

**UG-646**

**BMS-11/  
BMC-11**

**M.A. DEGREE EXAMINATION – JUNE, 2018.**

**First Year**

**Mathematics**

**ELEMENTS OF CALCULUS**

Time : 3 hours

Maximum marks : 75

SECTION A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Find the  $n^{\text{th}}$  differential co-efficient of  $\cos x \cos 2x \cos 3x$ .
2. Find the maximum value of function  $f(x, y) = xy(a - x - y)$ .
3. Find the radius of curvature at the point ' $t$ ' of the curve  $x = a(\cos t + t \sin t)$   $y = a(\sin t - t \cos t)$ .
4. Evaluate  $\int_0^{\pi/2} \sin^7 \theta \cos^5 \theta d\theta$ .
5. Find the area of the cardioid  $r = a(1 + \cos \theta)$ .

6. If  $\{s_n\}$  is a sequence of non-negative numbers and if  $\lim_{n \rightarrow \infty} s_n = L$ , then  $L \geq 0$ .
7. Prove  $\lim_{n \rightarrow \infty} \frac{3n^2 - 6n}{5n^2 + 4} = \frac{3}{5}$ .
8. Show that the series  $\sum_{n=1}^{\infty} 2n/(n^2 - 4n + 7)$  diverges.

SECTION B — (5 × 10 = 50 marks)

Answer any FIVE questions.

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

12. Prove that the radius of curvature at a point  $(a\cos^3 \theta, a\sin^3 \theta)$  on the curve  $x^{2/3} + y^{2/3} = a^{2/3}$  is  $3a\sin\theta\cos\theta$ .
13. Find the length of one loop of the curve  $3ay^2 = x(x-a)^2$ .
14. Establish the reduction formula for  $\int \sin^n x dx$  and hence evaluate  $\int_0^{\pi/2} \sin^6 x dx$ .
15. Prove that the sequence  $\left\{ \left(1 + \frac{1}{n}\right)^n \right\}_{n=1}^{\infty}$  is convergent.
16. If  $\{s_n\}$  is a sequence of real number which converges to  $L$  then show that  $\{s_n^2\}_{n=1}^{\infty}$  converges to  $L^2$ .

**UG-647**

**BMS-12/  
BMC-12**

**U.G. DEGREE EXAMINATION –  
JUNE 2018.**

**First Year**

**Mathematics**

**TRIGONOMETRY, ANALYTICAL GEOMETRY  
(3D) AND VECTOR CALCULUS**

Time : 3 hours

Maximum marks : 75

**SECTION A — (5 × 5 = 25 marks)**

Answer any FIVE questions.

1. Express  $\cos 6\theta$  in terms of  $\cos \theta$ .
2. Prove that  $\cosh^{-1}x = \log_e \left[ x + \sqrt{x^2 - 1} \right]$ .
3. Prove that the planes  $x + 2y + 2z = 0$ ,  
 $2x + y - 2z = 0$  are right angles.
4. Find the equation of the plane parallel to  
 $2x - 3y + 5z + 12 = 0$  and passing through the  
points (2, 3, 1).

5. Find centre and radius of the sphere  $16x^2 + 16y^2 + 16z^2 - 16x - 8y - 16z - 55 = 0$ .
6. Find the equation of the sphere with centre  $(1, -1, 2)$  and touching the plane  $2x - 2y + z = 3$ .
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  $y = x$ .

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

Answer any FIVE questions.

9. Prove that  $\cos^8 \theta = \frac{1}{2^7} [\cos 8\theta + 8 \cos 6\theta + 28 \cos 4\theta + 56 \cos 2\theta + 35]$ .
10. Find  $\log(1+i)$ .
11. Find the equation of the plane passes through the intersection of the planes  $2x + 3y + 10z - 8 = 0$   $2x - 3y + 7z - 2 = 0$  and is perpendicular to the plane  $3x - 2y + 4z - 5 = 0$ .
12. Find the image of the point  $(2, 3, 5)$  in the plane  $2x + y - z + 2 = 0$ .

13. Obtain the equation of the plane passing through the points  $(2, 2, -1)$ ,  $(3, 4, 2)$  and  $(7, 0, 6)$ .
14. Find the shortest distance between the lines  $\frac{x-8}{3} = \frac{y+9}{-16} = \frac{z-10}{7}$  and  $\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-15}{-5}$ .
15. Find the equation of the sphere which pass through the circle  $x^2 + y^2 + z^2 = 5$ ,  $x + 2y + 3z = 5$  and touch the plane  $4x + 3y = 15$ .
16. 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  $(1, -1, 1)$ .
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**UG-665**

**BMC-13**

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

**First Year**

**Mathematics with Computer Applications**

**COMPUTER FUNDAMENTALS AND PC SOFTWARE**

**Time : 3 hours**

**Maximum marks : 75**

**SECTION A — (5 × 5 = 25 marks)**

**Answer any FIVE of the following.**

1. Write a short note on magnetic memory.
2. Distinguish between system software and application software.
3. How do you add and remove programs in the start menu?
4. How do you set a screen server with password?
5. Explain installing and uninstalling programs in MS-Windows.
6. Write a short note on E-Mail.

7. What are the main advantages of find and replace in MS-Word?
8. What are the steps involved in a slide show using power point.

SECTION B — (5 × 10 = 50 marks)

Answer any FIVE of the following.

9. Draw the block diagram of a computer and explain.
10. Explain virus protection and cure in detail.
11. How do you backup your files in MS-Windows? Explain with detailed steps.
12. Write a short note on disc fragmentation and disk cleanup.
13. Explain paint in MS-Windows in detail.
14. Explain various proofing tools that are available in Microsoft Word.
15. Write down the steps for creating mail-merge in a word document.
16. Explain various components of power point.