BOOKLET SERIES

C

30/06/2019

AFFIX PRESCRIBED RUBBER STAMP

CODE : DEF-13/2019

Test Topic : *APPLICATION OF DERIVATIVS, HEIGHTS AND DISTANCE, ARITHMATICS*

MATHEMATICS

ROLL NO. (In figure) | | | | | | | | | | OMR SRIAL NO. | | | | | | | |

(Only in english)

OMR SERIAL NO. (In words).....

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NAME OF THE CENTRE .....

TIME : 1 Houre

MM : 100

Signature of the invigilator

IMPORTANT INSTRUCTIONS

1- The candidate will write his/her Roll No. only at the place provided for i.e. on the cover page and on answer sheet given and nowhere else.

2- Immediately on the receipt of the question booklet, the condidate all the pages and that on question is missing. If there is any discrepancy, it should be reported by the candidate to the ivigilator within 10 minutes of issue of this question booklet without any discrepancy be obtained.

vko';d funsZ'k

1- vH;FkhZ viuk vudekd doy vkoj.k i'B rFkk i'u ifLrdk d lkFk fn; x, mRrj&i=d d fufn"V LFkku ij fy[kx] vU;= dgh ughA

2- i'u ifLrdk feyu d mijkUr vH;FkhZ dk rjUr tkp dj lfuf'pr dj yuk pkfg, fd ifLrdk e ij i"B g rFkk dkb i'u NV rk ugh x;k gA ;fn dkb folxfr g rk i'u&ifLrdk feyu d 10 feuV d Hkhrj gh d{k fujh{kd dk lfpr djuk pkfg, rFkk =fV jfgr nljh ifLrdk ikIr dj yuh pkfg,A

Numer of Questions : 50

SHUKLA SIR MATHS CLASSES

M.M. : 100 **MATHS** **TIME : 1 Hour**

T.G.T / P.G.T **(SHUKLA SIR MOB - 7800731619**

Test Topic : APPLICATION OF DERIVATIVS, HEIGHTS AND DISTANCE, ARITHMATICS

1. The curve $y = ax^3 + bx^2 + cx$ is inclined at 45^0 to the x-axis at $(0,0)$ but it touches x-axis at $(1,0)$, then the values of a,b,c are given by :

(a) $a=-2,b=1,c=1$ (b) $a=1,b=1,c=-2$ (c) $a=1,b=-2,c=1$ (d) $a=-1,b=2,c=1$

2. The tangent to the curve $x=a(\theta-\sin\theta)$, $y=a(1+\cos\theta)$ at the point $\theta=(2k+1)\pi, k\in z$ are parallel to:

(a) $y=x$ (b) $y=-x$ (c) $y=0$ (d) $x=0$

3. All the points on the curve $y^2=4a\left(x+a\sin\frac{x}{a}\right)$ at which the tangents are parallel to the axis of x lie on a :

(a) circle (b) parallel (c) line (d) none of these

4. The tangent to a given curve is perpendicular to x-axis if :

(a) $\frac{dy}{dx}=0$ (b) $\frac{dy}{dx}=1$ (c) $\frac{dx}{dy}=0$ (d) None of these

5. If the slope of the normal to the curve $x^3=8a^2y$, $a>0$ at a point in the first quadrant is $-\frac{2}{3}$, then the point is:

(a) $(2a,-a)$ (b) $(2a,a)$ (c) $(a,2a)$ (d) $(-a,a)$

6. If the sub normal at any point on $y=a^{1-n}x^n$ is of constant length, then the value of *n* is :

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

7. If the tangent of the curve $2y^3=ax^2+x^3$ at the point (a,a) cuts off intercepts α and β on the co-ordinate axes such that $\alpha^2+\beta^2=61$, then *a* =

(a) ±30 (b) ±5 (c) ±6 (d) ±61

8. A tower stands at the centre of a circular park. *A* and *B* are two points on the boundary of the park such that *AB* (=a) subtends an angle of 60^0 at the foot of the tower, and the angle of elevation of the top of the tower from *A* or *B* is 30^0. The height of the tower is :

(a) $\frac{2a}{\sqrt{3}}$ (b) $2a\sqrt{3}$ (c) $\frac{a}{\sqrt{3}}$ (d) $a\sqrt{3}$

9. *AB* is a vertical pole with B at the ground level and A at the top. *A* man finds that the angle of elevation of the point *A* from a certain point A from a certain point *C* on the ground is 60^0. He moves away from the pole along the line BC to a point *D* such that *CD*=7m. From D the angle of elevation of the point A is 45^0. Then the height of the pole is :

(a) $\frac{7\sqrt{3}}{2}\left(\sqrt{3}+1\right)m$ (b) $\frac{7\sqrt{3}}{2}\left(\sqrt{3}-1\right)m$ (c) $\frac{7\sqrt{3}}{2}\frac{1}{\sqrt{3}+1}m$ (d) $\frac{7\sqrt{3}}{2}\frac{1}{\sqrt{3}-1}m$

10. A tower is situated on horizontal plane. From two points, the line joining these points passes the base and which are a and b distance from the base. The angle of elevation of the top are α and $90^0-\alpha$ and θ is the angle which two points joining the line makes at the top, the height of tower will be :

(a) $\frac{a+b}{a-b}$ (b) $\frac{a-b}{a+b}$ (c) $\sqrt{ab}$ (d) $(ab)^{1/3}$

11. The angle of elevation of the top of a pillar at any point *A* on the ground is 15^0. On walking 40 metres towards the pillar, the angle becomes 30^0. The height of the pillar is :

(a) 40 metres (b) 20 metres (c) $20\sqrt{3}$ metres (d) $\frac{40}{3}\sqrt{3}$ metres

12. From an aeroplane vertically over a straight horizontally road, the angle of depression of two consecutive mile stones on opposite sides of the aeroplane are observed to be α and β, then the height in miles of aeroplane above the road is :

(a) $\frac{\tan\alpha.\tan\beta}{\cot\alpha+\cot\beta}$ (b) $\frac{\tan\alpha+\tan\beta}{\tan\alpha.\tan\beta}$ (c) $\frac{\cot\alpha+\cot\beta}{\tan\alpha.\tan\beta}$ (d) $\frac{\tan\alpha.\tan\beta}{\tan\alpha+\tan\beta}$

13. A person observe the angle of elevation of a building as 30^0. The person proceeds towards the building with a speed of $25\left(\sqrt{3}-1\right)m/hour$. After 2 hours, he observes the angle of elevation as 45^0. The height of the building (in meter) is :

(a) 100 (b) 50 (c) $50\left(\sqrt{3}+1\right)$ (d) $50\left(\sqrt{3}-1\right)$

14. ABCD is a ractangular field. a vertical lamp post of height 12 m stands at the corner A. If the angle of elevation of its top from B is 60 and from C is 45, then the area of the field is :

(a) $48\sqrt{2}sq.m$ (b) $48\sqrt{3}sq.m$ (c) $48sq.m$ (d) $12\sqrt{2}sq.m$

15. The shadow of a tower is found to be 60 metre shorter when the sun's altitude changes from 30^0 to 60^0. The height of the tower from the ground is approximately equal to :

(a) 62m (b) 301m (c) 101m (d) 75m

16. A tower subtends an angle α at a point A in the plane of its base and the angle of depression of the foot of the tower at a point *l* meter just above A is β. The height of the tower is :

(a) $l\tan\beta\cot\alpha$ (b) $l\tan\alpha\cot\beta$ (c) $l\tan\alpha\tan\beta$ (d) $l\cot\alpha\cot\beta$

17. The angle of the depression of a ship from the top of a tower 30^0 metre high is 60^0, then the distance of ship from the base of tower is :

(a) $30m$ (b) $30\sqrt{3}m$ (c) $10\sqrt{3}m$ (d) 10 *m*

18. If the angles of elevation of two towers from the middle point of the line joining their feet be 60^0 and 30^0 respectively, then the ratio of their heights is :

(a) 2 :1 (b) $1:\sqrt{2}$ (c) $3:1$ (d) $1:\sqrt{3}$

19. The angle of elevation of the top of the tower observed from each of the three points A, B, C on the ground, forming

a triangle is the same angle α. If R is the circum-radius of the triangle *ABC*, then the height of the tower is :

(a) $R\sin\alpha$ (b) $R\cos\alpha$ (c) $R\cot\alpha$ (d) $R\tan\alpha$

20. The angle of elevation of a tower at a point distant d meters from its base is 30^0. If the tower is 20 meters high, then the value of d is :

(a) $10\sqrt{3}m$ (b) $\frac{20}{\sqrt{3}}m$ (c) $20\sqrt{3}$ (d) $10m$

21. The equation of a normal to the parabola $y^2 = 4x$ which passes through the point $(6,0)$ is :

(a) $y+2x=12$ (b) $y-2x=12$ (c) $y+2x=6$ (d) $y-2x=6$

22. The equation of the normal at the point $(1,1)$ on the curve $2y+x^2=3$ is :

(a) $x+y=0$ (b) $x+y+1=0$ (c) $x-y=0$ (d) $x-y=1$

23. The differntial coefficient of $e^{\sin^{-1}}$ with respect to $\sin^{-1}x$ is :

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

24. The differential coefficient of $\sin^{-1}x$ with respect to $\cos^{-1}x$ is :

(a) -1 (b) $\frac{1}{\sqrt{1-x^2}}$ (c) $-\frac{1}{\sqrt{1-x^2}}$ (d) None of these

25. Equation of the tangent to the cuve $x^3-y^3+7x^2-8y^2+12x-6y=0$ at origin is :

(a) $x^3-y^3=0$ (b) $2x-y=0$ (c) $14x-16y=0$ (d) None of these

26. The maximum area of an isosceles triangle inscribed in a circle of radius *r* is :

(a) r^2 (b) $\frac{r^2}{2}$ (c) $\frac{r^2}{4}$ (d) $\frac{r^2}{8}$

27. The angle between the straight lines $x+y\sqrt{3}=4$ and $x\sqrt{3}-y=5$:

(a) $\pi/6$ (b) $\pi/3$ (c) $\pi/4$ (d) $\pi/2$

28. The maximum value of $\frac{1}{\sqrt{2}}(\sin x-\cos x)$ for *x* in R is :

(a) $\sqrt{2}$ (b) $\sqrt{3}$ (c) 2 (d) 1

29. If $y=x^{x^{x^{\cdots\cdots\infty}}}$, then $x\frac{dy}{dx}$ is :

(a) $\frac{y^2}{1-y\log x}$ (b) $\frac{x^2}{1-y\log x}$ (c) $\frac{y^2}{1+y\log x}$ (d) $\frac{x^2}{1+y\log x}$

30. The points on the curve $x^2+y^2-2x-3=0$ at which the tangents are parallel to x-axis are :

(a) $(0,2),(0,1)$ (b) $(1,2),(1,-2)$ (c) $(1,4),(1,-4)$ (d) None of these

31. The maximum slope attained by the curve $y=-x^3+18x+7$ is :

(a) -1 (b) -3 (c) 18 (d) 20

32. The angle of intersection of the curve $x^2-y^2=a^2$ and $x^2+y^2=a^2\sqrt{2}$ is :

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

33. The normal to a given curve is parallel to x axis if :

(a) $\frac{dy}{dx}=0$ (b) $\frac{dy}{dx}=1$ (c) $\frac{dx}{dy}=0$ (d) $\frac{dx}{dy}=1$

34. Given that $f(x)=x^{1/x}, x>0$ has the maximum value at $x=e$, then :

(a) $e^{\pi}>\pi^{e}$ (b) $e^{\pi}<\pi^{e}$ (c) $e^{\pi}=\pi^{e}$ (d) $e^{\pi}\le\pi^{e}$

35. The tangent to the curve $x=a(\theta+\sin\theta)$ m, $y=a(1+\cos\theta)$ at $\theta=\frac{\pi}{3}$ makes an angle α which axis, then α = :

(a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) $\frac{\pi}{6}$ (d) $\frac{5\pi}{6}$

36. If the function $f(x)=a\sin x+\frac{1}{3}\sin 3x$ has maximum value at $x=\frac{\pi}{3}$ then the value of a is :

(a) 3 (b) 1/3 (c) 2 (d) 1/2

37. The arithmetic meanof the following numbers is 1,2,2,3,3,3,4,4,4,4 5,5,5,5,5,6,6,6,6,6,6, 7,7,7,7,7,7,7

(a) 4 (b) 5 (c) 14 (d) 20

38. The average of the six numbers is 20. If one number is removed, the average becomes 15. What is the number removed ?

(a) 5 (b) 35 (c) 112 (d) 45

39. The average of the first three numbers is double of the fourth number. If the average of all the four numbers is 12, Find the fourth number.

(a) 16 (b) 48/7 (c) 20 (d) 18/7

40. The average of 6 consecutive even numbers is 25, the difference between the largest and the smallest number is :

(a) 18 (b) 10 (c) 12 (d) 14

41. If $A:B=\frac{1}{2}:\frac{1}{3}$, $B:C=\frac{1}{2}:\frac{1}{3}$, then $A:B:C$ is equal to :

(a) 2 : 3 : 3 (b) 1 : 2 : 6 (c) 3 : 2 : 6 (d) 9 : 6 : 4

42. If $2A=3B$ and $4B=5C$, Then $A:C$ is :

(a) $4:3$ (b) $5:3$ (c) $1:3$ (d) $3:1$

43. If $(x:y)=2:1$ then $(x^2-y^2):(x^2+y^2)$ is :

(a) $3:5$ (b) $5:3$ (c) $1:3$ (d) $3:1$

44. A, B and C rent a pasture . A puts 10 oxen for 7 months, B put 12 oxen for 5 months and C puts 15 oxen for 3 months for grazing. If the rent of the pasture is `175 then how much C must pay as his share or rent :

(a) `45 (b) `50 (c) `55 (d) `60

45. A and B are partners in a business. A contrbutes 1/4 of the capital for 15 months and B received 1/4 of the profit. Find for how long B's money was invested in the business?

(a) 1 year (b) 9 months (c) 6 months (d) 10 months

46. A, B and C are partners of a company. During a particular year A received 1/3 of the profit, B recieved 1/4 of the profit and C received the remaining `5000. how much did A receive?

(a) `5000 (b) `4000 (c) `3000 (d) `1000

47. By selling an article at 3/4 th of the marked price, there is gain of 25%. The ratio of the marked price and the cost price is :

(a) 5 : 3 (b) 3 : 5 (c) 3 : 4 (d) 4 : 3

48. Successive discounts of 10%, 20% and 50% will be equivalent to a single discount of :

(a) 36% (b) 64% (c) 80% (d) 56%

49. A retailer offers the following discount scheme for buyers on an article :

I. Tho successive discounts of 10%

II. A discount of 12% followed by a discount of 8%

III. Successive discounts of 15% and 5%

IV. A discount of 20%

The following price will be minimum under the scheme

(a) I (b) II (c) III (d) IV

50. A can do a piece of work in 5 hours, B and C can do it in 3 hours; A and C can do it in 2 hours. How long will B alone take to do it?

(a) 10 hours (b) 12 hours (c) 8 hours (d) 24 hours

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30-06-2019

MATH TEST – ANSWERS

TOPIC : *APPLICATION OF DERIVATIVS, HEIGHTS AND DISTANCE, ARITHMATICS*

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