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Roll No. .....

202012

1st Sem / Branch : Advance Diploma in Tool and Die

Subject:- Applied Mathematics

Time : 3Hrs. M.M. : 100

SECTION-A

Note: Multiple choice questions. All questions are compulsory (10x1=10)

Q.1 If n is a natural number, then ${}^{n}C_{n}$ = _____

a) 1 b) n!

c) 0 d) None of these

Q.2 If a is the first term and d is the common difference in an Arithmetic Progression (A.P), then m^{th} term of the A.P. is_____

a) a.m.d b) $a.d^{m-1}$

c) a+(m-1)d d) None of these

Q.3 $\frac{11\pi}{12}$ radians = _____degree

a) 165 b) 145

c) 155 d) None of these

Q.4 Distance between the points (2,0) and (6,0) is_____

a) 0 *units* b) 4 *units*

c) -4 *units* d) None of these

Q.5 If m_1 and m_2 are slopes of two straight lines θ is the angle between them, then $\tan\theta$ = _____

a) $|m_1-m_2|$ b) $\left|\frac{m_1+m_2}{1+m_1.m_2}\right|$

c) $\left|\frac{m_1-m_2}{1+m_1.m_2}\right|$ d) None of these

cos A and cos B, where a,b and c denote the lengths of the sides of BC, CA and AB respectively

Q.26 Find the equation of straight line passing through the point (-4,-9) and having slope equal to -3

Q.27 Find the equation of circle if (-7,3) and (5,-9) are the end points of a diameter of the circle.

Q.28 Find the length of transverse axis and conjugate axis, eccentricity and coordinates of vertices of the hyperbola $9y^2 - 4x^2 = 36$

Q.29 Find the vertex, focus, directrix and latus rectum of the parabola $y^2 = -5x$

Q.30 Evaluate the following limit: $\lim_{x \to 5} \frac{x^4-625}{x-5}$

Q.31 Find $\frac{d^2y}{dx^2}$ at $x=0$, if $y=(2x+1)^2.\sin 2x$.

Q.32 Determine the volume of the solid of revolution formed by revolving the axes enclosed by the curve $y = 3x^2-1$, the y-axis and y = 2, y = 4 through one revolution about y-axis

Q.33 Evaluate $\int x^2 \cos x\, dx$.

Q.34 Solve the differential equation $\frac{dy}{dx} - \frac{y}{x} = 2x^2$

Q.35 Solve the differential equation $(D^2+2)y = e^x + \sin 2x$, where $D = \frac{d}{dx}$

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x10=20)

Q.36 Prove that $\sin A.\sin(60° - A).\sin(60° + A) = \frac{1}{4}\sin 3A$

Q.37 Find all the points of maxima & minima and corresponding maximum & minimum values of the function $y = x^3 - \frac{x^2}{2} - 2x + 4$

Q.38 Apply Simpson's rule to find approximate value of $\int_2^{10} (3 + 2x^2)\, dx$ by taking 8 equal subintervals of $2 \le x \le 10$.

Q.6 $\frac{d}{dx}\, e^{5x+1} =$ _____

a) $5.e^{5x+1}$ b) e^{5x+1}

c) $5.e^{5}$ d) none of these

Q.7 The rate of change of circumference of a circle i.e. $2\pi r$ with respect to radius r is _____

a) $2\pi r$ b) 2

c) 0 d) 2π

Q.8 The root mean square value of the curve $y = f(x)$ over the range x=a & x =b is given by

a) $\sqrt{\frac{1}{(a+b)} \int_a^b y^2\, dx}$ b) $\sqrt{\int_a^b y^2 dx}$

c) $\sqrt{\frac{1}{(b-a)}}$ d) $\sqrt{\frac{1}{(b-a)} \int_a^b y^2\, dx}$

Q.9 $\int_0^{\pi/2} 2\, dx$ =_____

a) $\pi/2$ b) π

c) 0 d) None of these

Q.10 $(y^2+1)\, dx + (xy + x^2y)\, dy = 0$ is a_____differential equation.

a) homogeneous b) linear

c) non-homogeneous d) None of these

SECTION-B

Note: Objective type questions. All questions are compulsory. (10x1=10)

Q.11 How many terms are there in the binomial expansion of $\left(3y - \frac{y}{3}\right)^{11}$

Q.12 What is the value of *cosec* 0° ?

Q.13 Fill in the blank:

$1 + tan^2\theta =$_____

Q.14 In which quadrant the point $(-7\sqrt{2}, -5\sqrt{3})$ lies?

Q.15 What is the centroid of the triangle whose vertices are (1,0), (0,1) and (1,1)?

Q.16 Fill in the blanks:

$\lim_{x \to 0} \frac{tan\, x}{x} =$ _____

Q.17 $\frac{d}{dx}\, (cosec^{-1}x) =$ _____

Q.18 What is the value of $\int \frac{-5}{x+3} dx$

Q.19 What is the value of $\int \frac{1}{a^2+x^2}\, dx$

Q.20 $\frac{dy}{dx} + y.e^y = e^x$ is a differential equation . *(linear/non linear)*

SECTION-C

Note: Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

Q.21 Solve the following for y and z using Cramer's Rule

$z = -y^2+2y+7$

and $z = -2y+2$

Q.22 Decompose the following into partial fractions:

$\frac{4x-1}{(2+x)(5-x)}$

Q.23 Find the middle term in the binomial expansion of $\left(3x - \frac{x^3}{6}\right)^6$

Q.24 Evaluate cot 15°.

Q.25 In ΔABC if a = 18, b = 24 and c = 30, find the values of