G 2132 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2010

Fifth Semester

Branch—Mechanical Engineering

MANUFACTURING PROCESSES (M U)

(Supplementary—Prior to 2007 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions in Part A and* **five** *questions from Part B.*

Part A

1. Name the different types of cores and illustrate any *two* of them.
2. How is Permeability of moulding sand tested ?
3. What are the various flames which can be obtained in gas welding ?
4. Write short notes on Welding of plastics.
5. What do you mean by High Energy rate forming ?
6. Differentiate hot and cold rolling with examples.
7. How is double action press different from a triple action press?
8. Differentiate Direct and Indirect extrusion.
9. Compare Forged parts with Machined and Cast parts.
10. Explain the Coining process.

(10 × 4 = 40 marks)

Part B

11. Explain the preparation, combustion zones and melting in a cupola furnace.

Or

12. Explain the continuous casting process with the help of a neat figure.
13. Sketch the explain the Electron Beam welding process.

Or

14. Explain spot, seam and projection welding processes.
15. Sketch and explain different types of Rolling Mills.

Or

16. Explain the Electro hydraulic forming process with the help of a neat sketch.

Turn over

17. Sketch and explain the operation of progressive and compound dies.

Or

18. Explain Injection and compression moulding processes.

19. Explain Tube Piercing and Spinning processes.

Or

20. Sketch and explain the operation of a Drog forging hammer.

(5 × 12 = 60 marks)

G 2141 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2010

Fifth Semester

Branch—Mechanical/Automobile Engineering

COMPUTER PROGRAMMING (M, U)

(Supplementary—Prior to 2007 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. What is a C token ? What are the different types ?
2. Compare while and do-while statements.
3. Explain the initialization of arrays.
4. Define a structure and mention its uses.
5. What is a function ? Explain the form of a C-function.
6. What is a Macro ? What are its uses ?
7. What is a pointer ? How is it initialized ?
8. What is dynamic memory allocation ?
9. Distinguish between the functions (i) get C and get char ; (ii) feof and ferror.
10. What are the bit wise operators available in C ? Discuss their meaning also.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Explain with examples the data types used in C language.

Or

(b) Write a program to evaluate e^x for values of x from 0.1 to 0.9 in steps of 0.1.

12. (a) Write a program to read two matrices A and B which are conformable for multiplication and to output the matrix C which is the product of A and B.

Or

(b) Write a program to illustrate the comparison of structure variables.

Turn over

13. (a) Write a multifunction to illustrate how automatic variables work.

Or

(b) Write a function prime that returns 1 if its argument is a prime number and returns zero other wise.

14. (a) Write a program to illustrate the use of structure pointers.

Or

(b) Write a function that receives a sorted array of integers and an integer value, and inserts the value in its correct place.

15. (a) A file DATA contains a series of integers. Write a program to read these numbers and then write all odd numbers to a file ODD and all even numbers to another file EVEN.

Or

(b) Write a program to illustrate error handing in file operations.

(5 × 12 = 60 marks)

G 2167 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2010

Fifth Semester

Branch : Mechanical/Automobile Engineering

THERMAL ENGINEERING—I (M, U)

(Supplementary—Prior to 2007 Admissions)

Time : Three Hours Maximum : 100 Marks

Use of Mollier Diagrams and Steam tables are permitted.

Part A

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

1. What is the effect of regeneration on steam cycle output and efficiency ?
2. How does an industrial steam generator differ from a utility boiler ?
3. What are the different forms of steam nozzles ?
4. How is the number of stages in a turbine estimated ?
5. What are the essential features of gas turbine blades ?
6. Explain the terms (a) combustion efficiency ; (b) combustion intensity.
7. Define the term over all loss coefficient.
8. Explain the principle of working of a solar pond.
9. What is the function of the coal crusher ?
10. What are the different types of pulverised coal burners ?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Discuss the different methods of controlling the superheat (and Reheat) temperature of steam. (6 marks)

    (b) Discuss the modifications provided on ideal Rankine cycle. (6 marks)

Or

12. With the help of neat sketches, explain the working of boiler mountings and accessories. (12 marks)

Turn over

13. Steam at 20 bar, 400°C expands in a steam turbine to 0.1 bar. There are four stages in the turbine and the total enthalpy drop is divided equally among the stages. The stage efficiency is 75% and is the same in all the stages. Determine the reheat factor and the turbine internal efficiency. (12 marks)

Or

14. (a) Derive an expression for maximum mass flow per unit area of flow through a convergent divergent nozzle when steam expands isentropically from rest. (6 marks)

(b) Explain supersaturated flow in steam nozzles, and degree of supersaturation and degree of under-cooling. (6 marks)

15. Prove that for a two stage gas turbine plant with perfect intercooling and perfect reheating, the intermediate pressure for maximum work output is given by the geometric mean of the initial section pressure and the final delivery pressure. (12 marks)

Or

16. A gas turbine plant works between the temperature limits of 1152 K and 288 K. Isentropic efficiencies for compressor and turbines are 0.85 and 0.8 respectively. Determine the optimum ratio for maximum work output and also for maximum cycle thermal efficiency. (12 marks)

17. Explain with a neat sketch the tower concept for solar power generation. (12 marks)

Or

18. (a) State the advantages and disadvantages of solar energy. (6 marks)

(b) With a neat sketch explain the working of a parabolic concentrator collector. (6 marks)

19. With neat sketches explain various types of condensers in a thermal power plant. (12 marks)

Or

20. (a) Discuss the function of cooling ponds and cooling towers in thermal stations. (6 marks)

(b) With the help of a neat diagram, explain a once through cooling water system. (6 marks)

[5 × 12 = 60 marks]

G 2160 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2010

Fifth Semester

Branch—Mechanical Engineering/Automobile Engineering

MECHATRONICS AND CONTROL SYSTEMS (M)

(Supplementary—Prior to 2007 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Distinguish between sensors and transducers.
2. Explain the working principle of proximity pickups.
3. What are the advantages of digital communication systems ?
4. Explain the importance of PLC systems.
5. Obtain the transfer function of a simple closed loop system with a feedback.
6. Define open loop and closed loop system by giving suitable examples.
7. Explain the concept of stability of a system.
8. State and explain the Routh-Hurwitz's stability criterion.
9. What is rool locus ? Explain with suitable examples.
10. State the advantages of Bode Plots.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Distinguish between : (i) Active and passing transducers ; (ii) Analogue and digital transducers ; (iii) primary and secondary transducers.

(7 marks)

(b) What are the scope of mechatronics in the present stage ? Mention the application of mechatronics.

(5 marks)

Or

Turn over

12. With neat sketches explain the various kinds of hydraulic actuators. (12 marks)

13. Explain some of the medical devices which are operated by mechatronic systems. (12 marks)

Or

14. Explain the function and working of the I/O systems in mechatronics. (12 marks)

15. Obtain the transfer function of the given cascaded elements :

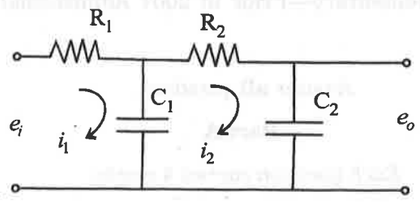

Fig. 1.

(12 marks)

Or

16. Draw the electric analog of the mechanical system given below by *f.v.* and *f.i.* analogy. Write the equilibrium equation of mechanical system.

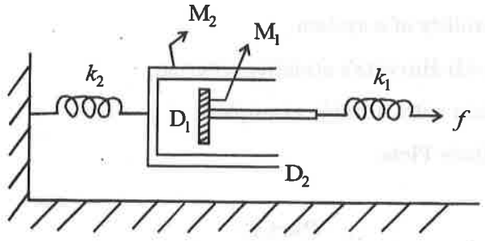

Fig. 2.

(12 marks)

17. Draw the Bode plot and determine GM and PM and find the stability of closed-loop system whose open loop transfer function is given by :

$$G(s)\,H(s) = \frac{10\,(s+3)}{s(s+2)\left(s^2+s+2\right)}.$$

(12 marks)

Or

18. Apply Route criterion to check the stability of the given characteristic equation :

(a) $2s^4 + s^3 + 12s^2 + 8s + 2 = 0$.

(b) $s^3 + 10s^2 + 24s + 3 = 0$.

(2 × 6 = 12 marks)

19. A second order system has a natural frequency of 10 rad/s. and a damping ratio of 0.5. It is given a step input of magnitude equation to 1.0. Determine :

(a) The response equation ;

(b) Time for complete response ;

(c) Response when time elapsed is equal to 0.5*s*.

(d) Time for 60% response.

(4 × 3 = 12 marks)

Or

20. Explain how the stability of the given system is obtained by Routh-Hurwitz criterion whose characteristic equation is given.

(12 marks)

[5 × 12 = 60 marks]

G 2150 **(Pages : 3)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2010

Fifth Semester

Branch—Mechanical Engineering

THEORY OF MACHINES II (M)

(Supplementary—Prior to 2007 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. (a) State and explain the conditions of equilibrium for a two force member and a 3-force member.
   (b) Explain free body diagram with the help of neat sketches.
   (c) Explain the effect of adding a central weight to the sleeves of a Watt governor.
   (d) Draw the controlling force diagram for Porter governor.
   (e) Explain the TMD for a double acting single cylinder steam engine.
   (f) Describe the role of a flywheel in a single cylinder 4 stroke engine.
   (g) Explain precession axis, spin axis and torque axis.
   (h) With the help of suitable example, explain rolling, pitching, yawing.
   (i) Explain pointing in cams.
   (j) Derive the expression for maximum velocity when a cam follower executes SHM.

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

2. In a four-bar mechanism ABCD the crank AB 5 cm long makes 60° with fixed link AD. Link BC = 7 cm, CD = 9 cm and AD = 10 cm. A force of 8 N at 73.5° acts on BC at a distance of 4 cm from B. Determine the reactive torque on link AB.

Or

3. A vertical petrol engine 150 mm dia and 200 m stroke has a connecting rod 350 mm long. Mass of reciprocating parts is 1.6 kg and the engine speed is 1800 r.p.m. On the expansion stroke with crank angle 30° from TDC the gas pressure is 750 kN/m^2. Find out the net thrust on the piston.

Turn over

4. In a spring controlled governor, the controlling force variation is linear. When balls are 400 mm apart, the controlling force is 1200 N and when 200 mm apart the force is 450 N. Determine the speed of the governor when the balls are 250 mm apart. The mass of each ball is 9 kg.

Or

5. A porter governor has two balls each of mass 3 kg and a central load of mass 15 kg. The arms are all 200 mm long, pivoted on the axis. If the maximum and minimum radii of rotation of the balls are 160 mm and 120 mm respectively, find the range of speed.

6. The TMD for a multicylinder engine has been drawn to a scale 1 mm = 600 N-m and 1 mm = 3°. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows :

+ 52, – 124, + 92, – 140, + 85, – 72 and + 107 mm^2,

when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the mass of the flywheel of a radius of 0.5 m.

Or

7. A punching press is required to punch 40 mm diameter holes in a plate of 15 mm thickness at the rate of 30 n.p.m. It requires 6 N - m of energy per mm^2 of sheared area. If the punching takes 1/10 of a second and the r.p.m. of the fly wheel varies from 160 to 140, determine the mass of the fly wheel having radius of gyration of 1 metre.

8. An aeroplane runs at 600 km/h. The rotor of the engine weighs 4000 N with radius of gyration of 1 m. The speed of rotor is 3000 r.p.m. in CCW direction when seen from rear side of the plane. If the plane takes a loop upwards in a curve of 100 m radius, find the (i) Gyrocouple developed ; (ii) effect of gyrocouple on the plane.

Or

9. A four wheel trolley car of 2000 kg running on rails of 1 m gauge takes a curve of 25 m radius at 40 km/h. The track is banked at 10°. The dia of wheels are 0.6 m and each pair of axle has 200 kg mass. The radius of gyration is 250 mm. The C.G. of the car above the wheel base is 0.95 m. Determine the pressure on each rail.

10. A roller follower executing SHM has a diameter of 8 mm. The details are :

(a) Outstroke of 25 mm during 120° rotation.

(b) Dwell for 60°.

(c) Return during 90°.

(d) Dwell during remaining 90° of can rotation.

The follower is offset by 10 mm. Cam radius is 20 mm. If the can rotates at 300 r.p.m. with uniform velocity, find the maximum velocity and acceleration during the outstroke and return stroke. Draw the profile of the cam.

Or

11. Draw the profile with oscillating follower for the following motion :

(a) follower moves through 20° during 120° cam rotation.

(b) Dwell for 50° cam rotation.

(c) follower to return to its initial position in 90° of cam rotation with uniform acceleration and retardation.

(d) Dwell for the remaining period.

Distance between pivot centre and roller centre is 130 mm and distance between pivot centre and cam axis is 150 mm. cam radius is 80 mm and roller diameter is 50 mm.

(5 × 12 = 60 marks)

G 2128 **(Pages : 3)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2010

Fifth Semester

Branches : Civil/Mechanical/Electrical and Electronics/Electronics and Communication/Polymer/Applied Electronics and Instrumentation/ Electronics and Instrumentation/Automobile

ENGINEERING MATHEMATICS—IV (CMELPASU)

(Supplementary—Prior to 2007 Admissions)

Time : Three Hours Maximum : 100 Marks

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

Module I

I. (a) State and prove Cauchy's integral formula.

(b) Evaluate $\int_C \left[\frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2 (z+2)}\right] dz$ where C is the circle $|z| = 3$.

Or

II. (a) Find the Laurent's series expansion of $f(z) = \left(z^2 - 1\right) \Big/ \left(z^2 + 5z + 6\right)$ in the regions :

(i) $|z| < 2$;

(ii) $2 < |z| < 3$; and

(iii) $|z| > 3$.

(b) Evaluate $\int_0^\infty dx \Big/ \left(x^2 + a^2\right)\left(x^2 + b^2\right)$.

Module II

III. (a) Using Newton's method find the root of $xe^x - \cos x = 0$ correct to four decimal places.

(b) Solve correct to four places of decimals by Jacobi's method :

$$x + y + 54z = 110,\ 27x + 6y - z = 85,\ 6x + 15y + 2z = 72.$$

Or

IV. (a) Using Regula Falsi medo solve correct to four decimal places $\cos x - 3x + 1 = 0$.

(b) Using Gauss-Seidel method solve correct to four places of decimals :

$8x - y + z = 18,\ 2x + 5y - 2z = 3,\ x + y - 3z = -6.$

Module III

V. (a) Using Taylor series method compute $y(0.1)$ and $y(0.2)$ correct to three decimal places where

$\frac{dy}{dx} = x + y^2,\ y(0) = 1.$

(b) Use Runge Kutta method to solve $10y^1 = x^2 + y^2,\ y(0) = 1$ for the interval $0 < x \leq 0.2$ with $h = 0.1$.

Or

VI. (a) Given $\frac{dy}{dx} = (y - x)/(y + x)$ with $y = 1$ for $x = 0$. Using Euler's method find y approximately for $x = 0.1$ in five steps.

(b) Compute $y(1)$ and $y(1.25)$ correct to four places of decimals, using Milne's predictor corrector method where $dy/dx = x^2 - y^3$, $y(0) = 1$, $y(0.25) = 0.821$, $y(0.5) = 0.7412$ and $y(0.75) = 0.741$.

Module IV

VII. (a) Evaluate the following :—

(i) $z\{\sin(3x + 5)\}$.

(ii) $z\{e^t \sin 2t\}$.

(iii) $z\{2(3^n) - 3(-1)^n\}$.

(b) Find $z^{-1}\left\{\left(3z^2 - 18z + 26\right)/(z - 2)(z - 3)(z - 4)\right\}$.

Or

VIII. (a) Use convolution theorem to evaluate $z^{-1}\left\{\left(z/z^{-1}\right)^3\right\}$.

(b) Using Z transform solve :

$u_{n+2} + 4u_{n+1} + 3u_n = 3^n$ with $u_0 = 0$ and $u_1 = 1$.

Module V

IX. (a) Solve the following linear programming problem by Simplex method :—

Minimize $Z = x_1 - 3x_2 + 2x_3$

subject to $3x_1 - x_2 + 3x_3 \leq 7$

$-2x_1 + 4x_2 \leq 12$

$-4x_1 + 3x_2 + 8x_3 \leq 10$,

$x_1, x_2, x_3 \geq 0.$

(b) Use two phase method to solve :

Maximize $Z = 2x_1 + x_2 + 3x_3$ such that

$x_1 + x_2 + 2x_3 \leq 5$

$2x_1 + 3x_2 + 4x_3 = 12$

$x_1, x_2, x_3 \geq 0.$

Or

X. (a) Apply the principle of duality to solve :

Minimize $Z = 4x_1 + 2x_2$ such that :

$x_1 + 2x_2 \geq 2$

$3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1, x_2 \geq 0.$

(b) Solve the following transportation problem :—

	D_1	D_2	D_3	Supply
O_1	2	7	4	5
O_2	3	3	1	8
O_3	5	4	7	7
O_4	1	6	2	14
Demand	7	9	18	34