

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: ME367

Course Name: NON-DESTRUCTIVE TESTING

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks.

- | | | Marks |
|---|---|-------|
| 1 | a) Differentiate between Destructive and Non- Destructive testing. | (4) |
| | b) What are the different visual aids used in Visual inspection? Explain any 3 in detail. | (6) |
| 2 | a) How visual inspection helps in Non- Destructive Testing? | (2) |
| | b) Explain computer enhanced visual system for Visual inspection. | (6) |
| | c) Explain the future scope of NDT methods. | (2) |
| 3 | a) Explain the principle of Liquid Penetrant Inspection. | (4) |
| | b) Explain various methods of Liquid Penetrant Inspection. | (6) |
| 4 | a) What are the properties required for a good penetrant? | (4) |
| | b) With neat sketches explain the steps involved in conducting the LPI. | (4) |
| | c) What are the limitations of LPI? | (2) |

PART B

Answer any three full questions, each carries 10 marks.

- | | | |
|---|---|-----|
| 5 | a) With neat sketch explain any four magnetization techniques used in Magnetic Particle Inspection. | (6) |
| | b) What is the use of field indicators in MPI? Explain any one type of field indicator used in MPI. | (4) |
| 6 | a) Explain procedure used for testing a component using Magnetic particle inspection (MPI). | (6) |
| | b) What is sensitivity in MPI? | (4) |
| 7 | a) What is the principle of Ultrasonic Testing (UT)? | (4) |
| | b) With sketches, explain different modes of display in Ultrasonic Testing. | (6) |
| 8 | a) Explain TOFD in ultrasonic testing. | (4) |
| | b) Explain straight beam and angle beam testing techniques used in UT. | (6) |

PART C

Answer any four full questions, each carries 10 marks.

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|----|---|-----|
| 9 | a) What is real time radiography? What are the advantages and disadvantages of real time radiography? | (5) |
| | b) Explain the production of X- Ray. | (5) |
| 10 | a) Explain SWSI, DWSI and DWDI inspection techniques in radiographic testing. | (8) |
| | b) What are the properties of X- and Gamma Rays. | (2) |
| 11 | a) How the quality of a good radiograph is accessed. | (3) |
| | b) Explain any two types of screens used in radiographic testing. | (3) |
| | c) What are the safety precautions to be taken during Radiographic testing? | (4) |
| 12 | a) What is the principle of Eddy current testing? | (5) |
| | b) What is sensitivity in Eddy current Testing? | (5) |
| 13 | a) Define 'lift off effect', 'edge effect' and 'end effect' in ECT | (5) |
| | b) Explain constant current drive and scanning probe ECT techniques. | (5) |
| 14 | a) Explain any three applications of Eddy current testing. | (6) |
| | b) What are the advantages and limitations of ECT? | (4) |

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: HS300

Course Name: PRINCIPLES OF MANAGEMENT

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks.

- | | | Marks |
|---|--|-------|
| 1 | a) Define management. | (3) |
| | b) Why management is called an art and science? | (3) |
| | c) In the context of a car manufacturing firm, describe any four elements of the external environment. | (4) |
| 2 | a) What is meant by competitive advantage? | (2) |
| | b) List any four important features of the organizations of the new era. | (4) |
| | c) What challenges are faced by the new generation firms? | (4) |
| 3 | a) List any four important contributions by FW Taylor. | (4) |
| | b) Why Elton Mayo's studies is called human relations management? | (2) |
| | c) State Douglas Mc Gregor's Theory X and Theory Y | (4) |
| 4 | a) Distinguish between system approach and contingency approach. | (4) |
| | b) Draw 7S Framework. | (3) |
| | c) Describe any one instance of application of Corporate Social Responsibility. | (3) |

PART B

Answer any three full questions, each carries 10 marks.

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|---|---|-----|
| 5 | a) List any four objectives of planning | (4) |
| | b) Who require strategic planning? Why? | (3) |
| | c) Distinguish between plan, goal and procedure. | (3) |
| 6 | a) List the steps of the planning process adopted in a production firm. | (4) |
| | b) Why the planning of lower level managers is considered easier? | (3) |
| | c) List the advantages of Management by objectives. | (3) |
| 7 | a) Define span of control. | (2) |
| | b) Classify the factors affecting the span of control. | (5) |
| | c) What is meant by departmentation? | (3) |
| 8 | a) List the merits and demerits of line organization structure (three each) | (6) |
| | b) Why decision making is a difficult task? (four reasons) | (2) |
| | c) List any two methods to deal with decision making under uncertainty. | (2) |

PART C

Answer any four full questions, each carries 10 marks.

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|---|---|-----|
| 9 | a) Write a note on staffing function of management. | (3) |
| | b) Give three reasons for the delegation of authority. | (3) |
| | c) List out the important characteristics of entrepreneurs. | (4) |

- 10 a) What is meant by –“Centralization of authority” (3)
b) List the steps of selecting engineers in a production firm. (5)
c) List four important interpersonal skills to be possessed by a manager. (2)
- 11 a) Explain the need of Job Design, indicating the factors influencing it. (4)
b) What is meant by a culture responsive organisation? (3)
c) List three important characteristics of global type organisation. (3)
- 12 a) How does a leader differ from a manager? (4)
b) Explain trait approach to leadership and contingency approach. (6)
- 13 a) Describe any two type of leadership styles. (4)
b) List six important qualities of a leader. (6)
- 14 a) Explain the process of controlling function with the aid of a sketch. (5)
b) Distinguish between feed back and feed forward control mechanisms. (5)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE311

Course Name: ELECTRICAL DRIVES & CONTROL FOR AUTOMATION (AU, ME)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks.

- | | | Marks |
|---|---|-------|
| 1 | a) Derive an expression for the e.m.f generated in a d.c machine. | (4) |
| | b) What is meant by armature reaction? How does it will affect the main field flux? | (2) |
| | c) List out the different methods of excitation. Explain. | (4) |
| 2 | a) A d.c shunt generator operating at 850rpm is given below | (8) |
| | Eg(V): 12 40 102 176 210 240 256 | |
| | I _f (A): 0 0.5 1 2 3 4 5 | |
| | The machine has 6 poles. The type of winding is lap. The number of conductors in the armature is 540. | |
| | i) Calculate residual flux per pole. | |
| | ii) The no load e.m.f for a total shunt field resistance of 120Ω. | |
| | iii) The critical field resistance of the field circuit. | |
| | iv) The critical speed for the shunt field resistance of 120Ω. | |
| | b) Define critical speed and critical field resistance of a d.c shunt generator. | (2) |
| 3 | a) Derive an expression for the electromagnetic torque developed in a d.c motor. | (2) |
| | b) A d.c shunt motor runs at 1300rpm on no-load drawing 5A from 220V mains. Its armature and field resistance are 0.24Ω and 110Ω respectively. When loaded the motor draws 60A from the mains. Calculate the speed when the motor is loaded. Assume that the armature reaction demagnetizes the field by 3%. Also calculate the internal torque developed at no load and on load. What is the motor shaft torque at load? | (8) |
| 4 | a) Derive the speed-torque characteristics of a d.c shunt and d.c series motor. | (4) |
| | b) What are the losses occurring in a d.c motor and how do they vary with load current? | (3) |
| | c) Why a starter is required for starting a d.c motor? | (3) |

PART B

Answer any three full questions, each carries 10 marks.

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|---|---|-----|
| 5 | a) Derive the e.m.f equation of a single phase transformer. | (4) |
| | b) Draw the phasor diagram of a 1-phase transformer at no load and derive the equivalent circuit. | (4) |
| | c) Explain the difference between an ideal transformer and an actual transformer | (2) |
| 6 | a) What are the losses produced in a transformer and derive the condition for | (4) |

- maximum efficiency.
- b) A 40kVA single phase transformer has iron loss of 450W and full load copper loss of 850W. If the pf of the load is 0.8 calculate: (4)
- i) The full load efficiency.
 - ii) The maximum efficiency.
 - iii) The load at which maximum efficiency occur.
- c) Write short notes on instrument transformers. (2)
- 7 a) Explain the principle of operation of a 3-phase induction motor (4)
- b) Differentiate between squirrel cage and slipring induction motor. (2)
- c) Write short notes on torque-slip characteristics of a 3-phase induction motor (4)
- 8 a) Explain no load and blocked rotor test on a 3-phase induction motor and derive the equivalent circuit parameters. (4)
- b) What is meant by circle diagram of a induction motor? What are the information that can be obtained from the circle diagram? (1)
- c) Explain with the help of neat diagram the working of any two methods of starting a 3-phase induction motor. (5)

PART C

Answer any four full questions, each carries 10 marks.

- 9 a) Derive the e.m.f equation of an alternator. (3)
- b) What is meant by regulation of an alternator? (1)
- c) How can you determine the regulation of an alternator by e.m.f method? Explain. (6)
- 10 a) Explain the principle of operation of 1-phase induction motor. (2)
- b) Explain the pitch factor and distribution factor of an alternator. (4)
- c) What is a universal motor? What are the applications of this type of motors? (4)
- 11 a) Why synchronous motor has no net starting torque. (2)
- b) Explain the methods of starting synchronous motor (6)
- c) What is synchronous condenser? (2)
- 12 a) With a neat sketch, explain the working of a permanent magnet stepper motor. (7)
- b) List out the classification of stepper motor and compare them. (3)
- 13 a) Draw and explain the torque-speed characteristics of stepper motor. (3)
- b) Write short notes on servo control and digital controllers. (7)
- 14 a) What is machine tool controller? (3)
- b) With neat diagram explain programmable logic controllers. (7)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: ME305

Course Name: COMPUTER PROGRAMMING & NUMERICAL METHODS
(MA, ME, MP, PE)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three full questions, each carries 10marks.

Marks

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|---|---|------|
| 1 | a) Explain how integer number and floating numbers are represented internally in a computer. | (5) |
| | b) Write an algorithm and draw a neat flowchart to find all the possible roots of a quadratic equation. | (5) |
| 2 | a) Explain with examples the tokens in C++ | (5) |
| | b) Describe the structure of a C++ program with an example. | (5) |
| 3 | a) Explain the use of a switch statement with an example. | (5) |
| | b) Explain the C++ declaration and initialization of 2-D arrays with suitable examples. | (5) |
| 4 | What are the different types of functions supported by C++ ? Give examples for each function. | (10) |

PART B

Answer any three full questions, each carries 10marks.

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|---|--|------|
| 5 | a) Discuss the advantage of using pointers with examples. | (5) |
| | b) Write a program to input two $n \times n$ matrices and display their product. | (5) |
| 6 | a) Write a program to generate N^{th} Fibonacci number using arrays . | (5) |
| | b) Write a function big to find largest of two numbers and use this function in the main program to find largest of three numbers. | (5) |
| 7 | a) Explain different types of inheritances in C++ | (5) |
| | b) Explain public inheritance and private inheritance with suitable examples | (5) |
| 8 | Explain major features of OOP | (10) |

PART C

Answer any four full questions, each carries 10marks.

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|----|--|------|
| 9 | a) Give the step by step procedure for solving algebraic equations by Gauss elimination method | (6) |
| | b) What are the sources of error in numerical computations? Explain. | (4) |
| 10 | Using Lagrange's formulae find the values of | (10) |
| | i) y_x if $y_1 = 4, y_3 = 120, y_4 = 340, y_5 = 2544$ | |
| | ii) if $y_{-30} = 30, y_{-12} = 34, y_3 = 38, y_{18} = 42$ | |
| 11 | Solve by Gauss Siedel method the following system of equations | (10) |

$$8x - 3y + 2z = 20$$

$$6x + 3y + 12z = 35$$

$$4x + 11y - z = 33$$

- 12 a) Prepare a C++ program for fitting a parabola to a given set of data. (5)
- b) In an organization, systematic efforts were introduced to reduce the employee absenteeism and results for the first 10 months are shown below. Fit a straight line to the data and from this equation, estimate the average weekly reduction in absenteeism. (5)

x	1	2	3	4	5	6	7	8	9	10
y	10	9	9	8.5	9	8.5	8	7	8	7.5

- 13 a) Interpolate the value of f at $x = 0.25$ using Newton's forward interpolation formula using the following data. (5)

$x:$	0.1	0.2	0.3	0.4	0.5
$f:$	0.11246	0.22270	0.32863	0.42839	.52050

- b) What numerical methods are available for the solution of partial differential equations? (5)
- 14 a) Write a complete program to fit a straight line using n data values. (5)
- b) Explain the terms: correlation and regression. (5)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: ME303

Course Name: MACHINE TOOLS AND DIGITAL MANUFACTURING (IE, ME)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks.

- | | | Marks |
|---|--|-------|
| 1 | a) Define tool signature. How is it related to tool geometry? | (4) |
| | b) Sketch the top view, front view and end view of a 25-mm square bit having tool signature of 15-15-10-10-15-10-3 and label all parts. | (6) |
| 2 | a) Clearly explain the utility of Merchant's Circle Diagram. How it can be plotted? | (4) |
| | b) A lathe while running consumes 2000W when cutting a steel specimen at 30m/min. Determine the cutting force and torque at the spindle running at 120 rpm. Also determine the specific power consumption if the depth of cut is 4 mm and feed is 0.25 mm/rev. | (6) |
| 3 | a) Discuss the relative merits and demerits of the different methods for machining external taper on lathe. | (4) |
| | b) State any six advantages of using cutting fluids during machining. | (6) |
| 4 | a) Sketch a fully labelled schematic diagram of a Radial Drilling Machine. List any four key design features that make it popular. | (6) |
| | b) Identify the possible causes for the following problems in drilling: | (4) |
| | i) Drill breakage ii) Oversized hole | |
| | iii) Rough hole iv) Breakage of outer corners of cutting edges. | |

PART B

Answer any three full questions, each carries 10 marks.

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|---|--|------|
| 5 | a) With the help of a fully labelled schematic diagram, explain the kinematic system provided in shaping machine for transmitting power and motion from the motor to the tool and job at desired speeds and feeds. | (6) |
| | b) With the help of neat sketches explain any two operations (other than machining of flat surfaces) that can be carried out using a shaping machine. | (4) |
| 6 | a) Compare and contrast (differentiate) shaping machine, slotting machine and planing machine. | (10) |
| 7 | a) Differentiate between up-milling and down milling operations. | (5) |
| | b) Show that the mean cross-sectional area of chip in plain milling is given by | (5) |
| | $A_m = \frac{fW}{Nm} \sqrt{\frac{d}{D}}$ Where f = feed in mm/m; N = cutter rpm; D = milling cutter diameter; d = depth of cut; m = No of tooth in cutter; W = Width of work piece. | |

- 8 a) With the help of simple sketches, explain any three common attachments used in Milling Machines. (6)
- b) Estimate the machining time that will be required to finish a vertical flat surface of length 120 mm and depth 15 mm by an 8 teeth HSS end mill cutter of 32 mm diameter and 60 mm length in a milling machine. Assume, cutting velocity = 30 m/min, feed = 0.12 mm/tooth. (4)

PART C

Answer any four full questions, each carries 10 marks.

- 9 a) With suitable sketches, clearly explain the similarities and differences between cylindrical grinding and centreless grinding. (6)
- b) The base of a brass bracket has to be rough ground to remove the unevenness. Suggest the most suitable grinding wheel for this purpose. Justify the choice of the wheel also. (4)
- 10 a) Differentiate between truing and dressing of a grinding wheel (5)
- b) Write a short note on the self-sharpening characteristic of a grinding wheel. (5)
- 11 a) Explain the basic principle of broaching. (4)
- b) Explain the kinematic system and operating principle of a swiss type automatic lathe with the help of a line diagram. (6)
- 12 a) With the help of a suitable illustration explain the concept of Digital Manufacturing. (5)
- b) With the help of a block diagram explain the Architecture of Digital Manufacturing System. (5)
- 13 a) Briefly outline the system modelling principle, modelling methods and modelling steps followed to create an abstract model of the digital manufacturing system. (6)
- b) Formulate the general mathematical model of the digital manufacturing system. (4)
- 14 a) Write short notes on the following models of digital manufacturing system: (8)
- i) Organization Model ii) Function model
- iii) Information model iv) Operation & Control Model
- b) Explain the role of Bionic Mechanics and Manufacturing Intelligence in Digital Manufacturing. (2)

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: ME301

Course Name: MECHANICS OF MACHINERY (ME, MP, PE)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three full questions, each carries 10marks.

- | | | Marks |
|---|---|-------|
| 1 | a) Distinguish between lower and higher kinematic pairs with ONE example each. | (2) |
| | b) Sketch and explain slider-crank chain; Show with sketch any two inversion mechanisms obtained from it. | (8) |
| 2 | a) Explain any ONE exact straight line mechanism with suitable diagram. | (5) |
| | b) Sketch and explain Geneva mechanism; List any ONE use of this mechanism. | (5) |
| 3 | A slider crank mechanism is having following dimensions crank 480mm, connecting rod 1600mm. If crank is rotating at 20rad/s counter clockwise (CCW) and is at 60° from the IDC measured counter clock wise, calculate following | (10) |
| | i) Velocity of slider ii) Acceleration of slider | |
| | iii) Angular acceleration of connecting rod | |
| 4 | a) What is coriolis component of acceleration; How its magnitude and directions are calculated? | (4) |
| | b) Perform displacement, velocity and acceleration analysis of cam-follower subjected to uniform acceleration/deceleration motion | (6) |

PART B

Answer any three full questions, each carries 10marks.

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|---|---|-----|
| 5 | a) Obtain the profile of a disc cam operating roller follower having the following motions; Cam lifts the follower for 120° with SHM followed by 30° dwell. During next 150° follower is lowered with uniform acceleration and deceleration and then dwell. Assume minimum radius of cam as 25mm, lift as 30mm and roller diameter 15mm | (8) |
| | b) Draw the profile of tangent cam with roller follower; why such cams are preferred? | (2) |
| 6 | a) For the case of gears, What is meant by i) Pressure angle, ii) Circular pitch, iii) Module. | (3) |
| | b) A pinion having 30 teeth drives a gear having 80 teeth. The profile of gears is involute with 20° pressure angle, 12 module and 10mm addendum. Find the length of the path of contact, arc of contact and the contact ratio. | (7) |
| 7 | a) What is meant by backlash in gears; How it can be reduced? | (3) |
| | b) With reference to helical gears with the help of a sketch; define | (7) |
| | i) Helix angle ii) Circular pitch iii) Normal circular pitch. | |
| 8 | a) Distinguish between internal and external gears, rack and pinion with sketch. | (4) |

- b) Describe with diagram: (6)
i) Axial pitch ii) Lead iii) Lead angle for a worm gear

PART C

Answer any four full questions, each carries 10marks.

- 9 a) What is the difference between simple and compound gear trains? (2)
b) In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm in the counter clockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed makes 300rpm in the clockwise direction, what will be the speed of gear B. (8)
- 10 a) Explain with neat sketch working of differential gears. (7)
b) How precision points are obtained using Chebychev spacing? (3)
- 11 a) List the differences between type, number and dimensional synthesis. (2)
b) Perform 2 position graphic synthesis of slider crank mechanism for any convenient dimensions of crank and coupler. (8)
- 12 a) Discuss overlay method. (4)
b) Explain 3 position synthesis of four-link mechanism. (6)
- 13 a) Design a four bar mechanism with the help of Frudenstein's equation to coordinate the input and output angles as follows input angle = 20°, 30°, and 45° output angles = 30°, 45° and 60°. Assume input link length = 1m (8)
b) What is meant by function generator? (2)
- 14 Explain the procedure of analytical synthesis of mechanism of your choice with sketch. (10)
