



ACE
Engineering College
(with a Difference in Excellence)

An AUTONOMOUS Institution

ACE- R20

Question Paper Code:

MA201BS

Semester End Examination

I B. Tech- II Semester- September 2021

Mathematics - II

(ADVANCED CALCULUS & ELEMENTARY COMBINATORICS)

(Common To All Branches)

Time: 3 Hours

Max. Marks: 70

H. T. No

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Answer any five full questions from the following. All Questions carry equal marks.

M=Marks; CO=Course Outcomes; PO= Program Outcomes

Q.No	Question	M	CO	PO
1. a)	Solve $(ax + hy + g)dx + (hx + by + f)dy = 0$	7	1	1,12
b)	Solve $x \frac{dy}{dx} + y = x^3 y^6$	7	1	1,12
2. a)	A body originally at 80°C cools down to 60°C in 20 minutes, the temperature of air being 40°C. What will be the temperature of the body after 40 minutes from the original ?	7	1	2
b)	Solve $x - yp = a p^2$	7	1	1,2
3. a)	Solve $(D^2 + 5D + 6)y = e^x$	7	2	1,2
b)	Solve $(2x + 3)^2 \frac{d^2y}{dx^2} - (2x + 3) \frac{dy}{dx} - 12y = 6x$	7	2	1,2,3
4. a)	Solve $(D^2 + 5D + 4)y = x^2$	7	2	2,12
b)	Using the method of variation of parameters, solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$.	7	2	1,12
5. a)	Evaluate $\int_0^5 \int_0^{x^2} x(x^2 + y^2) dx dy$.	7	3	1,3
b)	Find by triple integration, the volume of the sphere $x^2 + y^2 + z^2 = a^2$.	7	3	1,2
6. a)	Find a unit vector normal to the surface $xyz^3 = 4$ at the point $(-1, -1, 2)$.	7	4	1,3
b)	Prove that $\nabla \cdot (\nabla \times F) = 0$	7	4	1,3
7. a)	Apply stoke's theorem to evaluate $\int_C (y dx + z dy + x dz)$ where C is the curve of intersection of $x^2 + y^2 + z^2 = a^2$ and $x + z = a$.	7	4	1,12
b)	Verify Green's theorem to evaluate $\int_S F \cdot ds$ where $F = 4x\bar{i} - 2y^2\bar{j} + z^2\bar{k}$ and S is the surface bounded by the region $x^2 + y^2 = 4$, $z = 0$ and $z = 3$.	7	4	1,2
8. a)	Find the number of arrangement of the letters in the word ACCOUNTANT.	7	5	1,3
b)	Find the eighth term in the expansion of $\left[2x^2 - \frac{1}{x^2}\right]^{12}$	7	5	1,3