5.5 Faculty competencies in correlation to Program Specific Criteria (10)

(List the program specific criteria and the competencies (specialization, research publications, course developments etc.,) of faculty to correlate the program specific criteria and competencies.)

| | | | Competencies | | | |
|----------|---------------------------------|----------------------------------|--------------------------|--|----------------------|----------------------|
| S. N. | Faculty | Specializati on | Research Publications | Course Development s | Curricu | ılum |
| 1 | Dr. Muraleedharan C | Thermal Sciences | 31 | 1. Studio Video Lectures on Engineering Graphics 2. Monograms for two courses: Engineering Graphics Self Taught and Air Conditioning in Tropical Climate | ME6221D, ZZ1002D | ME6222D, |
| 2 | Dr. Jose Mathew | Manufacturin g Science | 27 | | ME3113D, ME2113D, | ME3113D, ME6393D, |
| | | Machina | | | ME6301D, ME6 | |
| 3 | Dr. P. K. | Machine Design, | 15 | | ME6613D, ME6693D, | ME2014D, ME6623D, |
| 3 | Rajendrakumar | Tribology | 13 | | ME6691D, ME3 | • |
| | | Industrial | | | ME4127D, | ME6112D, |
| 4 | Dr. R. Sridharan | Engineering | 33 | | IK3001D, | IK3002D, |
| | | | | | ME6135D | , |
| | | Material | | | ME3115D, M | 1E 6522D, |
| 5 | Dr. M. A. Joseph | Science | 20 | | ME6593D, | ME6502D, |
| | | | | | ME3191D, ME2 | |
| | | Machine | | | ME3011D, | ME3099D, |
| 6 | Dr. M. L. Joy | Design, | 16 | | ME6601D, | ME6691D, |
| | | Tribology | | | ME2002D | ME 4000D |
| 7 | Dr. A. Shaija | Thermal and Fluids | 12 | | ME2011D, ME2004D, | ME4099D, ME3091D, |
| ' | Dr. A. Shaija | Engineering | 12 | | ME3091D | MESOSID, |
| | | Thermal | | | ME6231D, | ME6432D, |
| 8 | Dr. Biju T. | Sciences | 20 | | ME6293D, | ME6221D, |
| | Kuzhiveli | | | | ME6291D, ME6 | • |
| 9 | Dr. Madhusoodhanan Pillai | Industrial Engineering | 28 | | ME6132D, ME6 | |
| 10 | Dr. R. Manu | Manufacturin g Engineering | 18 | | ME6312D, ME3 | 101D |
| 11 | Dr. Sobhan C. B. | Heat Transfer | Adjunct | | ME6202D | |

| 12 Dr. Arun P Energy Engineering 17 ME2013D, ME203D, ME3091D ME302D, ME3091D ME302D, ME3091D ME302D, ME3091D ME302D, ME3091D ME302D, ME3091D ME302D, ME303DD, | | | | | | | |
|--|-----|-------------------|---------------|---------|----------------|-----------------|-----------|
| 12 Dr. Arun P | | | Energy | | | ME2013D. | ME6413D. |
| Manufacturin Solid Manufacturin Materials Manufacturin Manufacturin Manufacturin Manufacturin Materials Manufacturin Manufacturin Manufacturin Manufacturin Materials Manufacturin Manuf | 12 | Dr. Arun P | | 17 | | | |
| 13 Dr. P. B. Dhanish g | | | 3 11 3 | | | · · | |
| 13 Dr. P. B. Dhanish g | | | Manufacturin | | | | |
| Mean | 13 | Dr. P. B. Dhanish | | 8 | | , | |
| 1. Dynamics of machines 2. Kinematics of Mechanism and John 2. Kinematics of Mechanism 2. Kinematics | | | 9 | - | | · · | • |
| 14 | | | | | 1. Dvnamics of | , | |
| 14 | | | | | - | | |
| 144 Dr. M. Narayanan D. Dynamics and Vibration 8 3. Newtonian and analytical mechanics 4. Nonlinear dynamics and chaos ME3030D, ME3099D, ME3099D, ME3030D, ME3192D, ME3030D, ME3030D, ME3030D, ME303DD, ME303DD, ME3091D, ME2091D 15 Dr. Jinu Paul Materials and Manufacturin 9 Mesonate Manufacturin 9 ME3115D, ME2091D, ME3091D, ME2091D ME6511D, ME2091D, ME2091D 16 Dr. V. Sajith Thermal Engineering Adjunct ME6311D, ME3093D, ME3093 | | | | | | | |
| 144 Dr. M. Narayanan D. Dynamics and Vibration 8 3. Newtonian and analytical mechanics 4. Nonlinear dynamics and chaos ME3030D, ME3099D, ME3099D, ME3030D, ME3192D, ME3030D, ME3030D, ME3030D, ME303DD, ME303DD, ME3091D, ME2091D 15 Dr. Jinu Paul Materials and Manufacturin 9 Mesonate Manufacturin 9 ME3115D, ME2091D, ME3091D, ME2091D ME6511D, ME2091D, ME2091D 16 Dr. V. Sajith Thermal Engineering Adjunct ME6311D, ME3093D, ME3093 | | | | | of Mechanism | ME2012D, | ME6611D. |
| 14 Narayanan and Vibration 8 and analytical mechanics and chaos ME3030D, ME3192D, ME3192D, ME303D, A. Nonlinear dynamics and chaos 15 Dr. Jinu Paul Materials and Manufacturin 9 ME3115D, ME3115D, ME3191D, ME2101D, ME3191D, ME2101D, ME3191D, ME2101D, ME2091D 16 Dr. V. Sajith Thermal Engineering Adjunct ME3032D 17 Dr. Jagadeesha T Manufacturin 9 84 ME6311D, ME309D, ME309D, ME309D, ME3193D, ME3001D, ME3193D, ME3001D, ME3191D, ME3103D 18 Dr. Jayadeep U. B. Dr. Jayadeep U. B. Dr. T J Stuids and Design Solid Mechanics and Design ZZ1001D, ME6692D, ME2003D, ME4191D, ME6622D 19 Sarvoththama Jothi Thermal 15 ME2010D, ME6912D, ME602D, ME2001D, ME6401D, ME6401D, ME6401D, ME4091D 20 Dr. Murali K. P. Science 6 ZZ1002D, ME309D, ME309SD, ME309SD, ME6401D, ME6912D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ME652D, ME6501D, ME201D, ME691D, ME6092D, ME6002D, ME4002D, ME6002D, ME4002D, ME6092D, ME3106D, ME3004D 24 Dr. A. P. Sudheer Manufacturin 9 Engige/Robotic 8 45 ME6313D, ME3024D | | Dr. M. D. | Dynamics | | | · · | |
| Materials and chaos Messister | 14 | Narayanan | - | 8 | | · · | · |
| Materials and chaos Mes Materials and Manufacturin g | | , | | | | | , |
| Chaos | | | | | 4. Nonlinear | | |
| Chaos | | | | | dynamics and | | |
| 15 Dr. Jinu Paul Materials and Manufacturin g Machanics and Design Mesangab Mesa | | | | | - | | |
| 15 Dr. Jinu Paul Materials and Manufacturin g Machanics and Design Mesangab Mesa | | | Matadal | | | ME3115D, | ME6513D, |
| 15 Dr. Jinu Paul Manufacturin 9 ME3191D, ME2091D 16 Dr. V. Sajith Thermal Engineering Adjunct ME3032D 17 Dr. Jagadeesha T Manufacturin 9 84 ME6311D, ME3099D, ME3193D, ME3001D, ME6612D, ME6692D, ME2003D, ME4191D, ME6622D ME2003D, ME4191D, ME6622D ME201DD, ME6412D, ME3095D, ME2001D, ME6401D, ME4091D 19 Dr. T | 4- | B. P. B. | | 40 | | · · | |
| ME2091D | 15 | Dr. Jinu Paul | | 16 | | · · | ME2101D, |
| 16 Dr. V. Sajith Engineering Adjunct ME3032D 17 Dr. Jagadeesha T Manufacturin g 84 ME3191D, ME309D, ME3001D, ME3001D, ME3103D 18 Dr. Jayadeep U. B. Solid Mechanics and Design 6 ZZ1001D, ME662D, ME2003D, ME2003D, ME4191D, ME6622D 19 Dr. T J Sarvoththama Jothi Fluids and Thermal ME2010D, ME6412D, ME6292D, ME3095D, ME2001D, ME6401D, ME6401D, ME4091D 20 Dr. Murali K. P. Materials Science 6 ZZ1002D, ME 6525D, ZZ1002D, ME 6525D, ZZ1002D 21 Dr. Saleel Ismail Engineering 19 ZZ1002D, ME6237D 22 Dr. K. Sekar Materials Science 47 ME6213D, ZZ1002D, ME6501D, ME6501D, ME2101D, ME6591D, ME6591D, ME610D, ME2101D, ME6591D, ME6412D, ME6492D, ME6591D, ME6402D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6412D, ME6402D, ME4002D, ME4091D 24 Dr. A. P. Sudheer Manufacturin g Engg/Robotic s 45 ME6332D, ME3106D, ME2091D, ME3024D | | | g | | | | , |
| Dr. Jagadeesha T Manufacturin g | | | Thermal | | | | |
| Dr. Jagadeesha T Dr. Jagadee | 16 | Dr. V. Sajith | Engineering | Adjunct | | ME3032D | |
| 17 Dr. Jagadeesha T g 84 ME3193D, ME3001D, ME3191D, ME3103D 18 Dr. Jayadeep U. B. Solid Mechanics and Design 2Z1001D, ME6692D, ME2003D, ME4191D, ME6622D 19 Dr. T J Sarvoththama Jothi Fluids and Thermal 15 ME2010D, ME692D, ME3095D, ME2001D, ME6401D, ME692D, ME3095D, ME2001D, ME4091D 20 Dr. Murali K. P. Materials Science 5 ZZ1002D, ME 6525D, ZZ1002D, ME6512D, ZZ1002D, ME6512D, ZZ1002D 21 Dr. Saleel Ismail Thermal Engineering 19 ME2013D, ZZ1002D, ZZ1002D, ME623D, ME6227D 22 Dr. K. Sekar Materials Science 47 ME2112D, ME3027D, ME6591D, ME6591D, ME6591D, ME2101D, ME6591D, ME2101D, ME6591D, ME2101D, ME6402D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6412D, ME6402D, ME6402D, ME6402D, ME4091D 24 Dr. A. P. Sudheer Manufacturin G Engg/Robotic S 45 ME6313D, ME3024D | | , | | • | | | |
| 17 Dr. Jagadeesha T g 84 ME3193D, ME3001D, ME3191D, ME3103D 18 Dr. Jayadeep U. B. Solid Mechanics and Design 2Z1001D, ME6692D, ME2003D, ME4191D, ME6622D 19 Dr. T J Sarvoththama Jothi Fluids and Thermal 15 ME2010D, ME692D, ME3095D, ME2001D, ME6401D, ME6491D 20 Dr. Murali K. P. Materials Science 5 Z21002D, ME6512D, Z21002D, ME6512D, Z21002D, ME6512D, Z21002D, ME623D, Z21002D, Z21002D, Z21002D, Z21002D, Z21002D, Z21002D, Z21002D, ME623TD 21 Dr. Saleel Ismail Thermal Engineering 19 ME2112D, ME3027D, ME6592D, ME6501D, ME6592D, ME6501D, ME2101D, ME6591D, ME2101D, ME6591D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6412D, ME6402D, ME6402D, ME6402D, ME4002D, ME3002AD 24 Dr. A. P. Sudheer Manufacturin g Engg/Robotic S 45 ME6313D, ME4023D, ME3002AD | | | Manufacturin | | | ME6311D, | ME3099D, |
| ME3191D, ME3103D ME3003D ME3101D ME6622D ME3003D ME3005D ME3005D ME3005D ME3005D ME3005D ME3005D ME3001D ME3005D ME3001D ME3005D ME3001D ME300 | 17 | Dr. Jagadeesha T | | 84 | | · · | |
| 18 Dr. Jayadeep U. B. Mechanics and Design 6 ME6692D, ME2003D, ME4191D, ME6622D 19 Dr. T J Sarvoththama Jothi Fluids and Thermal 15 ME2010D, ME6412D, ME6022D, ME3095D, ME2001D, ME6401D, ME6401D, ME4091D 20 Dr. Murali K. P. Science 6 Z71002D, ME 6525D, Z71002D, ME 6525D, Z71002D, ME 6525D, Z71002D, ME 6525D, Z71002D, ME6213D, Z71002D, ME6237D 21 Dr. Saleel Ismail Engineering 19 Z71002D, ME3027D, ME60501D, ME60501D, ME60501D, ME2112D, ME6592D, ME6501D, ME2101D, ME6591D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6412D, ME6402D, ME6402D, ME6402D, ME6402D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME3004D 24 Dr. A. P. Sudheer Manufacturin g Engig/Robotic s 45 ME6313D, ME4023D, ME3004D | | | | | | ME3191D, M | E3103D |
| B. | | Du lavadasa II | Solid | | | ZZ1001D, | ME6612D, |
| Dr. T | 18 | • | Mechanics | 6 | | ME6692D, | ME2003D, |
| Dr. T J Sarvoththama | | В. | and Design | | | ME4191D, M | E6622D |
| 19 Sarvoththama Thermal 15 ME6292D, ME3095D, ME2001D, ME6401D, ME6401D, ME4091D | | D. T. I. | Electeda anad | | | ME2010D, | ME6412D, |
| Jothi | 40 | | | 4.5 | | ME6292D, | ME3095D, |
| Materials Materials ZZ1002D, ME 6512D, ZZ1002D ME 6525D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ME 6227D ME 6527D ME 6592D, ME 6501D, ME 6592D, ME 6501D, ME 2101D, ME 6591D, ME 4193D ME 4193D ME 6412D, ME 6402D, ME 6402D, ME 6402D, ME 6402D, ME 6402D, ME 6402D, ME 6392D, ME 6301D, ME 6392D, ME 6302D, ME 3106D, ME 3024D M | 19 | | Inermai | 15 | | ME2001D, | ME6401D, |
| 20 Dr. Murali K. P. Science 6 ZZ1002D, ME 6525D, ZZ1002D 21 Dr. Saleel Ismail Thermal Engineering 19 ME6213D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ME6227D 22 Dr. K. Sekar Materials Science 47 ME2112D, ME3027D, ME6591D, ME6591D, ME6591D, ME2101D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6412D, ME6402D, ME6402D, ME6402D, ME4091D 24 Dr. A. P. Sudheer Manufacturin g Engg/Robotic S 45 ME6313D, ME3024D | | Jotni | | | | ME4091D | |
| ZZ1002D ME6213D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ME6227D ME2112D, ME3027D, ME6592D, ME6591D, ME2101D, ME4193D ME2101D, ME6591D, ME4193D ME2013D, ME6412D, ME6402D, ME6402D, ME6402D, ME6402D, ME4002D, ME4001D ME6313D, ME4002D, ME4001D ME6313D, ME4002D, ME4001D ME6302D, ME6302D, ME30024D ME6302D, ME30024D ME3002 | | | Materials | | | ZZ1002D, | ME6512D, |
| 21 Dr. Saleel Ismail Thermal Engineering 19 ME6213D, ZZ1002D, ZZ1002D, ZZ1002D, ZZ1002D, ME6227D 22 Dr. K. Sekar Materials Science 47 ME2112D, ME3027D, ME6591D, ME6591D, ME6591D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6412D, ME6492D, ME6402D, ME6402D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME3106D, ME3024D 24 Dr. A. P. Sudheer Manufacturin 9 Engg/Robotic S 45 ME6313D, ME3024D | 20 | Dr. Murali K. P. | Science | 6 | | ZZ1002D, | ME 6525D, |
| 21 Dr. Saleel Ismail Engineering 19 ZZ1002D, ME6227D 22 Dr. K. Sekar Materials Science 47 ME2112D, ME3027D, ME6592D, ME6591D, ME6591D, ME2101D, ME2101D, ME2101D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6492D, ME6492D, ME6492D, ME6402D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME6313D, ME6313D, ME6392D, ME6392D, ME3106D, ME6392D, ME3106D, ME2091D, ME3024D | | | | | | ZZ1002D | |
| ME6227D ME6227D ME3027D, ME3027D, ME6592D, ME6591D, ME2101D, ME6591D, ME4193D ME2101D, ME6591D, ME4193D ME2013D, ME6412D, ME6492D, ME6402D, ME6402D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME6313D, ME6313D, ME6313D, ME6392D, ME3106D, ME2091D, ME30024D ME2091D, ME30024D M | | | Thermal | | | ME6213D, | ZZ1002D, |
| 22 Dr. K. Sekar Materials Science 47 ME2112D, ME3027D, ME6591D, ME6591D, ME6591D, ME6591D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6412D, ME6492D, ME6402D, ME6402D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME6313D, ME6392D, ME3106D, ME6392D, ME3106D, ME2091D, ME3024D | 21 | Dr. Saleel Ismail | Engineering | 19 | | ZZ1002D, | ZZ1002D, |
| 22 Dr. K. Sekar Materials Science 47 ME6592D, ME6501D, ME2101D, ME6591D, ME2101D, ME6591D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6412D, ME6492D, ME6402D, ME6402D, ME6402D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME6313D, ME3106D, ME6392D, ME3106D, ME3024D | | | | | | ME6227D | |
| 22 Dr. K. Sekar Materials Science 47 ME6592D, ME6501D, ME2101D, ME6591D, ME2101D, ME6591D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6412D, ME6492D, ME6402D, ME6402D, ME6402D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME6313D, ME3106D, ME6392D, ME3106D, ME3024D | | | Materiala | | | ME2112D, | ME3027D, |
| 22 Dr. K. Sekar Science 47 ME2101D, ME6591D, ME4193D 23 Dr. Mokkala Srinivas Energy Engineering 18 ME2013D, ME6412D, ME6492D, ME6402D, ME6402D, ME4002D, ME6313D, ME6392D, ME3106D, ME6392D, ME3106D, ME2091D, ME3024D | 00 | D. K. Oalaa | | 47 | | · · | |
| Dr. Mokkala Energy Engineering 18 ME4193D ME2013D, ME6412D, ME6492D, ME6492D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME4002D, ME6313D, ME6313D, ME6392D, ME3106D, ME2091D, ME3024D ME2091D, ME3024D ME | 22 | Dr. K. Sekar | Science | 47 | | · · | |
| 23 Dr. Mokkala Srinivas Energy Engineering 18 ME6492D, ME6402D, ME4002D, ME6313D, ME6313D, ME6392D, ME3106D, ME2091D, ME30024D | | | | | | ME4193D | · |
| 23 Dr. Mokkala Srinivas Energy Engineering 18 ME6492D, ME6402D, ME4002D, ME6313D, ME6313D, ME6392D, ME3106D, ME2091D, ME30024D | | Da Maldada | Гастан | | | ME2013D, | ME6412D, |
| 24 Dr. A. P. Sudheer Manufacturin g Hengg/Robotic s ME6313D, ME4023D, ME6392D, ME3106D, ME2091D, ME3024D | 23 | | | 18 | | ME6492D, | |
| 24 Dr. A. P. Sudheer Manufacturin g ME6313D, ME4023D, ME6392D, ME3106D, ME2091D, ME3024D | | orinivas | ⊏ngineering | | | · · | • |
| 24 Dr. A. P. Sudheer g | | | Manufacturin | | | | |
| Engg/Robotic s Engg/Robotic s ME3024D | 0.4 | D* A D O: !! | g | 45 | | · · | |
| S ME2091D, ME3024D | 24 | Dr. A. P. Sudheer | | 45 | | | |
| 25 Dr. G. Varaprasad Industrial 24 ME3104D, ZZ1092D, | | | | | | WEZU91D, MI | E3UZ4D |
| | 25 | Dr. G. Varaprasad | Industrial | 24 | | ME3104D, | ZZ1092D, |

| | | Engineering | | | ME3104D, ZZ10 | 92D |
|----|------------------------|---------------|----|----------------------|---------------------------|----------------------|
| | | & | | | 201012, 2210 | 025 |
| | | Management | | | | |
| | | Industrial | | | ME3130D, | ME3126D, |
| 26 | Dr. Vinay V | Engineering | 38 | | ME6102D, | ME3102D, |
| | Panicker | gg | | | ME6191D | , |
| | | Nonlinear | | | ZZ1001D, | ME6611D, |
| | | Dynamics, | | | ME3025D, | ME3099D, |
| 27 | Dr. Ashesh Saha | Vibration | 8 | | ME6602D, | ME3194D, |
| | | Control | | | ME3001D | , |
| | | Manufacturin | | | ME3112D, | ME6330D, |
| 28 | Dr. Deepak | g | 12 | | ME3192D, | ME6323D, |
| | Lawrence K | Engineering | 12 | | ME4102D, ME4 ² | , |
| | | Fluids & | | | ME6411D, | ZZ1002D, |
| 29 | Dr. Gangadhara | Thermal | 27 | | ME2092D, | ME6226D, |
| 20 | Kiran Kumar | sciences | 2. | | ZZ1002D | WIEGZZOB, |
| | | Propulsion | | | ME2015D, | ME2010D, |
| 30 | Dr. P. V. Manu | Engineering | 3 | | ME3099D, | ME4002D, |
| | Di. i . v. iviana | Linginiceting | 3 | | ME3003D, ME40 | , |
| | | Industrial | | | ME3117D, | ME4126D, |
| 31 | Dr. Ratna Kumar | Engineering | 7 | | ME6193D, | ME4120D, ME6101D, |
| 31 | K | Lingingering | , | | ME3105D, ME4 ² | • |
| | | Thermal | | | ME6212D, | ME6411D, |
| 32 | Dr. B. Rohini Kumar | Sciences | 10 | | ME6493D, | ME6201D, |
| 32 | | Ociciices | 10 | | ME3002D, ME30 | , |
| | | | | Computational | ME4027D, | ZZ1002D, |
| 22 | D. 0' D.(| CFD | 3 | Fluid | · | |
| 33 | Dr. Simon Peter | | 3 | | ZZ1002D, | ME4027D, |
| | | | | Dynamics Deformation | ZZ1002D | |
| | | Materials | | | MESAACD | MEGGOOD |
| 34 | Dr. G. Srinu | Science | 0 | and | ME3116D, | ME6526D, |
| | | | | Processing | ME3192D | |
| | | Theorem | | of Materials | MEAOOAD | MECOAOD |
| 25 | Dr. Sujith Kumar | Thermal | 00 | | ME4031D, | ME6212D, |
| 35 | C. S. | Engineering | 20 | | ME2092D, | ME3003D, |
| | | | | | ME3091D, ME64 | 121D |
| | | | | Introduction to | | |
| | | Mechanical | | Fracture | ME6631D, | ME3026D, |
| 36 | Dr. Vineesh K. P. | systems | 14 | Mechanics and | ME3195D, | ME4001D, |
| | | design | | Introduction to | ME4191D | , |
| | | g.: | | Finite Element | | |
| | | | | Method | | |
| | Dr. Devendra | Supply Chain | _ | | ME4131D, | ME6111D, |
| 37 | Kumar Yadav | Management | 7 | | ME6192D, | ME6141D, |
| | | | | | ME4131D, ME3 | 191D |
| | Dr. Basil | Manufacturin | | | ME3113D, | ME2113D, |
| 38 | Kuriachen | g | 40 | | ME3193D | , |
| | | | | | | |
| | Dr. Sandip Rudha | Design | | | ME6511D, | ME2012D, |
| 39 | Budhe | Engineering | 7 | | ME3099D, | ME3021D, |
| | | | | | ME4191D, ME20 | |
| 40 | Dr. Sumer Bharat | CFD and | 4 | | ME2015D, | ME6235D, |
| . | Dirbude | Heat transfer | | | ME3095D, | ME2001D, |

| | | | | ME6491D, ME4030D |
|----|------------------|------------------------|---------|------------------|
| 41 | Dr. Hanas T. | Material Science | Adjunct | ME6502D |
| 42 | Dr. Shijo Thomas | Thermal Engineering | Adjunct | ME2013D |

Self-Assessment Marks: 10

SECTION-2

5.6. Innovations by the Faculty in Teaching and Learning (10)

Innovations by the Faculty in teaching and learning shall be summarized as per the following description.

Contributions to teaching and learning are activities that contribute to the improvement of student learning. These activities may include innovations not limited to, use of ICT, instruction delivery, instructional methods, assessment, evaluation and inclusive class rooms that lead to effective, efficient and engaging instruction. Any contributions to teaching and learning should satisfy the following criteria:

- The work must be made available on Institute website
- The work must be available for peer review and critique
- The work must be reproducible and developed further by other scholars

The department/institution may set up appropriate processes for making the contributions available to the public, getting them reviewed and for rewarding. These may typically include statement of clear goals, adequate preparation, use of appropriate methods, significance of results, effective presentation and reflective critique.

SHIKSHA KAUSHAL:

The department has seventeen class rooms and three seminar halls for conducting lectures for both core and electives courses. Mini project and major project presentations, their evaluations and expert lectures are carried out in the seminar halls. All the classrooms are equipped with multimedia projectors, and high quality audio systems. Some class rooms are equipped with digital interactive boards and other required e-learning facilities. The institute has a learning management system, NITC Eduserver named as "SHIKSHA KAUSHAL". Which is based on Moodle. It is customized to meet the requirements curriculum requirements of all programmes offered at the institute. The design of the Eduserver system facilitates various methods for course content delivery and assessment that assures an effective online teaching learning platform. The institute has purchased an online platform "Cisco Webex" customized for the institute needs. The Webex Educational Package provides facilities for conducting Meeting, Training and Events. The Webex platform has facility to connect 1000 participants. It has recording facilities at both cloud and local computer. It has facilities like content sharing, Application sharing, Web browser sharing and Remote Desktop. It has all the facilities related with a academics including Annotation and Co-annotation as well as white boarding which enables effective content delivery during online classes. It has polling facility which enables teachers to conduct effective "Q and A" sessions in smaller groups. The Webex Training provides additional facilities to add more speakers/ Presenters/ Panelists. Also there is an attention indicator facility which helps to monitor students while taking online classes. The effective participation time for each student per class/session could be obtained using this facility. Webex Event gives facility to conduct webinars which can be live streamed through Youtube,

Facebook etc. Along with the facilities in the classroom, the webex pack integrated with our LMS Eduserver thus facilitates an efficient teaching learning platform in the institute.

E-Learning:

Students and faculty members are encouraged to register for the NPTEL and SWAYAM courses and online certification courses in their own areas of teaching and research interests, for enhancing their teaching skills, smooth conduct of the teaching process in the regular class room teaching and for understanding the potential concepts much effectively. Currently the Institute permits the students for crediting courses from SWAYAM platform in place of the courses from the institute. Faculty members from the institute are made as mentors for providing support to the students to complete the course.

Other aspects of Innovations by the Faculty in teaching and learning:

| S. N. | Faculty | Course Name | Course Code | Modules Develope d | Developmen t done | Advantages Expected after developmen t | Suggeste d Assessm ent Policy after develop ment |
|----------|-----------------------------|--|----------------|------------------------------|-------------------------|--|--|
| 1 | Dr. Simon Peter | Computation al Fluid Dynamics | ME4027D | Three | Entire syllabus | Better employability | 30% weightage on coding assignme nts, Relative Grading |
| 2 | Dr. Srinu Gangolu | Deformation and Processing of Materials | ME6526D | Three | Entire syllabus | Advanced Topics | 20% weightage for course project |
| 3 | Dr. M.D. Narayanan | Dynamics of Machines | ME3001D | Nearly complete course | Video based Lectures | Enables an alternative learning for students | |
| 4 | Dr. C. Muraleedhara n | Engineering Graphics | ZZ1002D | Full Syllabus | Video based lectures | Benefitted by whole first year students | |
| 5 | Dr. Ashesh Saha | Nonlinear Dynamics and Chaos | ME3025D | One Module | Video based lectures | Enables an alternative learning for student | Nonlinear Dynamics and Chaos |

Self-Assessment Marks: 10

5.7 Faculty as participants in Faculty development/training activities/STTPs (15)

- A Faculty scores maximum five points for participation
- Participation in 2 to 5 days Faculty/ Faculty development program: 3 Points
- Participation >5 days Faculty/ Faculty development program: 5 points

| | Faculty Participation as | Max. 5 | per Facul | ty |
|-----------------------------|----------------------------------|--------|-----------|-------|
| Name of the Faculty | (Resource Person/Participant) | CAYm1 | CAYm2 | CAYm3 |
| Dr. Jose Mathew | O/P/E | 5 | 5 | 5 |
| Dr. P. K. Rajendrakumar | O/P/E | 3 | 0 | 0 |
| Dr. S. Jayaraj | O/P/E | 0 | 0 | 0 |
| Dr. Muraleedharan C | O/P/E | 3 | 0 | 0 |
| Dr. R. Sridharan | O/P/E | 3 | 0 | 5 |
| Dr. M. A. Joseph | O/P/E | 0 | 0 | 0 |
| Dr. M. L. Joy | O/P/E | О | 0 | 3 |
| Dr. A. Shaija | O/P/E | О | 0 | 0 |
| Dr. Biju T. Kuzhiveli | O/P/E | 0 | 0 | 0 |
| Dr. Madhusoodhanan Pillai | O/P/E | 0 | 0 | 5 |
| Dr. R. Manu | O/P/E | 0 | 0 | 0 |
| Dr. Sobhan C. B. | O/P/E | 0 | 0 | 0 |
| Dr. Arun P | O/P/E | 0 | 0 | 0 |
| Dr. P. B. Dhanish | O/P/E | 0 | 5 | 5 |
| Dr. M. D. Narayanan | O/P/E | 0 | 0 | 0 |
| Dr.Jinu Paul | O/P/E | 0 | 0 | 0 |
| Dr. V. Sajith | O/P/E | 0 | 0 | 0 |
| Dr. Jagadeesha T | O/P/E | 3 | 0 | 3 |
| Dr. Jayadeep U. B. | O/P/E | 0 | 0 | 0 |
| Dr. T J Sarvoththama Jyothi | O/P/E | 0 | 0 | 0 |
| Dr. Murali K. P. | O/P/E | 0 | 0 | 0 |
| Dr. Saleel Ismail | O/P/E | 3 | 5 | 0 |
| Dr. K. Sekar | O/P/E | 5 | 5 | 5 |

| Dr. Mokkala Srinivas | O/P/E | 0 | 0 | 0 |
|-----------------------------------|----------------------|----------------|-------|------|
| Dr. A. P. Sudheer | O/P/E | 5 | 3 | 3 |
| Dr. G. Varaprasad | O/P/E | 5 | 0 | 0 |
| Dr. Vinay V Panicker | O/P/E | 0 | 3 | 5 |
| Dr. Ashesh Saha | O/P/E | 5 | 0 | 5 |
| Dr. Deepak Lawrence K | O/P/E | 5 | 5 | 0 |
| Dr. Gangadhara Kiran Kumar | O/P/E | 5 | 0 | 0 |
| Dr. P. V. Manu | O/P/E | 0 | 5 | 0 |
| Dr. Ratna Kumar K | O/P/E | 5 | 0 | 5 |
| Dr. B. Rohini Kumar | O/P/E | 0 | 0 | 0 |
| Dr. Simon Peter | O/P/E | 5 | 3 | 0 |
| Dr. G. Srinu | O/P/E | 0 | 0 | 0 |
| Dr. Sujith Kumar C. S. | O/P/E | 5 | 3 | 0 |
| Dr. Vineesh K. P. | O/P/E | 3 | 5 | 3 |
| Dr.Devendra Kumar Yadav | O/P/E | 5 | 5 | 3 |
| Dr.Basil Kuriachen | O/P/E | 0 | 0 | 0 |
| Dr.Sandip Rudha Budhe | O/P/E | 0 | 0 | 0 |
| Dr.Sumer Bharat Dirbude | O/P/E | 5 | 0 | 5 |
| Dr. Hanas T. | O/P/E | 0 | 0 | 0 |
| Dr. Shijo Thomas | O/P/E | 0 | 0 | 0 |
| | O-Organized, | | | |
| Sum | P–Participated, | 78 | 52 | 60 |
| | E-Expert | | | |
| RF= Number of Faculty required to | + | | | |
| comply with 20:1 Student-Faculty | | 45 | 41 | 42 |
| ratio as per 4.1 | | | | |
| Assessment = 3 * (Sum/0.5 RF) | | | | |
| (Marks limited to 15) | | 10.40 | 7.61 | 8.57 |
| · | Average assessment o | ver last three | years | |
| | (Marks limited | | - | 8.86 |
| | (marks mined | | | |

Table B.4.7

5.8.1 Academic Research

PATENTS

| S. N. | Name of Staff (s) | Title | Status |
|----------|---|--|---------------------------------|
| 1 | Mr. Renju Mohan (P150023ME), Dr R. Manu, Dr Jayadeep U. B. | Multi-Mode Friction Stir Welding Tool | Published 2023 |
| 2 | Mr. Amudhan.A.N & Dr. Sudheer.A.P | A Hypermetropic Convolutional Neural Network Device For Small Size Object Detection And A Method Thereof | Granted 2022/05778 28/09/2022 |
| 3 | Mr. Amudhan.A.N, Mr. Lijiya A & Dr. Sudheer.A.P | CNN Based Method And System For Real-Time Object Detection With Feature Reuse And Csp Net To Reduce Computations | Granted 2022/06075 31/08/2022 |
| 4 | Dr.G Varaprasad | Mudra prabha | Granted 2022/06791 31/08/2022 |
| 5 | Dr. Sudheer.A.P, Mr. Ajin, Mr. Hariram Sankar, Mr. Murali Gopal & Mr. Thomas Joseph | Deployable Retractable Prefabricated Building Structure | Granted 399106 14/06/2022 |
| 6 | Dr. Sudheer A P | Automated Robotic System for Cleaning Railway Tracks | Published 03/06/2022 |
| 7 | Dr. Vinay V Panicker | Multipurpose waste picker | Granted 380432 27/10/2021 |
| 8 | Dr. Sudheer A P | Radial robotic friction gripper | Granted 375918 31/08/2021 |
| 9 | Dr. Sudheer A P | Robotic Tree Climber | Published 02/04/2021 |
| 10 | Dr. Sudheer A P | Radially Contracting Toroidal Pneumatic Artificial Muscle | Published 06/11/2020 |
| 11 | Dr. S. Jayaraj and Mr. K.P. Mohanan | Solar PV Based Jet Propulsion Boat | Published 2020 |
| 12 | Mr. Lokesh B. Paradeshi, Mr. M. Mohanraj, Dr. M. Srinivas and Dr. S. Jayaraj | New Hydrocarbon Mixture for Solar Assisted Heat Pump System Suitable for Heating Applications | Published 2019 |
| 13 | Dr. Vinay V. Panicker, Francis J. Emmatty and Baradwaj K.C. | Linear sorting table with manually movable pallets | Application filed 2019 |
| 14 | Dr. Biju T Kuzhiveli, Dr. Lity Alen Varghese, Dr. Sony Varghese and Rahul | Multipurpose combo cooling heating rest for personal in frontier areas | Application filed 2019 |
| 15 | Dr. Biju T Kuzhiveli, Dr. Rijil Ramchand and Mohammed Sohail | Self-sustained advanced micro Stirling CHP for unelectrified rural homes | Application filed 2019 |
| 16 | Dr. Biju T Kuzhiveli and Mr. Jerin Saji (MS16180) IISER, Mohali | Electrostatic thruster-Design of an electric thruster | Application filed 2019 |
| 17 | Dr. Sudheer A P and Dr. M L Joy | Robot for high-voltage electrical transmission line inspection | Published 2018 |

| 18 | Dr. V Madhusudanan Pillai | A method and tool for simulating role play based | Application |
|----|--|---|-------------|
| 10 | Dr. v Madriusudariari Piliai | supply chain operation | filed 2018 |
| 19 | Dr. Aidarkhan Kaltayev, Dr. Yerzhan Belyayev and Dr. Jayaraj S | Direct Expansion Cascade Solar Assisted Heat Pump | |

5.8.3 Development Activities

SOFTWARES

| S. N. | Name of Staff (s) | Title | Status |
|----------|--|--|-------------------------|
| 1 | Dr. V Madhusudanan Pillai | Supply Chain Role Play Game | Used for Assignments |
| 2 | Dr. V Madhusudanan Pillai | Vendor Managed Inventory-Based Supply Chain Role Play Game | Used for Assignments |
| 3 | Dr. V Madhusudanan Pillai | Real-time Collaborative Supply Chain Role Play Game Using Google Spreadsheet | Used for Assignments |
| 4 | Dr. V Madhusudanan Pillai | Supply Chain Inventory Policy Analyser | Used for Assignments |
| 5 | Dr. V Madhusudanan Pillai | Performance Analysis of a Serial Supply Chain under Different Inventory Policies | Used for Assignments |
| 6 | Dr. V Madhusudanan Pillai | Layout Planning | Used for Assignments |
| 7 | Dr. V Madhusudanan Pillai | Manufacturing System Simulator for Performance Evaluation | Used for Assignments |
| 8 | Dr. V Madhusudanan Pillai | Material Requirement Planning (MRP) Package | Used for Assignments |
| 9 | Dr R. Manu, Dr Deepak Lawrence K and Dr. Remil George Thomas | Feature extraction and Fixture planning: FiXplan software, Copyright with number: SW-14005/2020 dated 14/12/2020 received from Copyrights Office, Govt. of India | Used for Assignments |

5.9 Faculty Performance and Development System (FPADs)

| SI No | 142111 | e | | | Remark |
|-------|-----------------------|---------|---------|-------------|--|
| 41.00 | Dr. C Muraleedhara | n | | | |
| 2. | Dr. Biju T Kuzhivel | i | | MA TO F | Secretary Aug. |
| 3. | Dr. Jose Mathew | | | the light . | |
| 14. | Dr. M A Joseph | | | | |
| 5. | Dr. M L Joy | e el | 1 | | |
| 6. | Dr. V Madhusudana | n Pilla | i | | |
| 7. | Dr. R Manu | | - | | |
| 8. | -Dr. P K Rajendra Ki | mar | | - 1 | The state of the s |
| 19. | Dr. A Shaija | 1F. 35 | | | |
| 10. | Dr. R Sridharan | | | - | |
| 11. | Dr. Arun P | | 1 | | |
| 12. | Dr. P B Dhanish | 32E - | | | |
| 13. | Dr. Jinu Paul | - | | - | |
| 14. | Dr. M D Narayanan | | | 451 | |
| | Dr. Jagadeesha T | | 1 | 14 4 6 | |
| 116 | Dr. Murali K P | | | . 414 | |
| 17. | Dr. T J Sarvoththama | T .1. | | | A CONTRACT OF THE CONTRACT OF |
| 18. | Dr. K Sekar | Jothi | | | |
| | Dr. M Srinivas | | | | 5-2-1 |
| 20. | Dr. Sudheer A P | | 100 | | |
| | Dr. G Varaprasad | | | | |
| -25 | Dr. Vinay V Panicker | | N. F. | 11. | |
| 23. | Dr. Amis V Panicker | | | | |
| . 21 | Dr. Amit Kumar Singl | 1 | | | |
| 25. | Dr. Jayadeep ÜB | | | | |
| - | Dr. B Rohini Kumar | | | | - |
| 27. | Dr. Saleel Ismail | | | | |
| | Dr. Ashesh Saha | | | | |
| 28. | Dr. Basil Kuriachen | | | 1 12 | |
| | Dr. Deepak Lawrence I | < | | | 787 |
| 30. | Dr. L G Kiran Kumar | | 1. 1. | | ************************************** |
| 31. 1 | Dr. P V Manu | | | | |
| 32. I | Or. K Ratna Kumar | | | 1 | |
| 33. 1 | Or. Sujith Kumar C S | | | | · · · · · · · · · · · · · · · · · · · |
| 34. I | Dr. Vineesh K P | | | 1000 | |
| 35. I | Dr. Devendra K Yadav | 6.0 | 111 141 | Rg - F | 3 |
| 36. I | Dr. Sandip Rudha Budh | e | | | |
| 37. E | r. Simon Peter | | | | 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 |
| 38. D | r. Sumer B Dirbude | 10 | | | |

To the Dean (FW)/Sir.

APAR 2021-22 for Professors

endored:

throwness.

| | Name | | | |
|--------|-------------------------|--------|-----------|--|
| 1. | Dr. C Muraleedharan | | | Remark |
| 2. | Dr. Biju T Kuzhiveli | | | |
| 3. | Dr. Jose Mathew | | | See to reserve |
| 4. | Dr. M A Joseph | | | |
| 18. | Dr. M L Joy | 20120 | | |
| 6. | Dr. V Madhusudanan l | Pillai | | 7 |
| 7. | Dr. R Manu | illai | | |
| 8. | -Dr. P K Rajendra Kum | ar | | |
| 19. | Dr. A Shaija | ai | | |
| 10. | Dr. R Sridharan | | | |
| | Dr. Arun P | | | |
| | Dr. P B Dhanish | | | |
| | Dr. Jinu Paul | | - | |
| | Dr. M D Narayanan | | | |
| | Dr. Jagadeesha T | | | |
| 46. | Dr. Murali K P | | | |
| | Dr. T J Sarvoththama Jo | .1 : | | |
| | Dr. K Sekar | thi | | |
| | Dr. M Srinivas | | | |
| 20. | Dr. Sudheer A P | | i la lita | A CONTRACTOR OF THE PARTY OF TH |
| -21. | or. G Varaprasad | | | |
| 22. I | Or. Vinay V Panicker | | | |
| 23. I | Dr. Amit Kumar Singh | | | |
| 24. 1 | Dr. Jayadeep U B | | | |
| 25. Г | Dr. B Rohini Kumar | | | |
| 26. I | Dr. Saleel Ismail | | | |
| | r. Ashesh Saha | | | 1 |
| | r. Basil Kuriachen | | | - Intelligence of the state of |
| 29. D | r. Deepak Lawrence K | | | |
| 30. D | r. L G Kiran Kumar | | | |
| 31. D | r. P V Manu | | | |
| 32. D | r. K Ratna Kumar | | | |
| | r. Sujith Kumar C S | | | |
| 34. Di | r. Vineesh K P | | | |
| 35. Di | . Devendra K Yaday | | | |
| 36. Di | Sandip Rudha Budhe | | | 4 |
| 37. Di | Simon Peter | | | |
| 38. Dr | Sumer B Dirbude | | | |

APAR 2021-22 J Associate Professors + Azst Professors endosed

| Sl. No | Name | Remark |
|--------|----------------------|--|
| V. | Rajendran M K | |
| 2. | A Ajayan | |
| 3. | T M George | |
| A. | Raghu P V | |
| 5. | Surendran P K | |
| 6. | Suresh K C | |
| 7. | Manoj K G | |
| v8. | Prasad M V | |
| 19. | Shali Joseph | |
| 10. | – Hariharan C P | The second secon |
| M. | Velayudhan kutty N P | |
| 12. | Sasi K K | |
| 13. | Sanal P R | |
| 14. | Unnikrishnan R | |
| 15. | K K Pradeep Kumar | |
| 16. | Vasu T C | |
| 17. | Eldo P Varghese | |
| 18. | P Anil Kumar | |
| 19: | P Anandan | |
| 20. | A Abhilash | ą. |
| 21. | Sudheer P R | |
| 22. | Unnikrishnan C | |

To Dem (FW) Siz APAR 2021-22 of Non Faculty enclosed.

Anarahusha

| LOCAL DELIVERY BOOK | | National Institute of Technology | | Dept | | |
|---------------------|-----------------------------------|---|---------------------|--|-------------------------------|---------|
| Date | Name of office to which addressed | Details | Number of Covers | Name of Peon entrusted with delivery | Initials of receiving officer | Remarks |
| 30/08/86 | FW | From HoD MED | maye | Poopyle | 300 | (v) |
| 01 /04/22 | Salary | 1- Attendance Statement Ad office Staff (Anuska be | hoc | Asudhy. in | 1 | Hain |
| | | 2-Affendance state and A Technical staff (26) | so ho | | | |
| 01/01/21 | Dean REE | 1- Application for reimber Under Dorce Project Rs 24,998 Fromon South | of | 4 | | |
| | | 2- March Shiften | E T | RF | | |

5.10 Visiting/Adjunct/Emeritus Faculty etc

Guest lectures organized by the Mechanical Engineering Association

| S. N. | Тор | Date | |
|----------|---|------------|--|
| 1 | Higher Studies and Professional Life by Nived Govind, Ford Motor Company, Michigan USA | | |
| 2 | Future Prospects of Mechanical Engineers in Automotive Industry by Dr.Ramdas AS ,Senior Researcher IOCL R and D Center, Faridabad | 07/01/2019 | |
| 3 | Higher studies abroad: Challenges and Opportunities Rhinithaa P , University of Illinois USA | 12/02/2020 | |
| 4 | Engineering to Data Science: A personal reflection, by Dr. Roshan Joseph, Professor, Georgia Tech USA and Editor-in-Chief of Technometrics | 07/10/2020 | |
| 5 | Design and development of two-wheelers: State of the art and Future by Kuriyan Arimboor, Divional Manger R and D , Bajaj Auto Ltd | 14/10/2020 | |
| 6 | What it takes to build a career: Attitude or Knowledge! by Sailesh Shetty, Vice President, Corporate Governance, Toyota Kirloskar motor | 21/10/2020 | |
| 7 | Design Considerations for Rotating machinery in Oil and Gas industries: Industrial practice and standards by Prakash Shetty Technical Director, Gasotech and RS Industry | 28-10-2020 | |
| 8 | Multi-Disciplinary Thermal Technology by Dr. Arun Muley Technology Director, Boeing USA | 11-11-2020 | |
| 9 | Mechanics Inspiration for learning and control. By Dr. Akella Maruthi Ram Director, Control lab for Distributed and Uncertain Systems, The University of Texas at Austin, USA | 6/10/2021 | |

| 10 | How NITC prepared me for life ahead by Sebi Joseph, President, The Otis, India | | |
|-----|---|-------------|--|
| 11 | Nuclear Reactors in India: Advances and Opportunities by A K Balasubrahmanian, | 21 -10-2021 | |
| ' ' | Director (Technical) retd., Nuclear Power Corporation of India Limited | | |
| 12 | Fast and Furious 21: Accelerating a career in the Transforming Mobility Industry, Mr. | 29-10-2021 | |
| '- | Anant Kamat, Managing Director, Accenture USA | | |
| 13 | Futursistic Aerospace Missions by Prof.S.S. Gokhale, BoG Chairman NIT Durgapur and | 02-09-2022 | |
| 13 | Former Professor of Aerospace Department, IIT Madras | | |
| 14 | Learnings from my professional life, Mr. Ajith Babu. N, Managing Director ,Carlsberg, | 26-10-2022 | |
| '* | Nepal | | |
| 15 | Career path to the oil and gas industry Mr. Vikas Makhija | 28-10-2022 | |
| | Learning from what we study: A personal journey of a mechanical engineer through the | 7-11-2022 | |
| 16 | tele revolution, Mr. Bobby Rajgopal, Director of Sales and Business development, Tata | | |
| | communications and transformations services Pvt Ltd | | |
| 17 | Robotics: The state of the art and career opportunities by Ratheesh Rajan, Software | 21-11-2022 | |
| | Engineer Principal, NASA, USA | | |