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06CE6013

Reg. No _____

Name _____

A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY

M.TECH DEGREE EXAMINATION, DECEMBER 2016

FIRST SEMESTER

Branch: Civil Engineering

Advanced Mathematics and Applied Statistics

PART A

Time : 3 hrs

Total Marks : 60

Answer all questions
Each question carries 5 marks

1. Solve $(D^3 + D^2 - D - 1) y = \sin 2x$
2. Using Taylor series method of fourth order find y at $x = 1.1$ $y = 1.2$ by solving the equation $\frac{dy}{dx} = x^2 + y^2$ $y(1) = 2$.
3. State and prove Baye's theorem
4. Write a short note on Design of Experiments .

(4X 5=20marks)

PART B

Answer any one question from each module
Each question carries 10 marks

Module I

5. (a) Solve $(D^2 + 2D + 2) y = e^{e^x}$.
(b) Solve $(D^2 - 4D + 1) y = x e^{-x} \sin x$.

OR

6. (a) use Power series method to solve $y''' + xy'' + y = 0$
(b) Show that y_p is a solution of the given differential equation $y'' - y = 8 e^{-3x}$ $y_p = e^{-3x}$

Module II

7. Solve the equation $5x \frac{dy}{dx} + y^2 - 2 = 0$; $y(4) = 1$ for $y(4.1)$ and $y(4.2)$ taking $h=0.1$ and using all the three Euler's method .

OR

8. Given the values of $U(x,y)$ on the boundary of the given figure . Evaluate the function $U(x,y)$ satisfying the Laplace's equation $\nabla^2 u = 0$ at the pivotal point of this figure

	1000	1000	
1000			1000
2000	1	2	500
2000	3	4	0
1000			0
	500	0	

Module III

9. (a) The following are the self reported times (hours for month) spent on home work by random samples of juniors in two different majors

Major I	63	72	29	58	81	65	79	57	40	76
Major II	41	32	26	43	78	49	39	56	15	54

Find the correlation and the regression equations

- (b) Data , collected over seven years reveals a positive correlation between the annual starting salary of engineers and the annual sale of diet soft drinks . Will buying more diet drinks increase starting salaries ? Explain your answer and suggest a possible lurking variable .

OR

10. (a) It has been claimed that in 60% of all solar –heat installations the utility bill is reduced by at least one-third .Accordingly, what are the probabilities that the utility bill will be reduced by at least one-third in (i) four of five installations (ii) at least four of five installations .
- (ii) In the inspection of tin plate produced by a continuous electrolytic process 0.2 imperfection is spotted per minute , on an average . Find the probabilities of spotting
- (a) One imperfection in 3 minutes
- (b) At least two imperfections in 5 minutes
- (c) At most one imperfection in 15 minutes

Module IV

11. A randomized block experiment is run with 3 treatments and 4 blocks . The 3 treatment means are $\bar{y}_1 = 6$, $\bar{y}_2 = 7$, $\bar{y}_3 = 11$. The total corrected sum of squares is $220 = \sum_{i=1}^3 \sum_{j=1}^4 (y_{ij} - \bar{y})^2$
- The ANOVA table takes the form

Source of variation	Degrees of freedom	Sum of squares	Mean square	F
Treatments				
Blocks		132		
Error				
Total	11	220		

- (a) Fill in all the missing values in the analysis table
- (b) Conduct the F test for treatments and F test for block at 0.05 level of significance

OR

12. The following data resulted from an experiment to compare 3 burners B1,B2,B3 . A Latin Square design was used as the tests were made on 3 engines and were spread over 3 days .

	Engine I	Engine II	Engine III
Day 1	B1 16	B2 17	B3 20
Day 2	B2 16	B3 21	B1 15
Day 3	B3 15	B1 12	B2 16

Test the hypothesis that there is no difference between the (i) burners (ii) engine .

(4X10=40marks)