

FACULTY OF ENGINEERING**B.E. 3/4 (Civil) I – Semester (Old) Examination, December 2016****Subject: Transportation Engineering****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 What is the importance of Nagpur road plan in highway planning of our country? 2
- 2 What are the objects of reconnaissance in engineering survey? Discuss the scope of aerial survey for the purpose. 3
- 3 What are the different vehicular characteristics which affect the road design? 2
- 4 Explain the advantages and limitations of rotary, in particular reference to traffic conditions in India. 3
- 5 What are the various tests for judging the suitability of road stones? 2
- 6 What are the various factors to be considered in pavement design? Discuss the significance of each. 3
- 7 What are the factors to be considered in the selection of rails? 2
- 8 Explain:
 - i) Negative super elevation and
 - ii) Cant deficiency 3
- 9 Enumerate the characteristics of an aircraft. 2
- 10 Explain the corrections needed for basic runway length. 3

PART – B (5x10 = 50 Marks)

- 11 a) Discuss briefly the various requirements of an ideal highway alignment. 5
 - b) Enumerate the various design factors controlling the vertical alignment of highways. 5
- 12 a) What are the various objects and applications of spot speed studies? 5
 - b) Explain grade separated intersections, the advantages and limitations. 5
- 13 a) What are the different types of bituminous materials used in road construction? Under what circumstances each of these materials is preferred. 5
 - b) Explain the following terms:
 - i) Modulus of sub-grade reaction and
 - ii) Radius of relative stiffness 5
- 14 a) Enumerate the types of Rail joints. Briefly explain the requirements of an ideal joint. 5
 - b) Calculate the cant deficiency and permissible speed for a 4° curve on a B.G. track. 5

- 15 a) Explain the cases to be considered for the determination of basic runway length. 6
- b) The length of a runway under standard condition is 1650 m. The airport site has an elevation of 280 m. Its reference temperature is 31.26°C. If the runway is to be constructed with an effective gradient of 0.28%, determine the corrected length of runway by applying the standard corrections. 4
- 16 a) Explain the attainment of super elevation with neat sketches. 5
- b) Compute the radius of relative stiffness of 16 cm thick cement concrete slab from the following data:
Modulus of elasticity of cement concrete = $2.1 \times 10^5 \text{ kg/cm}^2$
Poisson's ratio of concrete = 0.15
Modulus of sub-grade reaction:
i) 3.0 kg/cm^3
ii) 6.5 kg/cm^3 . 5
- 17 Write short notes on the following: 10
- a) Map study
b) Advantages and disadvantages of signals
c) ESWL, EALF
d) Role of ICAO

FACULTY OF ENGINEERING**B.E. 3/4 (Civil) I – Semester (New) (Main) Examination, November / December 2016****Subject: Transportation Engineering****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 Define Highway Alignment? What are the requirements of Alignment? [2]
- 2 Define Camber? Write the recommended values of camber for different types of roads. [3]
- 3 Define Intersection at grade and how they are classified? [3]
- 4 Distinguish between Time Mean Speed and Space Mean Speed. [2]
- 5 What do you understand by 80/100 grade Bitumen? [2]
- 6 Explain the critical load position in Rigid Pavement design. [3]
- 7 Explain Percussion theory in Rails. [2]
- 8 Draw a neat diagram showing details of elastic spike fitted to flat footed rails. [3]
- 9 Draw a neat diagram showing turning radius of Aircraft. [3]
- 10 Define Cross Wind Component and Wind Coverage. [2]

PART – B (5x10=50 Marks)

- 11 a) How are Highways Classified in India? Explain the objectives of each classification. [5]
b) What is Overtaking Sight Distance? Calculate the safe over taking sight distance for a design speed of 96 Kmph. Assume all other data suitably. [5]
- 12 a) Explain Traffic Volume Studies and What are the objectives of it? Write down different methods for conducting Traffic Volume Studies. [5]
b) Calculate 98th and 85th percentile speed from following data: [5]

Mid-Speed	15	25	35	45	55	65	75	85	95
No.of Vehicles	0	12	19	38	33	25	16	13	5

- 13 a) Explain the procedure of Flexible Pavement design by Cumulative Standard axles method of IRC:37-2001. [5]
b) Calculate the Radius of relative stiffness and equivalent Radius of resisting section for a cement concrete pavement based on following data: [5]
 Thickness of Pavement = 25 cm;
 Modulus of Elasticity of Cement Concrete = 3×10^5 Kg/cm²;
 Modulus of Subgrade reaction = 6.8 Kg/ cm³;
 Poisson Ratio = 0.15;
 Design Wheel Load P = 5100 Kg;
 Tyre pressure = 6 Kg/cm², Assume other data suitably.

- 14 a) Explain Various types of Joints provided in Cement Concrete Pavements. Write the importance of tie and dowel bars in CC pavement joints. [6]
b) Explain the Importance of Vehicle Damage Factor (V.D.F). [4]
- 15 a) What are the possible causes of Creep? What are their effects? State any four preventive measures to be taken to minimize Creep. [5]
b) What are the Requirements of good Railway track? Explain what kind of forces act on track. [5]
- 16 a) What are the factors to be considered for site selection of an Airport. [5]
b) Explain the procedure of Runway Orientation using Wind Rose diagram. [5]
- 17 Write a note on any **FOUR** of the following: [10]
a) Super elevation
b) Origin and Destination Studies
c) Bitumen and Tar
d) Sleeper types and Characteristics.
e) Airport layout and its components.

FACULTY OF ENGINEERING

B.E. 3/4 (EEE/Inst.) I-Semester (Old) Examination, Nov. / Dec. 2016

Subject : Linear Integrated Circuits

Time : 3 hours

Max. Marks : 75

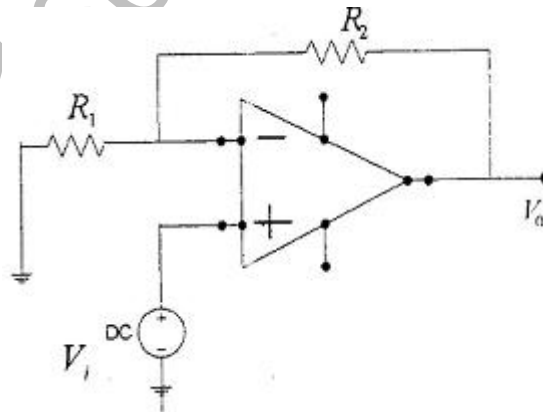
Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

- | | |
|---|---|
| 1 Define input offset and input bias current. | 2 |
| 2 What is a Peak Detector and draw its relevant Op-Amp circuit? | 3 |
| 3 Mention any four applications of a comparator. | 2 |
| 4 Draw a Multiplier and a Divider circuit diagrams. | 3 |
| 5 What are Barkhausen's criteria for Oscillations? What are quadrature Oscillators? | 3 |
| 6 Define capture in range, lock-in range and pull in time in PLL. | 2 |
| 7 Draw the pin diagram of a 555 timer. | 3 |
| 8 Mention three techniques for A/D and D/A converters. | 2 |
| 9 What is meant by frequency response? | 2 |
| 10 The basic step of a 9-bit D/A is 0.3mV. If 000000000 represents 0V, what output is produced if the input is 101101111? | 3 |

PART – B (50 Marks)

- | | |
|---|---|
| 11 a) Explain the dc/ac balancing techniques for an Op-Amp. | 3 |
| b) Find the closed loop gain for the Op-Amp shown below. | 7 |



- | | |
|--|----|
| 12 a) Explain the operation of difference amplifier with neat circuit diagram. | 5 |
| b) Write about notes on instrumentation amplifier using Op-Amp. | 5 |
| 13 Derive the closed loop gain for a) An inverted summer b) An integrator with relevant circuit diagram. | 10 |

..2

- 2 -

- 14 a) Explain with neat sketch about any ADL. 4
b) Using circuit diagram derive the frequency of square wave generator using 555 timer. 6
- 15 a) Explain working of switching regulator with a neat block diagram. 5
b) Explain shunt regulator working principle with neat circuit diagram. 5
- 16 a) Explain the working principle of monostable multivibrator with relevant circuit diagram. 5
b) Explain band-reject filters using Op-Amp. 5
- 17 Design a Narrow band pass filter using an Op-Amp. The resonant frequency is 100 Hz and $Q = 2$. Assume $C = 0.01\mu\text{F}$. 10

FACULTY OF ENGINEERING**B.E. 3/4 (EEE/Inst.) I-Semester (New) (Main) Examination, Nov. / Dec. 2016****Subject : Linear Integrated Circuits****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

- | | | |
|----|---|---|
| 1 | Write the comparison's of ideal and practical characteristics of an Op-Amp. | 3 |
| 2 | Explain the effect of feedback in Op-Amp. | 2 |
| 3 | Explain the Op-Amp summing amplifier circuit. | 3 |
| 4 | Explain the difference between inverting and non-inverting AC Amplifiers. | 2 |
| 5 | Draw the block diagram of PLL. | 3 |
| 6 | Explain the specifications of A/D converter. | 3 |
| 7 | Define voltage regulation. | 3 |
| 8 | Write the limitations of three terminal IC regulators. | 2 |
| 9 | Explain the principle of switched capacitor filter. | 2 |
| 10 | Why we required high pass filter? | 2 |

PART – B (50 Marks)

- | | | |
|-------|--|----|
| 11 a) | Explain the working of an ideal integrator and explain its frequency response graph. | 5 |
| b) | Design a differentiator to differentiate an input signal varies in frequency from 10 Hz to 10 KHz. | 5 |
| 12 a) | Explain the operation of non-inverting Schmitt trigger circuit. | 5 |
| b) | Explain the operation of zero crossing detector. | 5 |
| 13 | Derive the expressions for the lock in and capture ranges of IC 565 PLL. | 10 |
| 14 a) | Explain the operation of voltage to current converter and derive the necessary equations. | 5 |
| b) | Explain the working of D/A converter. | 5 |
| 15 a) | Draw and explain the operation of dual voltage regulator. | 5 |
| b) | Explain the principle and operation of hybrid voltage regulator. | 5 |
| 16 a) | Design second order butter with LPF having an upper cut off frequency 2KHz. | 5 |
| b) | Explain the operation of balanced demodulator. | 5 |
| 17 | Write short notes on the following : | 10 |
| a) | Positive clipper and positive clamper | |
| b) | Instrumentation amplifier | |

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I - Semester (Old) Examination, November / December 2016

Subject : Automatic Control Systems

Time : 3 Hours

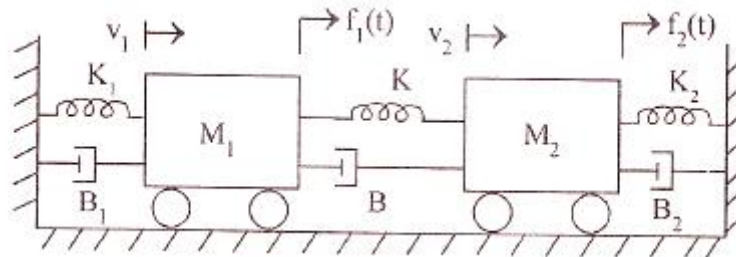
Max. Marks: 75

Note: Answer all questions from Part-A and answer any five questions from Part-B.**PART – A (25 Marks)**

1. Differentiate between force-voltage and force-current analogy for mechanical (translational and rotational) and electrical systems. [2]
2. Define Mason's gain formula and discuss the advantages over block diagram reduction techniques. [3]
3. Define steady state error and write the expression for it. [2]
4. Define and order and type of a system with an example. [3]
5. What is principle of argument ? [2]
6. Derive the transfer function of Lag-Lead compensator network and draw its characteristics. [3]
7. With the help of detailed block diagram explain Digital control system with signal convertors. [2]
8. Compare Analog and Digital control systems. [3]
9. Discuss the significance of state space analysis. [2]
10. Define Controllability and Observability. [3]

PART – B (50 Marks)

11. (a) Classify various types of control systems and give examples for open loop and closed loop control systems. [4]
- (b) Write the differential equations governing the mechanical system shown in figure. Also draw the force-voltage and force-current analogous circuit. [6]



12. Sketch the root locus of the system whose open loop transfer function is

$$G(s) = \frac{K}{s(s+2)(s+4)}$$

Find the value of K so that the damping ratio of the closed loop system is 0.5. [10]

13. (a) Mention various advantages for investigating the system performance in frequency domain than time domain. [5]

- (b) Sketch the Bode Plot and find out the stability for $G(s) = \frac{10}{s(s+10)}$. [5]

..2..

14. (a) Obtain the expression for $C(z)$ in terms of $R(z)$ of a basic closed loop discrete control system. [4]
(b) For a system having $G(s) = 1/s+2$ and $H(s) = 1$, find the output value at sampling instants for unit step input $r(t)$. Take sampling interval $T = 0.5$ sec. [6]
15. (a) Write the properties of State transition matrix. [6]
(b) Find the solution of the state equation to an unit step input. [4]
16. (a) Sketch Bode plot for the following transfer function and determine the system gain K for the gain cross over frequency to be 5 rad/sec. [6]
$$G(s) = \frac{Ks^2}{(1+0.2s)(1+0.02s)}$$

(b) Classify various types of Compensators and explain briefly. [4]
17. Write Short notes on : [10]
(a) Error sensing devices
(b) Digital control systems using state space
(c) Modern control theory vs Conventional control theory

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I - Semester (New)(Main) Examination, November / December 2016

Subject : Automatic Control Systems

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions from Part-A and answer any five questions from Part-B. Missing data, if any, may suitably be assumed.

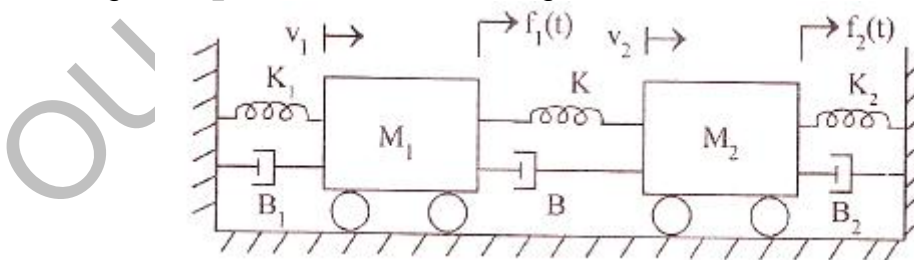
PART – A (25 Marks)

- 1 Discuss about the block diagram and its components of a Control system. [2]
- 2 What are the properties of Signal flow graphs ? [3]
- 3 Give the steady state error values to standard inputs for Type 2 system. [2]
- 4 Describe the transient and steady state response of a Control system. [3]
- 5 Analyze the effects of addition of open loop poles. [2]
- 6 Illustrate the need for a Compensator ? Derive the transfer function of a lead compensator network and draw its characteristics. [3]
- 7 With the help of detailed block diagram explain Digital control system with signal convertors. [2]
- 8 Draw the circuit of sample and hold circuit and obtain its transfer function. [3]
- 9 Mention the need for State variables. [2]
10. Find the State transition matrix for [3]

$$A = \begin{bmatrix} 0 & -1 \\ +2 & -3 \end{bmatrix}$$

PART – B (50 Marks)

- 11 (a) Negative feedback is preferred in Control Systems. Justify. [4]
- (b) Write the differential equations governing the mechanical system shown in figure. Also draw the force-voltage and force-current analogous circuit. [6]



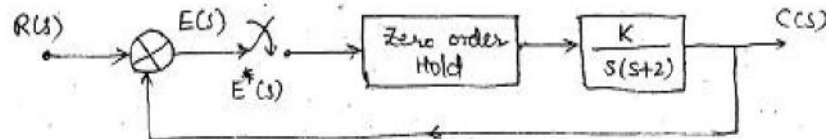
- 12 (a) A unit ramp input is applied to a unity feedback system whose output response is $C(s) = 100/(s^2+5s+100)$. Analyze the time response and steady state error. [5]
- (b) Explain the rules to construct a root locus. [5]
- 13 For the system with transfer function, draw the Bode Plot and obtain Gain margin and Phase margin. (10)

$$G(s) = \frac{400(s+2)}{s^2(s+5)(s+10)}$$

..2

..2..

- 14 (a) For the system shown in fig. find the response at sampling instants to unit step input for $T = 1$ Sec and $K = 1$. [6]



- (b) Obtain the expression for $C(z)$ in terms of $R(z)$ of a basic closed loop discrete control system. [4]

- 15 (a) What are the advantages of State space representation ? [4]
 (b) A system is described by the following differential equations. Obtain State space representation of the system. [6]

$$\frac{d^3x}{dt^3} + 3\frac{d^2x}{dt^2} + 4\frac{dx}{dt} + 4x = u_1(t) + 3u_2(t) + 4u_3(t)$$

$$y_1 = 4\frac{dx}{dt} = 3u_1, \quad y_2 = \frac{d^2x}{dt^2} + 4u_2 + u_3$$

- 16 (a) Illustrate any two limitations of Routh stability criterion [4]
 (b) Determine State Controllability and Observability of the system described by [6]

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 10 \end{bmatrix} u \quad y = [1 \quad 0 \quad 0] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

- 17 Write Short notes on : [10]
 (a) Translational system Vs Rotational system
 (b) BIBO Stability
 (c) PID Controller

FACULTY OF ENGINEERING

B.E. 3/4 (Mech.) I-Semester (Old) Examination, Nov. / Dec. 2016

Subject : Manufacturing Processes

Time : 3 hours

Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

- 1 What is directional solidification? What is the problem, if directional solidification is not achieved?
- 2 What are the purpose of chaplets and chills?
- 3 Compare the merits and demerits of arc furnace with those of cupola.
- 4 State the applications of blow moulding and thermoforming.
- 5 What are fillers and fluxes used in soldering and brazing processes?
- 6 State the differences between carburizing and oxidizing flames.
- 7 State any two welding defects along with their remedies.
- 8 State the merits of Laser Beam welding over Electron Beam Welding.
- 9 If the plastic deformation starts with the normal components of 100 MPa, 200 Mpa tension and 50 MPa compression with the zero shear components. Find the yield strength of the material according to Tresca Criteria.
- 10 What are the advantages of rubber pad forming over conventional forming?

PART – B (50 Marks)

- 11 a) State the materials used for pattern making. Compare them based on their suitability as pattern materials and their selection.
b) What are the required properties of moulding sand? Explain briefly about any five of them.
- 12 a) Explain the investment casting process with a neat sketch. State its applications.
b) What are the various defects that occur in casting process? Explain the causes and remedies for any five of them.
- 13 a) Explain about the friction welding process along with its merits and demerits.
b) What are the advantages of TIG welding process? Why is tungsten electrode coated with Thoria or Zirconia? Explain TIG welding process briefly with a neat sketch.
- 14 a) What is Weldability? State the effect of Melting point, thermal conductivity, coefficient of expansion, hardenability of the material on the weldability.
b) What are various types of resistance welding processes? Describe about any two of them.

- 15 a) What are the differences between forward and back ward extrusion processes?
How are collapsible tubes manufactured?
b) State the types of explosive forming operations. Explain about them in brief.
- 16 Explain the following briefly
a) Modulus method of riser design
b) Carbon-dioxide moulding
c) Ultrasonic welding
- 17 Explain the following briefly
a) Electroslag welding
b) Von-Mise's criteria
c) Stretch forming

OU - 1607 OU - 1607

FACULTY OF ENGINEERING**B.E. 3/4 (Mech.) I - Semester (New)(Main) Examination, November / December 2016****Subject : Manufacturing Processes****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions from Part-A and answer any five questions from Part-B.****PART – A (25 Marks)**

- 1 Explain the function of risers.
- 2 Discuss on wood and metal as pattern materials.
- 3 What are advantages of die casting over sand moulding process?
- 4 What is cold shut and Hot tears? How do you avoid them?
- 5 What is HAZ? On what parameters HAZ depends on in welding.
- 6 What are the applications of thermit welding?
- 7 Explain about tresca yield criteria.
- 8 What are the advantages of rubber pad forming over conventional forming?
- 9 What are the various types of patterns used in casting process?
- 10 Explain about “Directional solidification”?

PART – B (50 Marks)

- 11 (a) Explain with the help of neat sketches how ultrasonic welding takes place. What are its applications?
(b) Explain the PAW process. Give advantages, limitations and applications.
- 12 a) With suitable diagram discuss the working principle of LBW, applications and its limitations .
(b) Explain Oxy-Acetylene gas welding with neat sketch with its flames and chemical reactions.
- 13 (a) Differentiate between hot working and cold working. Give advantages and disadvantages for both.
(b) What is electro-hydraulic forming? With neat sketch discuss the salient features, principle, limitations and specific applications of this process.
- 14 (a) Explain the GTAW process with help of neat sketch. Give advantages, limitations and applications.
(b) What are different types of gates used in sand moulding? Explain about them with relative merits, demerits and applications.
- 15 (a) What are the differences between cold chamber and hot chamber die casting process? Explain about any one of them in brief with a neat diagram.
(b) Name some few components which can be manufactured by thermoforming and blow moulding processes. Explain any one process with neat sketch.
- 16 (a) What are different types extrusion processes? Explain about any one of them.
(b) What are the advantages of high rate energy forming processes over conventional processes?.
- 17 Discuss the following:
 - (a) Additives and binders used in sand moulding.
 - (b) MEMS
 - (c) Ceramics

FACULTY OF ENGINEERING**B.E. 3/4 (Prod.) I-Semester (Old) Examination, November / December 2016****Subject : Metal Forming Technology****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

- 1 Define true stress and true strain discussing their importance in metal forming. 3
- 2 What is spring back in sheet metal bending? 2
- 3 What is flow stress and how it can be expressed? 2
- 4 A hole of 100 mm diameter is to be punched in a steel plate of thickness 6mm. Estimate the cutting force if shear strength of the material is 550 MPa. 3
- 5 Write the parameters affecting extrusion pressure. 2
- 6 Explain the importance of optimum die angle in wire drawing. 3
- 7 What is powder rolling? 3
- 8 Write about roll camber. 2
- 9 Match the following : 2

i) Connecting rod	a) Blanking
ii) Tooth paste tube	b) Stretch forming
iii) Rocket Nose	c) Forging
iv) Aeroplane wing panel	d) Extrusion
	e) Spinning
- 10 Write advantages of press forging over drop forging. 3

PART – B (50 Marks)

- 11 a) Explain recovery, recrystallization and grain growth with a neat sketch. 6
- b) Explain cold working and hot working with their advantages and disadvantages. 4
- 12 a) Explain drawing die design parameters. 6
- b) Discuss the methods used for reducing blanking / punching force. 4
- 13 a) An Al rod of 6.25 mm diameter is drawn into a wire of 5.6 mm diameter. Determine the drawing stress and reduction in area when yield stress is 35 MPa. 6
- b) Write about extrusion defects. 4
- 14 a) Derive expressions for roll force and power. 6
- b) Explain Sendzimir roll mill with a neat sketch. 4
- 15 a) Write any two types of forging hammers with neat sketches. 6
- b) Write about forgeability tests. 4
- 16 Write short notes on any two : 2 x 5 = 10
 - a) Progressive Die
 - b) Impact Extrusion
 - c) Isothermal forging
- 17 Write short notes on any two : 2 x 5 = 10
 - a) Spinning
 - b) Yield criterion
 - c) Shape rolling

FACULTY OF ENGINEERING**B.E. 3/4 (Prod.) I – Semester (New) (Main) Examination, November / December 2016****Subject: Metal Forming Technology****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- | | | |
|----|--|---|
| 1 | What do you understand by work hardening of metals? Explain. | 3 |
| 2 | What is plasticity cycle? Explain briefly. | 2 |
| 3 | Differentiate between blanking and piercing. | 3 |
| 4 | Sketch and explain important features of a progressive die. | 3 |
| 5 | Mention the properties of die material used for extrusion process. | 2 |
| 6 | Describe the principle of closed die forging. | 2 |
| 7 | Write the principle of roll forging process. | 2 |
| 8 | How extrusion is different from forging? Explain briefly. | 3 |
| 9 | Give a brief classification of roll mills. | 3 |
| 10 | Define the terms: roll load and roll torque. | 2 |

PART – B (5 x 10 = 50 Marks)

- 11 a) Compare the properties of cold worked and hot worked parts. Mention the advantages of cold working over hot working.
b) Explain the terms “crysto plasticity” and “thermo plasticity” with respect to plastic deformation of metals.
- 12 a) Give a detailed classification of presses and mention their applications.
b) Explain how you estimate the forces required for punching operation.
- 13 a) What is clearance? Explain its significance in shearing operation.
b) Describe the extrusion process with the help of a neat sketch.
- 14 a) Explain how spinning is different from deep drawing.
b) Describe the principle of flow forming process.
- 15 a) Distinguish between drop forging and press forging.
b) What are the factors considered while designing forging dies? Explain with an example.
- 16 a) Describe the principle of rolling with a neat sketch.
b) Explain the roll bending operation with a neat sketch.
- 17 Write short notes on any **TWO** of the following:
a) Spring back
b) Forging defects
c) Power rolling process.

FACULTY OF ENGINEERING**B.E. 3/4 (AE) I – Semester (Old) Examination, December 2016****Subject: Production Technology****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 Define pattern. Enlist types of pattern. 2
- 2 Sketch three types of flames in gas welding and label its various zones and temperatures. 2
- 3 Differentiate between punching and blanking. Sketch the difference. 2
- 4 What are various types of chips in metal cutting and state the conditions favouring them. 2
- 5 Name the three elements of metal cutting process. 2
- 6 What is neutral plane in rolling? Sketch the process and indicate plane. 3
- 7 What are the functions of cutting fluids? State its characteristics. Name five cutting fluids. 3
- 8 State the advantages and applications of friction welding. 3
- 9 What is electrode? How it differs from a filler rod? Write the specification of electrode. 3
- 10 What are the specifications of lathe? Sketch them. 3

PART – B (5x10 = 50 Marks)

- 11 a) What are the properties of moulding sand? Explain. 5
b) Explain with neat sketch CO₂ process. 5
- 12 a) What are the various types of welding defects? State its causes and remedies with neat sketches. 5
b) What is polarity? Explain with neat sketches straight and reverse polarity. 5
- 13 a) Differentiate between forward extrusion and backward extrusion. 5
b) Explain drop forging. State its advantages and limitations. 5
- 14 a) Sketch the tool nomenclature of a single point cutting tool. Write down the Tool Signature for a SPCT and explain. 5
b) Define Machinability. What are the factors that affect machinability. 5
- 15 With neat sketches explain in detail the various taper turning attachment methods. 10
- 16 a) Differentiate between drilling, boring, reaming and trepanning. 5
b) Explain ultrasonic welding with sketch. 5
- 17 With neat sketches write short notes on: 5
a) Principle of die casting 5
b) Casting defects. 5

FACULTY OF ENGINEERING**B.E. 3/4 (AE) I – Semester (New) (Main) Examination, November / December 2016****Subject: Production Technology****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 Define pattern. Name different types of patterns.
- 2 What are the constituents of green sand? Name types of sand.
- 3 Name the various modes of material transfer in GMAW.
- 4 Distinguish between Brazing and Soldering.
- 5 Distinguish between blanking and piercing.
- 6 What is the principle of Extrusion?
- 7 Sketch a single point cutting tool in ASA system.
- 8 What are the desirable properties of cutting fluids?
- 9 Sketch the difference between drilling, boring and reaming operations.
- 10 Distinguish between a shaper and planer

PART – B (5x10 = 50 Marks)

- 11 a) Define pattern allowance. What are the various pattern allowances considered for making a casting? Explain with neat sketch. [5]
- b) Explain Shell Moulding with neat sketch. [5]
- 12 a) With neat sketch explain the principle of Resistance Seam Welding. [5]
- b) Explain various welding defects, its causes and remedies. [5]
- 13 a) Distinguish between Blow Moulding and Injection moulding with sketches. [5]
- b) Explain the principle of Machine Forging with neat sketches. [5]
- 14 a) What are the desirable properties of a cutting tool. [5]
- b) Distinguish between Orthogonal and Oblique cutting with neat sketches. [5]
- 15 What are the various methods of taper turning? With neat sketches explain in detail. [10]
- 16 a) Explain with neat sketches four lathe operations in detail. [5]
- b) Distinguish between hot working and cold working. [5]
- 17 Write short notes on: [10]
 - a) Hydrostatic extrusion
 - b) Flash Butt Welding
 - c) Centrifuging

FACULTY OF ENGINEERING**B.E. 3/4 (CSE) I - Semester (Old) Examination, November / December 2016****Subject : Design and Analysis of Algorithms****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions from Part-A and answer any five questions from Part-B.****PART – A (25 Marks)**

- 1 Write the properties of Big-oh Notation. (3)
- 2 Show the intermediate steps when numbers 123, 23, 43, 54, 36, 75, 34 are sorted using merge sort. (3)
- 3 What do you mean by divide and conquer strategy? (3)
- 4 What is resultant max-heap for numbers "32, 15, 20, 30, 12, 25, 16"? (3)
- 5 Define optimal Binary search tree. (2)
- 6 What is chromatic number? (3)
- 7 Draw a graph with no Hamiltonian cycle. (2)
- 8 What is Cook's theorem? (2)
- 9 State the principle of Back tracking method. (2)
- 10 Differentiate P and NP class of problems. (2)

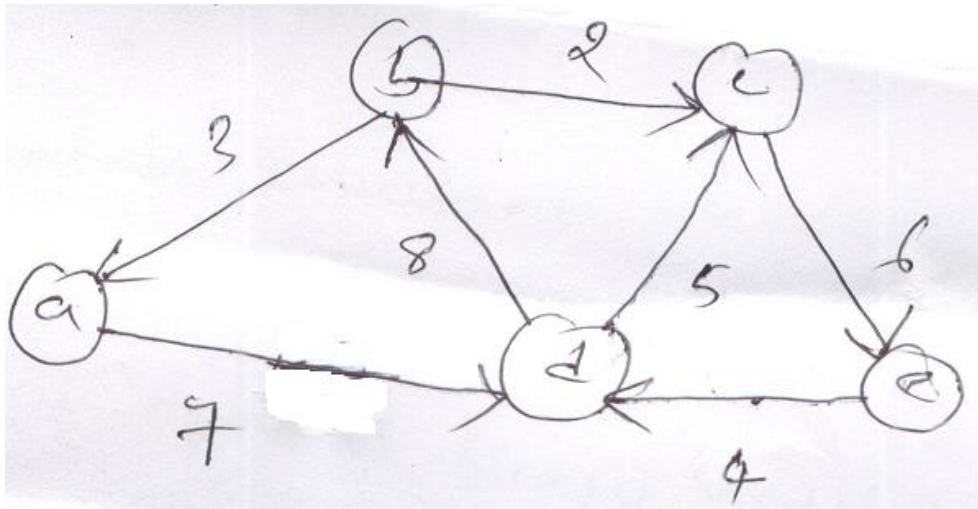
PART – B (50 Marks)

- 11 (a) Do the performance analysis for selection sort for the Best, worst and average cases? (5)
 - (b) Use linear probing, a hash table with bF13 buckets and has function $f(K) = K \% b$. Insert pairs whose keys are 7, 42, 25, 70, 14, 38, 8, 21, 34, 11. (5)
 - (i) Show hash table following each insert
 - (ii) What is max and average number of buckets examined in successful search
 - 12 (a) Implement Quick sort and derive the worst case time complexity. (6)
 - (b) Using 0/1 knapsack technique, find optimal solution for the given problem capacity = 30 (4)
- | | | | |
|-------|----|-----|----|
| Time | A | B | C |
| Price | 50 | 140 | 60 |
| Size | 5 | 20 | 10 |
- 13 (a) Explain all-pairs shortest path Algorithm. (5)
 - (b) Use Dynamic programming to obtain a solution for Travelling salesman problem that runs in $O(2^n)$ time. (5)
 - 14 (a) How backtracking works on 8-Queens problem with example? (6)
 - (b) Differentiate explicit and implicit constraints of a Backtracking solutions. (4)
 - 15 (a) Write short notes on NP-hard and NP-complete problems (5)
 - (b) Explain Node covering decision problem. (5)

..2..

16 Implement Depth first search and find all nodes reachable from 'a' in the below graph.

(10)



17 (a) Generate minimum spanning tree using Prim's algorithm write and analyse the algorithm used.

(6)

(b) How is graph coloring done using Backtracking method? Explain the algorithm used to find Next color.

(4)

OU - 1607

FACULTY OF ENGINEERING**B.E. 3/4 (CSE) I-Semester (New) (Main) Examination, Nov. / Dec. 2016****Subject : Data Communications****Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

- | | | |
|----|--|---|
| 1 | What are the advantages of Layered Approach? | 3 |
| 2 | What are the different types of Noises? | 2 |
| 3 | Difference between synchronous and asynchronous transmission. | 2 |
| 4 | What is bit stuffing? | 2 |
| 5 | What is full duplex transmission? Give example. | 3 |
| 6 | What is the difference between channel signaling and common channel signaling? | 2 |
| 7 | What is the difference between bridge and switch? | 3 |
| 8 | What is server farm? | 3 |
| 9 | What is the principal of frequency reuse in the context of cellular networks? | 3 |
| 10 | What is the difference between diffraction and scattering? | 2 |

PART – B (50 Marks)

- | | | |
|-------|---|----|
| 11 a) | Compare OSI model with TCP/IP model. | 5 |
| b) | Explain about transmission characteristics of any two guided media. | 5 |
| 12 a) | Explain sliding window flow control algorithm with a neat diagram. | 6 |
| b) | What are the reasons for breaking a long data transmission up into number of frames? | 4 |
| 13 a) | Explain in detail about ATM protocol architecture. | 6 |
| b) | Explain about soft switch architecture. | 4 |
| 14 a) | Explain in detail about CRC detection techniques with suitable example. | 6 |
| b) | Explain about PCM. | 4 |
| 15 | What is Ethernet? What are the different types of Ethernet? Write characteristics of one of them. | 10 |
| 16 | Explain about IEEE802.11 architecture and services. | 10 |
| 17 | Explain Blue tooth architecture in detail. | 10 |

FACULTY OF INFORMATICS

B.E. 3/4 (IT) I - Semester (Old) Examination, November / December 2016

Subject : Theory of Automata

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions from Part-A and answer any five questions from Part-B.**PART – A (25 Marks)**

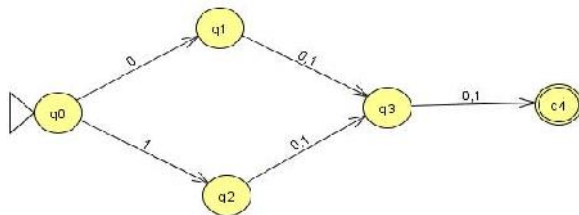
- 1 Construct a DFA to accept the substring 'aba' for $\Sigma = \{a,b\}$. (3)
- 2 Write the difference between DFA and NFA. (2)
- 3 Construct a parse tree for the string $+^*xyxy$ using the grammar
 $E \rightarrow +EE/*EE/-EE/x/y$ (3)
- 4 List various closure properties of regular languages. (2)
- 5 State Pumping Lemma for CFL's. (2)
- 6 Explain instantaneous description of a PDA with an example. (3)
- 7 Give the formal notation of a Turing Machine. (2)
- 8 Briefly explain multitape Turing Machine. (3)
- 9 What is undecidability? (2)
- 10 What is a satisfiability problem? (3)

PART- B (50 Marks)

- 11 Convert the following NFA to DFA. (10)



- 12 Construct minimum state automata for the following DFA using table filling algorithm. (10)



- 13 Construct a PDA to accept the language $L(M) = \{wCw^R/w \in (a+b)^*\}$ where w^R is the reverse of w . (10)
- 14 Explain the steps for converting a grammar into CNF using an example. (10)
- 15 Construct a Turing Machine to accept the language $L = \{0^n1^n/n \geq 1\}$ (10)
- 16 Find the solution for the given PCP Instance. (10)

	List A	List B
i	w_i	x_i
1	1	111
2	10111	10
3	10	0

- 17 (a) Write short notes on Restricted Turing Machine. (6)
- (b) Construct an NFA for the regular expression $(a+b)^*$. (4)

FACULTY OF INFORMATICS**B.E. 3/4 (IT) I – Semester (New) (Main) Examination, November / December 2016****Subject: Theory of Computation****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

- 1 Define the language of a DFA. Give an example. 3
- 2 Distinguish between 'transition function' and 'extended transition function'. 2
- 3 What is a 'sole parse tree'? State its use. 2
- 4 Show that the language L consisting of all palindromes over $(0+1)^*$ is not regular. 3
- 5 Define transition function for a PDA and explain Instantaneous Description (ID) of a PDA. 3
- 6 Define Chomsky Normal Form of a CFG. State its significance. 2
- 7 Give a formal definition of Turing machine. 2
- 8 For the following moves of a Turing machine, give the symbol in the cell (on the tape) under the head for each of the ID: 3

$$Y0q_201 \vdash Y00q_21 \vdash Y001q_2$$

- 9 Explain briefly, universal language L_u , recursively Enumerable language and Recursive language. 3
- 10 Describe 'Towers of Hanoi' problem. Is this problem tractable. 2

PART – B (5x10 = 50 Marks)

- 11 Illustrate the conversion of the given ϵ -NFA to DFA showing details of Basis and Induction steps eliminating ϵ -transitions: 10

		+, -	.	0,1,...,9
$\rightarrow q_0$	{q ₁ }	{q ₁ }		
q ₁			{q ₂ }	{q ₁ , q ₄ }
q ₂				{q ₃ }
q ₃	{q ₅ }			{q ₃ }
q ₄			{q ₃ }	
$\star q_5$				

- 12 a) Write table-filling algorithm for minimization of DFA. 4
 b) Minimize the following DFA. 6

	0	1
$\rightarrow q_0$	q_1	q_2
q_1	q_3	q_4
q_2	q_5	q_6
$\star q_3$	q_3	q_4
q_4	q_5	q_6
$\star q_5$	q_3	q_4
$\star q_6$	q_5	q_6

- 13 a) State pumping lemma for CFLs and explain briefly. 4
 b) Explain the simplifications needed to get CNF by eliminating: 6
 i) Useless symbols
 ii) ϵ -productions and
 iii) Unit productions

- 14 Given PDA $P = (Q, \Sigma, T, u, q_0, Z_0, F)$; $Q = \{q_0, q_1\}$, $\Sigma = \{0, 1\}$, $T = \{X, Y, Z\}$, $F = \{q_1\}$ with transition function: $u(q_0, 1, Z) = \{(q_0, XZ)\}$, $u(q_0, 0, X) = \{(q_0, \epsilon)\}$, $u(q_0, 1, X) = \{(q_0, XX)\}$, $u(q_1, 0, Z) = \{(q_1, YZ)\}$, $u(q_1, 1, Z) = \{(q_0, Z)\}$, $u(q_1, 0, Y) = \{(q_1, YY)\}$, $u(q_1, 1, Y) = \{(q_1, \epsilon)\}$, $u(q_0, 0, Z) = \{(q_1, Z)\}$.
 a) Draw the transition diagram for P.
 b) Write the sequence of IDs to illustrate acceptance of input 0000111. 10

- 15 Define and illustrate 'Acceptance' and 'Halting' for an example turing machine. 10

- 16 a) Check if the given case is an instance of PCP. 4

	List A	List B
i	w_i	x_i
1	110	110110
2	0011	00
3	0110	110

and write two solutions of the same, if true.

- b) Discuss undecidability of PCP. 6
- 17 Write short notes on: 10
 a) Regular languages
 b) Context free languages and DPDA
 c) Boolean satisfiability.
