

UG-444 BMC-11/ BMS-11

B.Sc. DEGREE EXAMINATION —
DECEMBER 2018.

First Year

Mathematics with Computer Applications

ELEMENTS OF CALCULUS

Time : 3 hours

Maximum marks : 75

SECTION A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Find the n^{th} differential co-efficient of $\cos x \cos 2x \cos 3x$.
2. Find the maximum and minimum value of $f(x, y) = x^2 + y^2 + \frac{2}{x} + \frac{2}{y}$.
3. Prove that the $(P-r)$ equation of the cardioid $r = a(1 - \cos \theta)$ is $P^2 = \frac{r^3}{2a}$.

4. Evaluate $\int_0^{\pi/2} \sin^{10} \theta d\theta$.
5. Find the area of the cardioid $r = a(1 + \cos \theta)$.
6. Prove that if $a_1 + a_2 + \dots$ converges to s , then $a_2 + a_3 + \dots$ converges to $s - a_1$.
7. Test the convergence of the series $\sum_{n=1}^{\infty} \left[\frac{1}{n(n+1)} \right]$.
8. Prove that the series $\sum_{n=1}^{\infty} \frac{1}{n}$ is divergent.

SECTION B — ($5 \times 10 = 50$ marks)

Answer any FIVE questions.

9. If $y = (x + \sqrt{1 + x^2})^m$, prove that $(1 + x^2)y_{n+2} + (2n + 1)xy_{n+1} + (n^2 - m^2)y_n = 0$.
10. (a) If $u = \tan^{-1} \left(\frac{x^2 + y^2}{x + y} \right)$ show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \sin 2u$.
- (b) Find $\frac{dy}{dx}$ if $x^3 + y^3 - 3axy = 0$.

11. Show that the evolute of the cycloid $x = a(\theta - \sin \theta)$, $y = a(1 - \cos \theta)$ is another cycloid.
12. Prove that the radius of curvature at the point ' θ ' on the curve $x = 3a \cos \theta - a \cos 3\theta$, $y = 3a \sin \theta - a \sin 3\theta$ is $3a \sin \theta$.
13. Find the length of one loop of the curve $3ay^2 = x(x - a)^2$.
14. Find the reduction formula for $\int_0^{\pi/2} \sin^m x \cos^n x dx$.
15. If $\{s_n\}$ is a Cauchy sequence of real numbers, then show that $\{s_n\}_{n=1}^{\infty}$ is convergent.
16. If $\sum a_n$ converges absolutely, then show that $\sum a_n$ converges.

UG-445 BMC-12/BMS-12

B.Sc. DEGREE EXAMINATION —
DECEMBER 2018.

First Year

Mathematics/Mathematics for Computer
Applications

TRIGONOMETRY, ANALYTICAL GEOMETRY (3D)
AND VECTOR CALCULUS

Time : 3 hours

Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Express $\cos 5\theta$ in terms of $\cos \theta$.
2. Prove that $\sinh^{-1} x = \log_e(x + \sqrt{x^2 + 1})$.
3. Find the angle between the planes $2x - y + z = 6$,
 $x + y + 2z = 3$.
4. Find the equation of the plane parallel to
 $2x - 3y + 5z + 12 = 0$ and passing through the point
(2, 3, 1).

5. Find the equation of the sphere whose centre $(1,2,3)$ and radius is 4 units.
6. Find the equation of the sphere whose centre $(1,-3,4)$ and which passes through the point $(3,-1,3)$.
7. If $\phi = x^2 + y^2 - z - 1$ find $grad \phi$ at $(1, 0, 0)$.
8. If $\vec{F} = x^2\vec{i} + xy\vec{j}$ evaluate $\int_C \vec{F} \cdot d\vec{r}$ from $(0, 0)$ to $(1, 1)$ along the line $y = x$.

PART B — $(5 \times 10 = 50$ marks)

Answer any FIVE questions.

9. Show that $\frac{\sin 6\theta}{\sin \theta} = 32 \cos^5 \theta - 32 \cos^3 \theta + 6 \cos \theta$.
10. Separate into real and imaginary parts of $\tan(x + iy)$.
11. Find the image of the point $P(2, 3, 5)$ in the plane $2x + y - z + 2 = 0$.
12. Obtain the equation of the plane passing through the points $(2,2,-1)$, $(3,4,2)$ and $(7,0,6)$.

13. Find the shortest distance between the lines $\frac{x-8}{3} = \frac{y+9}{-16} = \frac{z-10}{7}$ and $\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-15}{-5}$.
14. Find the equation of the sphere passing through the points $(1,0,-1)$, $(2,1,0)$, $(1,1,-1)$ and $(1,1,1)$.
15. Find $\nabla \cdot \vec{F}$ and $\nabla \times \vec{F}$ of the vector point function $\vec{F} = xz^3\vec{i} - 2x^2yz\vec{j} + 2yz^4\vec{k}$ at the point $(1,-1,1)$.
16. If $\vec{F} = 3xy\vec{i} - y^3\vec{j}$. Evaluate $\int_C \vec{F} \cdot d\vec{r}$ where C is the curve $y = 2x^2$ in the XY plane from $(0,0)$ to $(1,2)$.
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UG-458

BMC-13

**B.Sc. DEGREE EXAMINATION –
DECEMBER, 2018.**

First Year

Mathematics with Computer Applications

**COMPUTER FUNDAMENTALS AND PC
SOFTWARE**

Time : 3 hours

Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. What are the principal functions of an Operating System?
2. Explain the role of cryptography.
3. What is the Recycle bin? What are the uses of Recycle Bin?
4. What is the procedure of inserting symbols in an MS Word document?
5. How do you insert tables and picture in MS-Word?

6. What is parallel processing? Explain.
7. What is vector processing? Explain.
8. Write short note on I/O interfaces.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Discuss in detail about types of memory.
10. Explain in detail different types of data communication modes.
11. What are the issues to consider when sending file attachments in your mail?
12. Discuss about Mail Merge in MS Word.
13. Discuss in detail about different types of networks.
14. Explain about computer languages.
15. Explain about different tools available in multimedia.
16. Explain different types of input devices.