdot\vec{b}} + \frac{\vec{b}\cdot(\vec{c}\times\vec{a})}{(\vec{a}\times\vec{b})\cdot\vec{c}} + \frac{\vec{c}\cdot(\vec{a}\times\vec{b})}{(\vec{b}\times\vec{c})\cdot\vec{a}}$ =
a) 0 b) 1 c) –1 d) 3

52. The locus of the point $(r\sin\alpha\cos\beta, r\cos\alpha\sin\beta, r\sin\alpha)$ where α, β, γ are variables and r is constant is
a) x + y + z = r b) $x^2 + y^2 + z^2$ = r2 c) $x^2 + y^2 + z^2 = r$ d) $x + y + z = r^2$

53. If the centroid of tetrahedron 0ABC where A, B, C are given by (a, 3, 3), (1, b, 2) and (2, 1, c) respectively is (1, 2, –1) then distance p(a, b, c) from origin is
a) $\sqrt{107}$ b) $\sqrt{14}$ c) $\sqrt{\frac{107}{14}}$ d) $\sqrt{13}$

54. The foot of the perpendicular from the point (1, 3, 4) to the plane 2x – y + z + 3 = 0 is
a) (1, – 4, 3) b) (– 3, 2, 5) c) (3, –2, 5) d) (–1, 4, 3)

55. The optimal value of the objective function is attained at the points
a) Intersections of the inequalities with x-axis only
b) Intersections of the inequalities with axes only
c) corner points of the feasible region
d) None of these

56. Region represented by the inequation $x \geq 0, y \geq 0$ is

a) first quadrant b) second quadrant c) third quadrant d) fourth quadrant

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

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

58. A bag contains 3 red, 4 white and 7 black balls the probability of drawing a red or a black ball is

a) $\frac{2}{7}$ b) $\frac{3}{7}$ c) $\frac{4}{7}$ d) $\frac{5}{7}$

59. A and B are two events such that P(A) = 0.4 P(A $\cup$ B) = 0.7 if A and B are independent then P(B)

a) 0.3 b) 0.4 c) 0.5 c) 0.7

60. Five horses are in a race. A person selects 2 of horses at random and bets on them. The probability that he selected the winning horse is

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