Enrolment No. | | | | | | |

S$_4$(DSMA33B03) MA

BSMS 3rd Semester, Mid-Term Examination-2018
Name of Subject: **Ordinary Differential Equation**
Code No: **DSMA33B03**

Full Marks: 50 Times: 2 Hours

Symbols used here have their usual meanings

Group A
Answer all the following questions

Marks: 25

1. Solve **any two** of the following:
   (a) $x^2(p^2 - y^2) + y^2 = x^4 + 2xyp$, where $p = \frac{dy}{dx}$
   (b) $y = 2px + y^2p^3$
   (c) $y = yp^2 + 2px$ **[3X2=6]**

2. Solve $axyp^2 + (x^2 - ay^2 - b)p - xy = 0$ reducing it to Clairaut's form. **[5]**

3. Solve the differential equation $(8p^3 - 27)x = 12p^2y$ and investigate whether a singular solution exists. **[5]**

4. Solve $(D^3 + D)y = 2x^2 + 4sinx$ using method of undetermined coefficients. **[5]**

5. Solve: $Dx - y = t^2$, $x + Dy = 1$ **[4]**

Group B
Answer all the following questions

Marks: 25

1. Define Exact differential equation. Solve: $[1 + \log(xy)]dx + \left[1 + \frac{x}{y}\right]dy = 0$. **[1+4]**

2. Solve the differential equation: $y(1 + xy)dx + x(1 + xy + x^2y^2)dy = 0$. **[4]**

3. Define **Wronskian.** Obtain general solution of the differential equation $x^2y'' + xy' - y = x^3e^x$, by the method of variation of parameters. **[1+5]**

4. Find the complete solution of $(D^2 - 3D + 2)y = xe^{3x} + \sin 2x$. **[6]**

5. Obtain a suitable transformation for the dependent variable which transforms the equation $y'' + Py' + Qy = R$ into normal form. **[5]**

****

Enrolment No. 17DSMA01-7

BS-MS 3rd SEMESTER, MID TERM EXAMINATION – 2018 **S_3(DSMA33B04):MA**

NAME OF THE SUBJECT: Abstract Algebra-I

CODE NO: DSMA33B04

Full Marks: 50 **Time: 2 Hours**

Symbols used here have their usual meanings

GROUP – I

Answer the following questions

1. a. Define **Monoid** with an example. [2]

   b. Prove that a finite semi-group in which cancellation laws hold is a group.

   c. For elements a, b in a group G, prove that the equations $ax = b$ and $ya = b$ have unique solutions for x and y in G.

   d. Let G be a semi-group. Suppose there exists $e \in G$, such that $ae = a$ for all $a \in G$ and for each $a \in G$, there exists $a' \in G$, such that $aa' = e$. Show that G is a group.

2. a. Define **Commutative Ring.** [2+3+3+4] = 12

   b. Prove that an infinite cyclic group has precisely two generators.

   c. Prove that a non-zero integral domain is a field.

   d. Let G be a group. Show that $o(a^n) = \frac{o(a)}{(o(a),n)}$ for all $a \in G$, where n is an integer and $(o(a), n) = g.c.d\ (o(a), n)$.

[2+4+3+4] = 13

GROUP – II

Answer the following questions

1. If G be a group and H be a nonempty subset of G. Then show that H is a subgroup of G if and only if for all $a, b \in H$, $ab^{-1} \in H$.
2. State and prove **Langrange's** theorem. "Converse of Langrange'stheorem is not always true", explain by an example. [5]
3. If H be a subgroups of a group G,then show that $W = \cap_{g \in G} gHg^{-1}$ is a normal Subgroup of G. [4+1=5]
4. If H be a normal subgroup of a group G and G/H be the set of all cosets $\{aH | a \in G\}$ of G, then show that $(G/H, *)$ is a group, where * define on G/H by, [5]

   for all $aH, bH \in G/H$, $(aH) * (bH) = abH$.
5. Define permutation group. Show that the 8th roots of unity form a cyclic group. Find all generators of this group. [5]

[1+3+1=5]

****

Enrolment No. 11800501047.

BSMS(PHYSICS,CHEMISTRY,MATH)/BTMT 3rd Semester Mid Term Examination, 2018

Name of Subject: Computer Programming

Paper code: DSMA33B06/DTMA33B06

Paper code: **Full Marks-50** **Time: 2:00 Hrs**

The figures in the margin indicate full marks for the questions

---

A. **Answer the following** 5X2=10

1. What is a variable? Give Example.
2. Write the importance of Data types with example.
3. Define Symbolic constants with example.
4. Write the differences between keyword and identifiers.
5. What are the conditional and arithmetic operators?

and or

B. Determine the value of each of the following logical expressions if a=5, b=10 and c=-6 10

a) a>b && a<c 0
b) a<b && a>c 1
c) a==c || b>a 1
d) b>15 && c<0||a>0 0
e) (a/2.0==0.0 && b/2.0!=0.0||c<0.0 1

C. a)What is printed when the following is executed? 4X2.5=10

```
for(m=0;m<3;++m)
printf("%d\n", (m%2) ? m: m+2)
```

b) Find output

```
main()
{int x=10;
if(x=20) printf("TRUE");
else printf("FALSE");}
```

TRUE

c) What will be the value of x when the following segment is executed?

```
int x=10, y=15;
x=(x<y) ? (y+x) : (y-x)
```

25

d) State errors, if any

```
char city;float price;int year;
scanf("%c %f %d ",&city, &price, &year);
```

D. Write Programs 4X5=20

1. Write a program to print the following

```
1
11
111
1111
11111
```

2. Write a program to input five(5) numbers from user and print the average of those numbers.
3. Write a program to calculate the Fibonacci series upto 10 numbers using user defined function.
4. Convert metre to centimeter and centimeter to metre using user defined function.

Enrolment No. | | | | | | | |

S_3(DSMA33B05), BRANCH: Mathematics

BSMS 3rd Semester Mid-Term Examination–2018

Subject Name: Probability & Statistics

Subject Code: **DSMA33B05**

Full Marks: 50 Times: 2 Hours

Symbols used here have their usual meanings

.....

Group-A

Answer all the following questions $(5 \times 5 = 25)$

1. What is the probability that at least two out of n people have the same birthday? Assume 365 days in a year and that all days are equally likely.
2. Two shipments of parts are received. The first shipment contains 1000 parts with 10% defectives and second shipment contains 2000 parts with 5% defectives. One shipment is selected at random. Two parts are tested and found good. Find the probability that the tested parts were selected from the first shipment.
3. In a continuous distribution whose relative frequency density is given by:
$$f(x) = y_0.x(2-x), 0 \le x \le 2,$$
(i) Find mean, variance, skewness and kurtosis. (ii) Show that the distribution is symmetric.
4. Let X be a random variable such that:
$$P(X=-2) = P(X=-1), P(X=2) = P(X=1) \text{ and } P(X>0) = P(X<0) = P(X=0).$$
Obtain the probability mass function of X and its distribution function.
5. Define two-dimensional random variable, probability mass function, probability density function, marginal probability function.

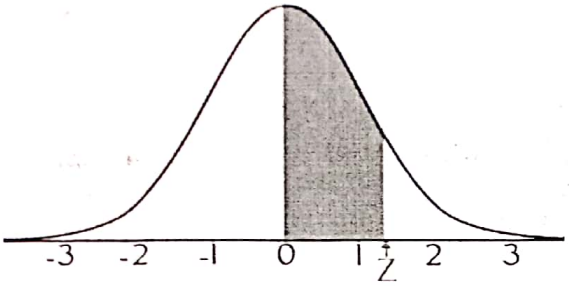
Group-B

Answer question number 1 and any three from the remaining:

1. (a) Define null hypothesis, critical region and type-I error.
(b) For a finite population, derive the mean and standard error of sampling distribution of sample proportion for the case of SRSWR. [3+4]
2. In Kolkata, 20% of a random sample of 900 school children had defective eye-sight. In Delhi, 15% of random sample of 1600 children had the same defect. Is this difference between the two proportions significant? Obtain 95% confidence limits for the population proportions. [6]
3. 500 ball bearings have a mean weight of 5.02 gm and a s.d. of 0.30 gm. Find the probability that a random sample of 100 ball bearings chosen from this group will have combined weight of (a) between 496 gm and 500 gm (b) more than 510 gm. [6]
4. (a) Write down the procedures for testing of hypothesis.
(b) Derive the test statistic for population variance (chi-square test statistic). [3+3]
5. The demand for a particular spare part in a factory was found to vary from day-to-day. In a sample study the following information was obtained:

Days	Mon	Tue	Wed	Thu	Fri	Sat
No. of parts demanded	1124	1125	1110	1120	1126	1115

Test the hypothesis that the number of parts demanded does not depends on the day of the week. (Given the value of chi-square significance at 5, 6, 7 d.f are respectively 11.07, 12.59, 14.07 at 5% level of significance.) [6]



STANDARD NORMAL TABLE (Z)

Entries in the table give the area under the curve between the mean and z standard deviations above the mean. For example, for $z = 1.25$ the area under the curve between the mean (0) and z is 0.3944.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0190	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2969	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3513	0.3554	0.3577	0.3529	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998

Enrolment No. | | | | | | | |

S_3(All Branch):ALL

B. TECH 3rd SEMESTER MID-TERM EXAMINATION – 2018

Subject Name: Engineering Mathematics – III

Subject code: UCH/CE/PE03C14/UCS/EC/EE/EI03C13/UME03C12

Full Marks: 50 Time: 2 Hours

Symbols used here have their usual meanings

Group A

Answer all the following questions

$[5 \times 5 = 25]$

1. The chances that doctor A will diagnose a disease X correctly is 60%. The chances that a patient will die by his treatment after correct diagnosis is 40% and the chances of death by wrong diagnosis is 70%. A patient of doctor A, who has disease X, died. What is the probability that his disease was diagnosed correctly?

2. The following is the distribution function of a discrete random variable X:

x	-3	-1	0	1	2	3	5	8
$F(x)$	0.10	0.30	0.45	0.50	0.75	0.90	0.95	1.00

(i) Find the probability distribution of X, (ii) Find $P(X \text{ is even})$ (iii)$P(1 \leq X \leq 8)$, (iv) Find $P(X = -3|X < 0)$.

3. The kms X in thousands of kms which car owners get with a certain kind of tyre is a random variable having probability density function:

$$f(x) = \begin{cases} \frac{1}{20} e^{-\frac{x}{20}}, & for\ x > 0 \\ 0, & for\ x \leq 0 \end{cases}$$

Find the probabilities that one of these tyres will last (i) at most 10, 000 kms, (ii) anywhere from 16,000 to 24,000 kms (iii) at least 30, 000 kms.

4. Define moment generating function. A random variable X is distributed at random between the values 0 and 1 so that its probability density function is: $f(x) = kx^2(1 - x^3)$, where k is a constant. Find the value of k. Using this value of k, find its mean and variance.

5. A car is parked among 10 cars in a row, not at either end. On his return the owner finds that exactly 4 of the 10 places are still occupied. What is the probability that both neighboring places are empty?

P.T.O.

Group B

Answer all the following questions

Marks: 25

1. Find the fourier series of the periodic function f with period 2π, defined as follows:

$$f(x) = \begin{cases} 0, & for -\pi < x < 0 \\ x, & for\ 0 < x < \pi \end{cases}$$

What is the sum of the series at $x = 0, \pm\pi, 4\pi$.

[6]

2. Find the Fourier series of $f(x) = \begin{cases} x, & -1 < x < 0 \\ x+2, & 0 < x < 1 \end{cases}$ and hence evaluate the value of $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$

[5]

3. Find the half range Sine Series of $f(x) = \begin{cases} \frac{1}{4} - x, & 0 < x < 1/2 \\ x - \frac{3}{4}, & \frac{1}{2} < x < 1 \end{cases}$

[3]

4. Define linear partial differential equation with suitable example. Form a partial differential equation by the elimination of the arbitrary functions ϕ from $\phi(x + y + z, x^2 + y^2 - z^2) = 0$.

[4]

5. Solve: $py + qx = xyz^2(x^2 - y^2)$.

[3]

6. Solve: $(x^2 - y^2 - yz)p + (x^2 - y^2 - zx)q = z(x - y)$.

[4]

****