Q.27 Determine the equation of circle if (-3,-2) and (-6,7) are the end points of a diameter of the circle.

Q.28 Find the length of major and minor axis, eccentricity and coordinates of vertices of the ellipse $16x^2 + 9y^2 = 144$

Q.29 Find the vertex, focus, directrix and latus rectum of the parabola $x^2 = -8y$.

Q.30 Evaluate the following limit: $\lim_{x \to 0} \frac{\tan 4x}{2^x - 1}$

Q.31 Find $\frac{d^2y}{dx^2}$ at $x = 0$ if $y = x^3 . \cos 3x$

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

Q.33 Evaluate $\int 3x^2 e^{x^3} dx$.

Q.34 Solve the differential equation $\frac{dy}{dx} = 1+x+y+xy$.

Q.35 Solve the differential equation $(D^2-4)y = x^2+e^x$, 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 $4 \cos 12° . \cos 48° . \cos 72° = \cos 36°$.

Q.37 Find all the points of maxima & minima and corresponding maximum & minimum values of the function $y = x^3 - 3x + 5$.

Q.38 Apply Simpson's rule to find approximate value of

$$\int_1^7 (3x^2+x+1)dx$$

by taking 6 equal subintervals of $1 \le x \le 7$.

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Roll No. .....

1st Year /Advance Diploma In Tool and Die Making

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 ${}^n p_n$ = _____.

a) $1!$ b) $n!$

c) 0 d) None of these

Q.2 If a is the first term and r is the common ratio in a Geometric Progression (G.P), then m^{th} term of the G.P. is _____.

a) $a.m.r$ b) $a.r^m$

c) $a.r^{m-1}$ d) None of these

Q.3 $\frac{7\pi}{12}$ *radians* = _____ degrees

a) 115 b) 110

c) 105 d) None of these

Q.4 Distance between the points $(0,0)$ and $(5,0)$ is _____.

a) 5 *Units* b) 0 *Units*

c) -5 *Units* d) None of these

Q.5 If m_1 and m_2 are slopes of two straight lines and 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

Q.6 $\frac{d}{dx}$ (¦ (g(x))) =_____

a) ¦ '(g(x))´ g'(x) b) ¦ '(g(x))

c) ¦ '(g'(x)) d) None of these

Q.7 The rate of change of area of a circle i.e. pr^2 with respect to radius r is_____.

a) pr^2 b) *0*

c) *1* d) 2pr

Q.8 The mean value of the curve y = ¦ (x) between $x = a$ & $x = b$ is given by

a) $\bar{y} = \frac{1}{b}\int_a^b f(x)dx$ b) $\bar{y} = \int_a^b f(x)dx$

c) $\bar{y} = \frac{1}{a+b}\int_a^b f(x)dx$ d) $\bar{y} = \frac{1}{b-a}\int_a^b f(x)dx$

Q.9 $\int_1^2 x\,dx$ =_____

a) $\frac{3}{2}$ b) $\frac{1}{2}$

c) 1 d) None of these

Q.10 $y^2dx+(xy+x^2)dy=0$ is a_____ Differential equation.

a) Homogeneous b) Linear

c) Both homogeneous & linear d) None of these

SECTION-B

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

Q.11 How many middle terms are there in the binomial expansion of $\left(2a+\frac{b}{2}\right)^7$?

Q.12 What is the value of cot 0°?

Q.13 Fill in the blank:

$\sin^2\theta + \cos^2\theta$ =_____.

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

Q.15 What is the centroid of the triangle whose vertices are (x_1,y_1), (x_2,y_2) and (x_3,y_3)

Q.16 Fill in the blank: $\lim_{x\to 0}\frac{\sin x}{x}$ =_____

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

Q.18 What is the value of $\int_{x-2}^{10} dx$?

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

Q.20 $\frac{dy}{dx}+x^2y=e^x$ 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 x and y:

$y = (x+2)^2 - 6$ and $y = 4x-2$

Q.22 Decompose the following into partial fractions:

$$\frac{-6x}{(7-x)(x-5)}$$

Q.23 Expand $(2+3x)^{-5}$ upto four terms by binomial theorem.

Q.24 Find the value of tan 15°.

Q.25 Use cosine formula in DABC to find ĐB if ĐA=30°and $b : c$ =2: $\sqrt{3}$, 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 which passes through the point (7, -8) and makes an angle 30° with positive direction of x-axis.