..... *B. Civil Engg. 2nd Year 1st Semester [Supplementary]* ..... EXAMINATION, *2017*

SUBJECT .....*Computer Programming-I*.....

PAPER .....--.....

Full Marks 100
(50 marks for each part)

Time: **Three hours**

Use a separate Answer-Script for each part

No. of Questions	PART I	Marks
	Answer Q.1 and ANY FIVE questions from the rest	
1.a)	Write the equivalent FORTRAN statements of the following arithmetic equations i) $Z = \frac{e^{\lvert x+y\rvert}}{x+y} - \frac{e^{\lvert x-y\rvert}}{x-y}$ ii) $g = \sin(\log_{10}(p+q)) - \sin 60^0$	[4+2x3 = 10]
1.b)	Answer, in brief, the following questions: i) What do you mean by compiler? ii) What are the differences between the executable and non-executable statements? iii) Give examples of 'Arithmetic IF' and 'Computed GO TO' statement.	
2.	Write a FORTRAN programme to find out the real roots of a quadratic equation $ax^2 + bx + c = 0$. It should display the message if the roots are imaginary.	8
3.	Write a FORTRAN program to determine the '*arithmetic mean*' and '*geometric mean*' of n real numbers $x_1, x_2, x_3, \ldots x_n$ having the frequencies $f_1, f_2, f_3, \ldots f_n$.	8
4.	Write a FORTRAN programme to check whether a given integer is prime or not.	8
5.	Write a FORTRAN program to determine the 'directions of principal planes' and 'the principal moment of inertia' using the following expressions and find the maximum and minimum principal moment of inertia. $\theta_1 = \left(\frac{1}{2}\right)\tan^{-1}\left(\frac{2.I_{yz}}{I_{zz} - I_{yy}}\right)$ and $\theta_2 = \theta_1 + 90^0$ $I_{max} = \left(\frac{1}{2}\right)(I_{zz} + I_{yy}) - \left(\frac{1}{2}\right)(I_{zz} - I_{yy})\cos(2\theta) - I_{yz}\sin(2\theta)$ $I_{min} = \left(\frac{1}{2}\right)(I_{zz} + I_{yy}) + \left(\frac{1}{2}\right)(I_{zz} - I_{yy})\cos(2\theta) + I_{yz}\sin(2\theta)$	8

(Contd. to page 2)

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No. of Questions	**PART I**	M
	(Contd. from page 1)	
6.	Write a FORTRAN program to calculate the harmonic mean of all integers in the range 51 to 80 that are divisible by either 7 or 11.	
7.	Write a sub-programme to calculate the factorial of an integer number. Using this, write a FORTRAN main-programme to calculate **nCr** where n and r will be given by the user. $$^nC_r = \frac{n!}{r!(n-r)!}$$	
8.	Write a FORTRAN sub-programme that finds the largest and smallest elements from a one dimensional array. Using this subprogramme, write a FORTRAN programme to find the smallest element from the upper triangular part and largest element from the lower triangular part of a matrix of size 5x5.	
9.	Write a FORTRAN subprogram to calculate the sum $S = a_1b_1 + a_2b_2 + \ldots + a_nb_n$. Using this subprogram, write a FORTRAN programme to calculate the following quantity $$R = \frac{\sqrt{x_1^2 + x_2^2 + \ldots + x_n^2} \times \sqrt{y_1^2 + y_2^2 + \ldots + y_n^2}}{\sqrt{x_1y_1 + x_2y_2 + \ldots + x_ny_n}}$$ where $x_1, x_2, x_3, \ldots x_n$ and $y_1, y_2, y_3, \ldots y_n$ will be given by the user.	

=== END ===

Ex/CE/T/215/ 2017(S)

B. C. E. 2ND YR 1ST SEMESTER SUPPLEMENTARY EXAMINATION, 2017

COMPUTER PROGRAMMING -I

Time 3 hours Full marks 100

(50 Marks for each part)

Use separate answer scripts for each part

Part- II

Answer any five questions. Each question carries 10 marks.

1. Conduct LU decomposition of the matrix $A=\begin{bmatrix}2 & -2 & 1\\ 5 & 1 & -3\\ 3 & 4 & 1\end{bmatrix}$.
2. Solve the following equation by Cholesky decomposition

$$\begin{bmatrix}2 & 1 & -1\\ 1 & -3 & 5\\ -1 & 5 & 4\end{bmatrix}\begin{Bmatrix}x\\ y\\ z\end{Bmatrix}=\begin{Bmatrix}6\\ 11\\ 13\end{Bmatrix}$$

3. Derive the Newton-Raphson scheme for one and two nonlinear equations.
4. Find a root of the equation $x^3 + 2x - 2 = 0$ using Regula-Falsi method, correct up to three decimal places.
5. Given $\dot{y} = y^2 - x^2$, where $y(0) = 2$. Find $y(0.1)$ and $y(0.2)$ by second-order Runge-Kutta method.
6. Given $\dot{y} = y^2 - x^2$, with $x = 0$, $y = 1$. Find $y(0.1)$ by fourth-order Runge-Kutta method.