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**C Reg. No. :**

**Question Paper Code: 51P05**

M.E. DEGREE EXAMINATION, NOV 2017

First Semester

Structural Engineering

15PMA125 - APPLIED MATHEMATICS FOR STRUCTURAL ENGINEERING

 (Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 1= 5 Marks)

|  |  |  |
| --- | --- | --- |
| 1. |  | CO1- R |
|  | (a)  | (b)  |
|  | (c)  | (d)  |
| 2. |  For a two point Gauss Hermite Quadrature then the weight is  | CO2 -R |
|  | (a) -0.8862  | (b)$ 0.8862$ | (c)$0.7071$ | (d) -0.7071 |
| 3. | Suppose ‘*f’* is independent of ‘*y’* then the solution of Euler’s equation is | CO3- R |
|  | (a)   | (b)  | (c)  | (d)  |
| 4. | To find the dominant eigen value of a matrix then use | CO4 -R |
|  | (a) Approximation method | (b) Power method |
|  | (c) Rayley-Ritz method  | (d) Faddeev-Leverrier method |
| 5. | The maximum likelihood estimate are | CO5- R |
|  | (a) Inconsistent | (b) Consistent | (c) Not biased  | (d) None of the above |
|  | PART – B (5 x 3= 15Marks) |
| 6. | Define Laplace transform of unit step function and find its Laplace transform. CO1-U |
| 7. | Define Rayleigh quotient of a Hermitian matrix. CO2-U |
| 8. | If y is independent of y, then give the reduced form of the Euler’s equation. CO3-U |
| 9. | Find the largest eigen value of CO4-U by Power method. |
| 10. | What are maximum likelihood estimators? CO5-U |
|  | PART – C (5 x 16= 80Marks) |
| 11. | (a) | Using the Laplace transform method, solve the IBVP described as PDE:   BCs: *u*(0*, t*) *=* 0, *u* is bounded as *x* tends to   ICs:  | CO1- App | (16) |
|  |  | Or |  |  |
|  | (b) | A string is stretched and fixed between two fixed points (0,0) and (l,0). Motion is initiated by displacing string inform u= sinand released from rest at time t=0. Find the displacement of any point on the string at any time t | CO1- App | (16) |
|  |  |  |  |  |
| 12. | (a) | (i) By relaxation method, solve    | CO2- Ana |  (8) |
|  |  | (ii) Solve the equation by Choleski method  | CO2- Ana |  (8) |
|  |  | Or |  |  |
|  | (b) |  (i) Using Gaussian three point formula evaluate   and compare with exact solution.   | CO2- Ana |  (8) |
|  |  | (ii) Evaluate  by Gaussian quadrature formula.             | CO2- E |  (8) |
|  |  |  |  |  |
| 13. | (a) | State and Prove Brachistochrone problem. | CO3-App | (16) |
|  |  | Or |  |  |
|  | (b) | Show that the curve which extremizes the functional I =  under the conditions y(0) = 0 , y’(0) = 1 , y() = y’() = .  | CO3-App | (16) |
|  |  |  |  |  |
| 14. | (a) | Use Faddeev-Leverrier method to find the characteristic polynomial and inverse of the matrix  . | CO4 -Ana | (16) |
|  |  | Or |  |  |
|  | (b) | Using Power method find all the Eigen Values of A = .  | CO4 -Ana | (16) |
| 15. | (a) | (i) Fit a parabola *y* = *a* + *bx* + *cx*2 to the following data by the  method of least squares X : 2 4 6 8 10 Y : 3.07 12.85 31.47 57.38 91.29  | CO5 -Ana |  (8) |
|  |  | (ii) Estimate  and  for the distribution defined by    by the method of moments.  | CO5 -Ana |  (8) |
|  |  | Or |  |  |
|  | (b) | Find the maximum likelihood estimate for the parameter λ of a Poisson distribution on the basis of a sample of size n. Also find its variance. Show that the sample mean  is sufficient for estimating the parameter λ of the Poisson distribution. |  CO5-Ana | (16) |
|  |  |