Sub Code:KAG101

Paper Id: 180101 Roll No:

B TECH
(SEM I) THEORY EXAMINATION, 2019-20
BASIC MATHEMATICS-I

Time: 3 Hours *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

Qno.	Question	Marks	CO
a.	Find the median of the following data:2000,1180,1785,1500,560,782,1200,385,1123,222.	2	1
b.	Write the normal equations: $y = a + bx + cx^2$.	2	1
c.	Define the continuity of function at $x = x_0$.	2	2
d.	Find$\frac{dy}{dx}$ $for\ y = x^2 cosecx$.	2	2
e.	Find$\frac{\partial^2 u}{\partial x \partial y}$ $for\ u = x^2 \log(x^2 + y^2)$.	2	3
f.	Evaluate $\int sin^3 x\, dx$	2	3
g.	Evaluate$\int \frac{1}{1+sinx} dx$.	2	4
h.	Find $\frac{dy}{dx} of\ y = \log(secx)$	2	4
i.	Find the order and degree of differential equation$\frac{d^2y}{dx^2} + y = (\frac{dy}{dx})^{\frac{2}{3}}$.	2	5
j.	Find the complementary function $(D^2 + a^2)x = 0\ where\ D \equiv \frac{d}{dt}$.	2	5

SECTION

2. Attempt any *three* of the following: 3 x 10 = 30

Qno.	Question	Marks	CO
a.	Find the mode from the following data: Age | 0-6 | 6-12 | 12-18 | 18-24 | 24-30 | 30-36 | 36-42 Frequ-ency | 6 | 11 | 25 | 35 | 18 | 12 | 6	10	1
b.	If $\sqrt{1+y} + y\sqrt{1+x} = 0\ and\ x \neq y, prove\ that\ \frac{dy}{dx} = -\frac{1}{(x+1)^2}$.	10	2
c.	Show that of all the rectangles inscribed in a given circle, the square has the maximum area.	10	3
d.	Evaluate $\int xtan^{-1}x dx$.	10	4
e.	Solve $(D^2 + 2D + 1)y = xsinx; D \equiv \frac{d}{dx}$.	10	5

SECTION C

3. Attempt any *one* part of the following: 1 x 10 = 10

Qno.	Question	Marks	CO
a.	Calculate Karl Pearson's Coefficient of skewness from the table given below. Wages of day | 55-58 | 58-61 | 61-64 | 64-67 | 6 No. of workers | 12 | 17 | 23 | 18 | 1	10	1
b.	Fit a parabola $y = ax^2 + bx + c$ to the following data: x | 2 | 3 | 5 | 7 | 11 | 13 | 17 | 19 y | 3 | 5 | 7 | 11 | 13 | 17 | 19 | 23	10	1

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4. Attempt any *one* part of the following: 1 x 10 = 10

Qno.	Question	Marks	CO
a.	Find $\frac{dx}{dt}$ of $x = t^{t^t}$.	10	2
b.	Show that f (x) given by $f(x) = \begin{cases} 5x-4 & if\ 0 < x \leq 1 \\ 4x^3 - 3x & if\ 1 < x < 2 \end{cases}$ is continuous at x = 1.	10	2

5. Attempt any *one* part of the following: 1 x 10 = 10

Qno.	Question	Marks	CO
a.	If $u = f(r), where\ r^2 = x^2 + y^2$, prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = f''(r) + \frac{1}{r} f'(r)$.	10	3
b.	If u,v w are the roots of the equation $(\lambda - x)^3 + (\lambda - y)^3 + (\lambda - z)^3 = 0\ in\ \lambda$, find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.	10	3

6. Attempt any *one* part of the following: 1 x 10 = 10

Qno.	Question	Marks	CO
a.	Evaluate $\int \frac{x^3}{(x-4)(x-5)} dx$.	10	4
b.	Evaluate $\int \frac{sec^4 x}{\sqrt{tanx}} dx$.	10	4

7. Attempt any *one* part of the following: 1 x 10 = 10

Qno.	Question	Marks	CO
a.	Solve $(x - y)dx - dy = 0; y(0) = 2$.	10	5
b.	Solve $(D^2 - 1)y = coshx.cosx; D = \frac{d}{dx}$.	10	5