F 3529 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fifth Semester

Mechanical Automobile Engineering

COMPUTER PROGRAMMING (M.U)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

1. What is the use of built in functions for 'C' programming ?
2. Briefly explain control instructions in 'C'.
3. What is meant by bubble sorting and quick sorting ?
4. Write a 'Struct' definition and define an array of such structs.
5. What are different string handling functions ?
6. Write notes on Macrus.
7. Compare call by value and call by reference.
8. Write a program to add the sum of number using pointer.
9. How are command line arguments passed to C-programming ?
10. Explain textile, binary file

(10 × 4 = 40 marks)

Part B

11. Write a 'C' program to find biggest among two numbers.

Or

12. Write a program to check, whether the given number is prime or not ?
13. Write a program to find standard deviation for the given data.

Or

Turn over

14. Write a program to sort an array of elements using bubble sort.

15. Write a program to print addition Subtraction and Multiplication values using functions.

Or

16. Write a user defined function that computer 'X' raised to the power of 'Y'.

17. Write a program to count number of vowels, consonants, digits, spaces and other characters in a line of text.

Or

18. (a) Write notes on dynamic memory location. (6 marks)

    (b) Write a program to print variables from memory address. (6 marks)

19. The contents of one text file has to append with the contents of another text file. Develop a 'C' program.

Or

20. Write notes on :

    (a) Various file handling function. (6 marks)

    (b) Transfer of data in blocks. (6 marks)

(5 × 12 = 60 marks)

F 3516 (Pages : 3) Reg. No.....ME.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fifth Semester

Branch—Civil/Mechanical/Electrical and Electronics/Elec. and Communication/Polymer/ Applied Elec. and Instrumentation/Elec. and Instrumentation Automobile

ENGINEERING MATHEMATICS—IV (CEMLPASU)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer any **one** *question from each module.*
All questions carry equal marks.

Module I

1. (a) If $f(a) = \int_C \frac{z^2 + 7z + 1}{z - a}\, dz$ where C is the circle $x^2 + y^2 = 4$ find $f(3)$, $f'(1-i)$ and $f''(1-i)$.

(10 marks)

(b) Find the Laurent's series expansion of $\frac{7z - 2}{z(z+1)(z-2)}$ in $1 < |z+1| < 3$. (10 marks)

Or

2. (a) Using contour integration, evaluate $\int_0^{2x} \frac{d\theta}{5 - 3\cos\theta}$. (10 marks)

(b) Using contour integration, evaluate $\int_{-\infty}^{\infty} \frac{x \sin x}{x^2 + a^2}\, dx$. (10 marks)

Module II

3. (a) Using Bisection method, find a real root of the equation $x^3 - 4x = 9$ correct to three decimal places.

(10 marks)

(b) Using Newton's iterative method, find a real root of the equation $x^3 - 2x - 5 = 0$ correct to three decimal places.

(10 marks)

Or

Turn over

4. (a) Using method of false position, find a root of the equation $xe^x = \cos x$ correct to four decimal places.

(8 marks)

(b) Using Jocobi's Iteration method, solve the system of equations :

$20x + y - 2z = 17,\ 3x + 20y - z + 18 = 0,\ 2x - 3y + 20z = 25.$

(12 marks)

Module III

5. (a) Using Taylor's series method, find $y(0.1)$ and $y(0.3)$ given that $\frac{dy}{dx} = x^2 - y$ and $y(0) = 1$.

(8 marks)

(b) Use Euler's modified method to compute $y(1.1)$, given that $\frac{dy}{dx} = x^2(1 + y)$, $y(1) = 1$ by taking $h = 0.05$.

(12 marks)

Or

6. (a) Apply Runge-Kutta method order four to find an approximate value of y at $x = 0.1$ and $x = 0.2$ if $\frac{dy}{dx} = x + y$ and $y(0) = 1$.

(10 marks)

(b) Using Milne's Predictor-Corrector method find $y(0.8)$ taking $h = 0.4$, given $\frac{dy}{dx} = y + x^2$, $y(0) = 1$.

(10 marks)

Module IV

7. (a) Find the Z-transforms of the following functions (i) cosh nx ; (ii) a^n cosh nx. (10 marks)

(b) Define Z-transform and prove the linearity property and damping rule. (10 marks)

Or

8. (a) Use convolution theorem to evaluate (i) $Z^{-1}\left\{\frac{2}{(z-a)(z-b)}\right\}$; (ii) $Z^{-1}\left\{\left(\frac{z}{z-a}\right)^2\right\}$.

(10 marks)

(b) Solve $4u_n - u_{n+2} = 0$ given $u_0 = 0, u_1 = 2$. (10 marks)

Module V

9. (a) Use graphical method to solve the following LPP :—

Maximize $Z = 2x + 3y$

subject to the constraints :

$$x + 2y \leq 10$$
$$x + y \leq 6$$
$$x - y \leq 2$$
$$x - 2y \leq 1, \text{ with } x, y \geq 0.$$

(8 marks)

(b) Use simplex method to solve the following LPP :—

Maximize $Z = 3x + 5y + 4z$

subject to the constraints :

$$2x + 3y \leq 8$$
$$2y + 5z \leq 10$$
$$3x + 2y + 4z \leq 15$$
$$\text{and } x, y, z \geq 0.$$

(12 marks)

Or

10. (a) Describe artificial variable technique to find an initial basic feasible solution. Using Charnes penalty (Big-M) method solve the following problem :

Maximize $Z = 3x + 2y$

subject to the constraints :

$$2x + y \leq 2$$
$$3x + 4y \geq 12$$
$$\text{with } x, y \geq 0.$$

(10 marks)

(b) The distribution centres at P, Q and R have availability of 40, 20 and 40 units of product and the retail outlets at A, B, C, D and E require 25, 10, 20, 30 and 15 units respectively. The following table gives cost matrix of transporting one unit of product from the distribution centres to retail outlets. Determine the optimum distribution to minimize cost of transportation.

	A	B	C	D	E
P	55	30	40	50	40
Q	35	30	100	45	60
R	40	60	95	35	30

(10 marks)

[5 × 20 = 100 marks]

F 3548 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fifth Semester

Branch—Mechanical Engineering/Automobile Engineering

MECHATRONICS AND CONTROL SYSTEMS (MU)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Explain the features of a practical op-amp.
2. What is meant by sampling frequency ?
3. Explain a simple sample and hold circuit.
4. What is a PID controller ?
5. What do you mean by a servo motor ?
6. Define a second order system.
7. What are the various buses in a micro processor system ?
8. Explain a DACA system.
9. What is a program counter register ?
10. Explain the working of an Optical Character Reader (OCR).

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

11. (a) Explain the construction and principle of a thermopile. (6 marks)

    (b) Explain how strain gauges are used in a load cells to measure force and torque. (6 marks)

Or

12. (a) Explain an instrumentation amplifier with a neat circuit diagram. (8 marks)

    (b) Explain the working of an optical proximity sensor. (4 marks)

Turn over

13. (a) Explain the PLC bringing out the difference of it with other microprocessor systems. (10 marks)

(b) Explain the 7 layer OSI model for protocols. (2 marks)

Or

14. (a) Explain the tracking system in a CD player. (10 marks)

(b) Explain ECG. (2 marks)

15. (a) Discuss the transfer function of the following circuit :

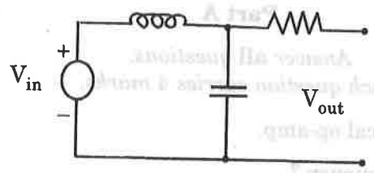


Fig.1.

(8 marks)

(b) What do you mean by step response of a system ? (4 marks)

Or

16. Obtain the governing equations of the following mechanical system used in vehicle suspension.

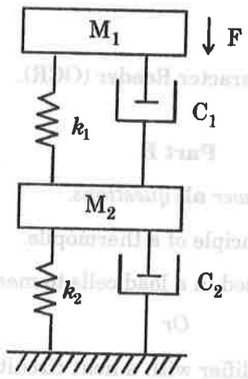


Fig.2.

(12 marks)

17. Discuss the stability of a system represented by the transfer function :

$$G(s) = \frac{1}{s^2 + 8s + 16}.$$

(12 marks)

Or

18. Explain the step response of a second order system and explain peak response and overshoot. (12 marks)

19. Construct the Bode plot for the system with transfer function :

$$G(s) = \frac{10}{s(2s + 1)}.$$

(12 marks)

Or

20. Discuss the method of analysing transient response of a control system using root locus plots. (12 marks)

[5 × 12 = 60 marks]

F 3538 (Pages : 3) Reg. No.....

Name .....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fifth Semester

Branch : Mechanical Engineering

THEORY OF MACHINES—II (M)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*
Drawing sheets may be supplied.

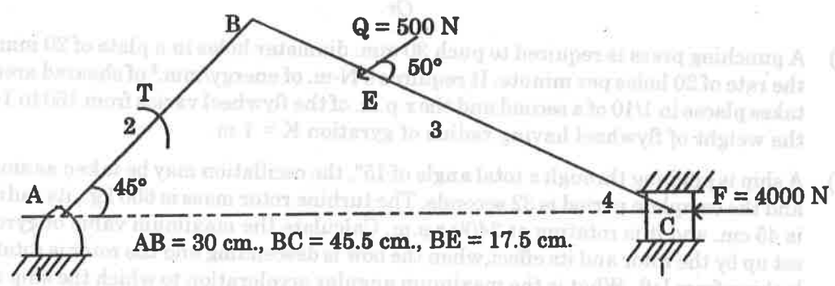
Part A

1. Explain D'Alembert's principle.
2. What is the effect of sliding friction in the analysis of slider crank mechanism ?
3. Explain the following terms of a governor :—
   (i) Isochromism.
   (ii) Hunting.
4. Sketch and briefly describe a porter governor.
5. Define fluctuation of energy and speed of a flywheel.
6. Derive an expression for energy stored in the flywheel.
7. Explain gyroscopic effect and discuss gyroreaction couple.
8. Explain the effect of gyroscopic couple on the stability of an automobile negotiating a curve.
9. Distinguish between the functions of a Cam and an Eccentric.
10. What is meant by pressure angle of a cam ? Discuss its significance.

(10 × 4 = 40 marks)

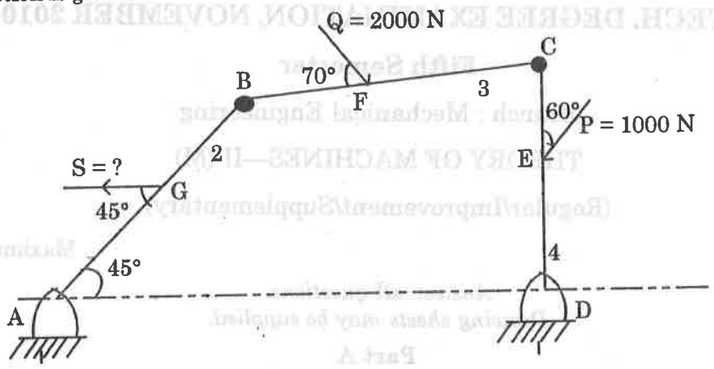
Part B

11. (a) Determine the couple T as applied in Fig. 1.



Or

(b) In Fig. 2 forces P and Q are given. Calculate the value of S applied on link 2 as only its direction is given.



AG = 15 cm., AD = 56 cm., DC = 30 cm., AB = 30 cm., BC = 30.5 cm., BF = 16 cm., CE = 14 cm.

12. (a) In a Hartnell governor the length of the ball arm is 190 mm., that of the sleeve arm is 140 mm., and mass of each ball is 2.7 kg. The distance of the pivot of each bell crank level from the axis of rotation is 170 mm. and the speed when the ball arm is vertical is 300 r.p.m. The speed is to increase 6 per cent for a lift of 12 mm. of the sleeve. Neglecting the weight of the sleeve, find the necessary stiffness of the spring and the initial compression.

Or

(b) A porter governor has all four arms 25 cm. long. The upper arms are attached on the axis of rotation and the lower arms are attached a sleeve at a distance of 3 cm. from the axis. The mass of each ball is 5 kg. and mass of the sleeve 50 kg. The extreme radii of rotation are 15 cm. and 20 cm. Determine the range of speed of governor.

13. (a) The turning moment diagram of an engine rotating at 200 r.p.m. is given by relation T (kN-m.) $= 15 + 8 \sin 2\theta - 2 \cos 2\theta$ where 'θ' is the crank angle. External resistance is constant. A flywheel weighing 20 kN is fitted on the engine shaft so that the total fluctuation of speed does not exceed 1%. Determine the least value of moment of inertia of the flywheel and its radius of gyration.

Or

(b) A punching press is required to puch 30 mm. diameter holes in a plate of 20 mm. thickness at the rate of 20 holes per minute. It requires 6 N-m. of energy/mm.^{2} of sheared area. If punching takes places in 1/10 of a second and the r.p.m. of the flywheel varies from 160 to 140, determine the weight of flywheel having radius of gyration K = 1 m.

14. (a) A ship is pitching through a total angle of 15°, the oscillation may be taken as simple harmonic and the complete period is 32 seconds. The turbine rotor mass is 600 kg., its radius of gyration is 45 cm. and it is rotating at 2400 r.p.m. Calculate the maximum value of gyroscopic couple set up by the rotor and its effect,when the bow is descending and the rotor is rotating clockwise looking from left. What is the maximum angular acceleration to which the ship is subjected to while pitching ?

Or

(b) In an epicyclic gear train an annular wheel A having 54 teeth meshes with a planet wheel B which gears with a sun wheel C, the wheels A and C being coaxial. The wheel B is carried on a pin fixed on one end of arm P which rotates about the axis of the wheels A and C. If the wheel A makes 20 r.p.m. in a clockwise sense and the arm rotates at 100 r.p.m. in the anticlockwise direction and the wheel C has 24 teeth, determine r.p.m. and sense of rotation of C.

15. (a) Draw the profile of a cam which raises a valve with S.H.M. through 3 cm. in 1/3 of revolution, keep it fully raised through 1/12 revolution and it is closed in next 1/3 revolution with S.H.M. The valve remains closed during the rest of the revolution. The diameter of the roller is 1 cm. and minimum radius of the cam is to be 2 cm. The axis of the valve rod is offset by 1 cm. from the axis of cam shaft.

Or

(b) A tangent cam is to drive a roller follower through a total lift of 1.25 cm. for a cam rotation of 75 °. The cam speed is 600 r.p.m. The distance between cam centre and follower centre at full lift is 4.5 cm. and the roller is 2 cm. in diameter. Find the cam proportions and plot displacement, velocity and acceleration of the follower for one full cycle.

(5 × 12 = 60 marks)

F 3555 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fifth Semester

Branch—Mechanical/Automobile Engineering

THERMAL ENGINEERING—I (M U)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Use of Mollier diagrams and steam tables are permitted.

Answer **all** *questions.*

Part A

1. Describe one method to find the dryness fraction of steam.
2. What are boiler accessories ? Give examples.
3. Explain why nozzles are made convergent–divergent.
4. What are the different methods of compounding of steam turbine ?
5. Explain why a leas mixture is used in gas turbine.
6. What problems are encountered in the design of gas turbine combustion chambers ?
7. Define the term overall loss coefficient.
8. Explain the term means plate temperature.
9. What is the purpose of a cooling tower ?
10. How is the draught of a chimney is determined ?

(10 × 4 = 40 marks)

Part B

11. (a) Steam at 10 bar, dry saturated, expands in a cylinder following the law, $pu^{1.35} = C$. The pressure at the end of expansion is 1 bar. Determine the workdone and change in internal energy.

(12 marks)

Or

(b) Explain the working of any one water–tube boiler. (12 marks)

12. (a) Dry saturated steam at 10 bar is passed through a convergent-divergent nozzle and exit pressure is 1 bar. Find the ratio of exit and throat area of the nozzle and the exit velocity, if the expansion process is isentropic.

(12 marks)

Or

Turn over

(b) What are the different losses in steam turbines ? What is compounding of steam turbines. (12 marks)

13. (a) Discuss various methods for improving the output and thermal efficiency of simple open cycle turbine plant. (12 marks)

Or

(b) What are the advantages and disadvantages of gas turbines over IC Engines ? What are the fields of applications of gas turbine ? (12 marks)

14. (a) Explain the working of a power generator using solar energy at low temperature (90°C) and higher temperature (140°C). (12 marks)

Or

(b) Explain the working of a liquid flat plate collector. (12 marks)

15. (a) Explain various methods of dust and ash handling systems of a thermal power plant. (12 marks)

Or

(b) Explain the working of a forced draught cooling tower. (12 marks)

[5 × 12 = 60 marks]

F 3520 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fifth Semester

Branch : Mechanical Engineering / Automobile Engineering

MANUFACTURING PROCESSES (M U)

(Regular / Improvement / Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Explain the importance of gating in casting.
2. Enumerate various tools used in foundry.
3. Differentiate between TIG-GMA and Co_2 processes.
4. Differentiate between soldering and brazing.
5. What is the importance of roll velocity and strip velocity?
6. How material behaviour affects rolling process?
7. Explain various types of die materials.
8. What is simple, progressive and compound dies?
9. Explain spinning process.
10. What is the relation between temperature and forge quality?

(10 × 4 = 40 marks)

Part B

Answer **all** *the questions.*
Each question carries 12 *marks.*

11. Explain in detail various types of moulding machines and moulding procedure.

Or

12. Explain in detail centrifugal, continuous, investment and squeeze castings.

Turn over

13. Explain in detail ISI specifications for welding.

Or

14. Explain with neat sketches thermite welding and electron beam welding.

15. Explain in detail hot and cold rolling processes.

Or

16. Explain mechanical, electrohydraulic and electromagnetic forming processes.

17. Explain with neat sketches various types of presses and press working operations.

Or

18. With neat sketches explain calendaring, transfer and injection moulding.

19. Explain in detail deep drawing, punching and tube piercing.

Or

20. With neat sketches explain various forging machines and impact of forces.

(5 × 12 = 60 marks)