UG-CS-1167 **BPHYS–11**

U.G. DEGREE EXAMINATION – FEBRUARY, 2023.

Physics

First Semester

PROPERTIES OF MATTER AND SOUND

Time : 3 hours Maximum marks : 70

PART A — ($3 \times 3 = 9$ marks)

Answer any THREE questions out of five questions in 100 words

All questions carry equal marks

1. Define Poisson's ratio.

2. Define the term angle of Contact.

3. What is the significance of Reynolds number?

4. Differentiate adhesion and cohesion behaviors in liquid.

5. Define intensity of sound.

PART B — ($3 \times 7 = 21$ marks)

Answer any THREE questions out of five questions in

200 words.

All questions carry equal marks.

6. Discuss the theory of non-uniform bending in detail.

7. Explain the variation of surface tension of the liquid with respect to the temperature.

8. Explain the significance of Ostwald viscometer.

9. Determine the A.C. frequency using sonometer.

10. Explain the factors affecting the acoustics of building.

PART C — ($4 \times 10 = 40$ marks)

Answer any FOUR questions out of Seven questions in 500 words.

All questions carry equal marks.

11. Explain the Dynamic torsion method for determining the rigidity modulus of an object.

12. Explain the Jaegar's method of determining the surface tension of the liquid and list out the applications.

13. Explain the Piezo electric method in detail for the production of ultrasonic waves and List out the properties of ultrasonic waves.

14. Explain the Lissajous plots for simple harmonic motion at various phase differences.

15. Derive an expression for rate flow of gas through capillary tube using Mayer formula.

16. Explain the composition of simple harmonic motion in a straight line and at right angles.

17. Explain the Medle's experiment in determining the frequency of a tuning fork.

UG–CS–1168 **BMSSA–11**

U.G. DEGREE EXAMINATION — FEBRUARY 2023

Computer Science

First Semester

Allied – MATHEMATICS – I

Time : 3 hours Maximum marks : 70

PART A — ($3 \times 3 = 9$ marks)

Answer any THREE questions out of five questions in 100 words.

All questions carry equal marks.

1. Find the Eigenvalues of $adj\ A$ if $A = \begin{bmatrix} 3 & 2 & 1 \\ 0 & 4 & 2 \\ 0 & 0 & 1 \end{bmatrix}$.

2. If $y = (\sin x)^x$, find $\frac{dy}{dx}$.

3. Form the partial differential equation by eliminating a and b from

$$(x-a)^2 + (y-b)^2 + z^2 = c^2 .$$

4. Define Dirichlet's conditions.

5. Old hen can be bought at Rs. 2 each and young ones at Rs. 5 each. The old hen lay 3 eggs per week and the young ones lay 5 eggs per week, each egg being worth 30 paise. A hen costs Rs. 1 per week to feed. A person has only Rs. 80 to spend for hens. How many of each kind should be buy to give a profit of more than Rs. 6 per week, assuming that he cannot house more than 20 hens. Formulate this as a L.P.P.

PART B — $(3 \times 7 = 21$ marks)

Answer any THREE questions out of five questions in 200 words.

All questions carry equal marks.

6. Using Cayley – Hamilton theorem find A^{-1} when $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$.

7. Evaluate $\int \frac{dx}{(3+x)\sqrt{x}}$.

8. Find the singular solution of the equation $z = px + qy + \sqrt{p^2 + q^2 + 1}$.

9. Find the half – range Fourier sine series for $f(x) = x^2$ in $(0, \pi)$.

10. Solve the following L.P.P by the graphical method *Minimize* $Z = 3x_1 + 5x_2$ subject to $-3x_1 + 4x_2 \le 12$, $x_1 \le 4$, $2x_1 - x_2 \ge -2$, $x_2 \ge 2$, $2x_1 + 3x_2 \ge 12$ and $x_1, x_2 \ge 0$.

PART C — (4 × 10 = 40 marks)

Answer any FOUR questions out of Seven questions in 500 words.

All questions carry equal marks.

11. Find all the Eigenvalues and Eigenvectors of the matrix $\begin{bmatrix} 7 & -2 & 0 \\ -2 & 6 & -2 \\ 0 & -2 & 5 \end{bmatrix}$.

12. Find the nth differential coefficient of $\cos^5 \theta \sin^7 \theta$.

13. Find the general solution of $(3z - 4y)p + (4x - 2z)q = 2y - 3x$.

14. Find the Fourier series for the function $f(x)=|x|$, $-\pi < x < \pi$. Show that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\cdots=\frac{\pi^2}{8}$.

15. Use Simplex method to solve the LPP *Minimize* $Z=8x_1-2x_2$ subject to $-4x_1+2x_2 \le 1$, $5x_1-4x_2 \le 3$, and $x_1, x_2 \ge 0$.

16. Solve $9\left(p^2z+q^2\right)=4$.

17. Solve the Diagonalize of the matrix $\begin{bmatrix} 10 & -2 & -5 \\ -2 & 2 & 3 \\ -5 & 3 & 5 \end{bmatrix}$.

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UG–CS-1146 **BMSS–21**

U.G. DEGREE EXAMINATION — FEBRUARY 2023.

Mathematics

Second Semester

DIFFERENTIAL CALCULUS

Time : 3 hours Maximum marks : 70

PART A — (3 × 3 = 9 marks)

Answer any THREE questions.

1. Find the n[th] derivative for e^{ax}.

2. If $u = x^2 y + 3xy^4$ where $x = e^t$ and $y = \sin t$ then find $\frac{du}{dt}$.

3. Write the Cartesian formula for Radius of curvature.

4. Find the angle between the radius vector and the tangent for $r = a(1 + \cos\theta)$.

5. Write briefly about asymptotes.

PART B — $(3 \times 7 = 21$ marks)

Answer any THREE questions.

6. If $y = a\cos(\log x) + b\sin(\log x)$ show that $x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$.

7. If $u = (x-y)(y-z)(z-x)$ show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$.

8. Find the radius of curvature at the point $\left(\frac{a}{4}, \frac{a}{4}\right)$ to the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$.

9. Prove that the parabolas $r = \frac{a}{1+\cos\theta}$ and $r = \frac{a}{1-\cos\theta}$ intersect at each other orthogonally.

10. Find the asymptotes of $x^3 + y^3 - 3axy = 0$.

PART C — $(4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Find the n^{th} derivative of $y = \frac{2x+1}{(2x-1)(2x+3)}$.

12. If $u = x^2(y-z) + y^2(z-x) + z^2(x-y)$ show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$.

13. Find the radius of curvature at $x=\frac{3a}{2}, y=\frac{3a}{2}$ to the curve $x^3+y^3=3axy$.

14. Find the angle of intersection of the curves $r=\frac{a}{1+\cos\theta}$ and $r=\frac{b}{1-\cos\theta}$.

15. Find the asymptotes of the curve $x^3+2x^2y-xy^2-2y^3+4y^2+2xy+y-1=0$.

16. If $y=e^{a\sin^{-1}x}$ prove that

$$\left(1-x^2\right)y_{n+2}-(2n+1)xy_{n+1}-\left(n^2+a^2\right)y_n=0$$

17. Find the maximum and minimum values of $4(x,y)=2\left(x^2-y^2\right)-x^4+y^4$.

UG-CS-1170	BMSSA-22

U.G. DEGREE EXAMINATION – FEBRUARY 2023.

Computer Science

Third Semester

Allied – MATHEMATICS – 2

Time : 3 hours   Maximum marks : 70

SECTION A — ($3 \times 3 = 9$ marks)

Answer any THREE questions.

1. Define Gamma function.

2. Evaluate $I = \int_0^1 \frac{1}{1+x} dx$ by Trapezoidal rule using the table and correct to three decimal place.

x	0	0.5	1.0
y	1.000	0.666	0.5000

3. Evaluate $\int_0^1 \int_0^2 \left(x^2 + y^2\right) dy\, dx$.

4. Evaluate $L[t]$.

5. Define Rank Correlation.

SECTION B — (3 × 7 = 21 marks)

Answer any THREE questions.

6. Prove that $\Gamma\frac{1}{2} = \sqrt{\pi}$.

7. The following table gives the corresponding values of x and y. Prepare a forward difference table and express y as a function of x. Also obtain y when $x = 2.5$.

x :	0	1	2	3	4
y :	7	10	13	22	43

8. Evaluate $\int_1^3\int_2^3\int_1^2 (x - y + z)\,dx\,dy\,dz$.

9. Find $L^{-1}\left[\frac{1}{s(s+1)(s+2)}\right]$.

10. Compute coefficient of correlation for the following:

x :	25	35	45	52	20	33	40	30
y :	20	15	10	14	23	18	22	30

SECTION C — (4 × 10 = 40 marks)

Answer any FOUR questions.

11. Prove that $\beta(m,n) = \frac{\Gamma m \Gamma n}{\Gamma m+n}$.

12. Using Newton's Backward formula find the annual premium at the age of 33 from the data:

Age in years :	24	28	32	36	40
Annual premium :	28.06	30.19	32.75	34.94	40

13. Evaluate the following integral by change the order of integration.

$$\int_0^\infty \left[\int_x^\infty \frac{e^{-y}}{y} dy \right] dx .$$

14. Solve the differential equation using Laplace transform $\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 0$ given $y(0) = -2$ $y'(0) = 5$.

15. Calculate the rank Correlation Coefficient from the following data :

x :	52	63	45	36	72	65	47	25
y :	62	53	51	25	79	43	60	33

16. From the following table using Simpson's $\left(\frac{1}{3}\right)^{\text{rd}}$ rule $\int_{7.47}^{7.52} y(x)dx$, $h = 0.01$. Evaluate

x :	7.47	7.48	7.49	7.50	7.51	7.52
y :	1.93	1.95	1.98	2.01	2.03	2.06

17. Calculate Karl Pearson's coefficient from the following:

x :	32	35	27	28	25	40
y :	28	32	26	35	24	38

UG-CS-1205	BMSSA–22

U.G. DEGREE EXAMINATION – FEBRUARY, 2023.

Computer Science/Computer Applications

Third Semester

ALLIED MATHEMATICS – II

Time : 3 hours | Maximum marks : 70

PART A — ($3 \times 3 = 9$ marks)

Answer any THREE questions.

1. Define Gamma function.

2. Evaluate $I = \int_0^1 \frac{1}{1+x} dx$ by Trapezoidal rule using the Table and correct to three decimal place

x	0	0.5	1.0
y	1.000	0.666	0.5000

3. Evaluate $\int_0^1 \int_0^2 (x^2 + y^2)\, dy\, dx$.

4. Evaluate $L[t]$.

5. Define Rank correlation.

PART B — ($3 \times 7 = 21$ marks)

Answer any THREE questions.

6. Prove that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$.

7. The following table gives the corresponding values of x and y. Prepare a forward difference table and express y as a function of x. Also obtain y when $x = 2.5$.

x	0	1	2	3	4
y	7	10	13	22	43

8. Evaluate $\int_1^3 \int_2^3 \int_1^2 (x - y + z)\, dx\, dy\, dz$.

9. Find $L^{-1}\left[\dfrac{1}{s(s+1)(s+2)}\right]$.

10. Compute coefficient of correlation for the following data :

x	25	35	45	52	20	33	40	30
y	20	15	10	14	23	18	22	30

PART C — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Prove that $\beta(m, n) = \dfrac{\Gamma m \, \Gamma n}{\Gamma (m+n)}$.

12. Using Newton's Backward formula find the annual premium at the age of 33 from the data

Age (in years)	24	28	32	36	40
Annual premium	28.06	30.19	32.75	34.94	40

13. Evaluate the following integral by change the order of integration

$$\int_0^\infty \left[\int_x^\infty \frac{e^{-y}}{y} dy \right] dx .$$

14. Solve the differential equations using Laplace transform

$$\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 0 \text{ given } y(0) = -2, \; y'(0) = 5$$

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17. Calculate Karl Pearson's coefficient from the following data

x	32	35	27	28	25	40
y	28	32	26	35	24	38