

**FACULTY OF ENGINEERING**  
**B.E. 3/4 (Civil ) II- Sem.(Old) Examination, May/June 2017**

**Subject : Theory of Structures-II**

**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. Calculate the focal length of a girder of span 20m carrying a dead load of 4 kN/m and E.U.D.L of 8 kN/m for shear. (2)
2. Define Linear Arch. Also state Eddy's Theorem. (2)
3. State at least four uses of Influence Line Diagram. (2)
4. Define Stiffness matrix and also explain Stiffness Coefficient ' $K_{31}$ '. (2)
5. Explain the reason for symmetry of Flexibility Matrix. (2)
6. What is a stiffening girder? Discuss determinacy of Two hinged and three hinged stiffening girder. (3)
7. A Two hinged parabolic arch has a span of 40 m and a central rise of 6 m. Calculate horizontal thrust due to a point load of 20 kN at a distance 15 m from left end. (3)
8. A single point load of magnitude 15 kN crosses a simply supported beam of span 10m, construct the curve for maximum Bending Moment for the beam. (3)
9. Find the support reaction at the prop of a propped cantilever beam of length 'L' subjected to a UDL of intensity 'w' per unit length, using flexibility method. (3)
10. Develop the stiffness matrix for the beam shown in fig.1 (3)

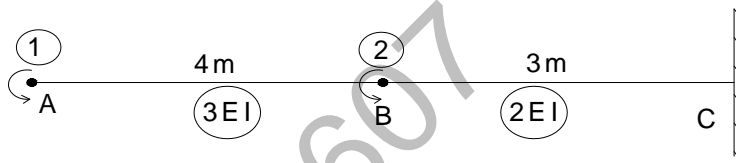


Fig.1

**Part-B (10 x 5 = 50 Marks)**

11. Two point loads of 100 kN and 50 kN spaced 3 meters apart, cross a girder of 10m span, the smaller load leading from the left to right. Construct the maximum S.F & B.M diagrams, stating the position & amount of absolute max. B.M
12. A three hinged arch consists of two circular quadrants, hinged together at the crown C and to rigid supports at A & B. The arch is loaded with two point loads of 80 kN each as shown in the fig.2. Obtain the vertical reactions & horizontal thrust at A and B. Also calculate the bending moments at sections 'D' and 'E'

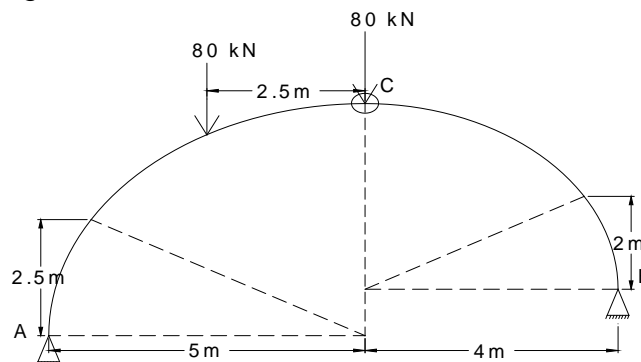


Fig.2

..2..

13. Construct the influence line diagram for forces in the members  $U_1L_1$ ,  $L_1L_2$  and  $U_1L_2$  for the truss shown in fig 3. Hence calculate the forces in these members due to a dead load of 30 kN/m and moving live load of 40 kN/m which is longer than the span.

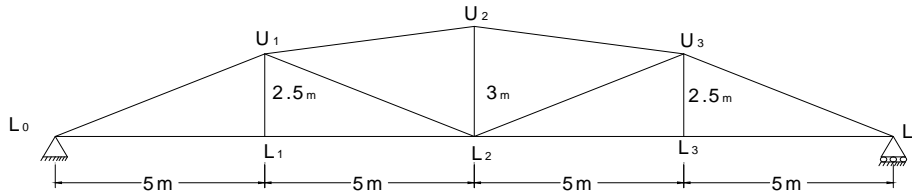


Fig.3

14. Analyse the following continuous beam shown in fig.4 by Stiffness method, if the support 'B' sinks down by 20mm. Take  $E = 200 \text{ GPa}$  and  $I = 1.35 \times 10^{-3} \text{ m}^4$ . Also draw BMD

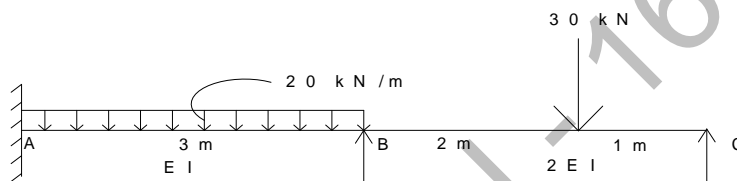


fig.4

- 15 Analyse the frame shown in fig.5 using flexibility method, and draw BMD

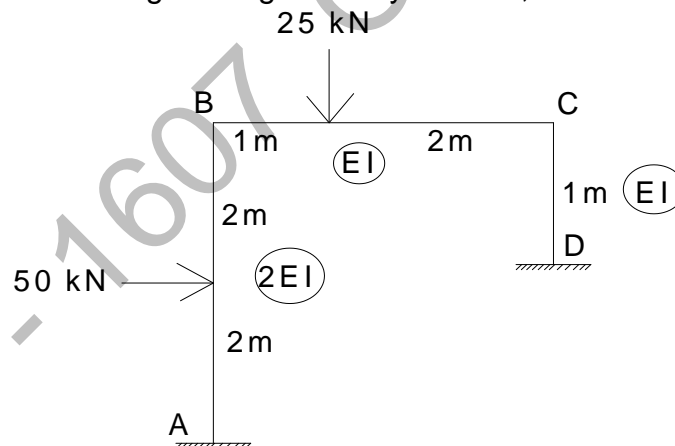


fig.5

16. A two hinged parabolic arch of span 30m, central rise 6m is hinged at the ends. It carries a uniformly distributed load of 20 kN per horizontal meter run extending 12m from the left hinge towards the center. Calculate the horizontal thrust, the reactions at the hinges and maximum negative bending moment. Take the moment of inertia at a section  $I = I_0 \sec^3 \theta$ , where  $\theta$  is the inclination of the arch at the section to the horizontal and  $I_0$  is the moment of inertia of the section at the crown.
17. Write short notes on the following
- Comparison between flexibility method and Stiffness method
  - Comparison between two hinged and three hinged Arches
  - Construction of Enveloping parabola

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**FACULTY OF ENGINEERING**

B.E. 3/4 (Civil) II - Semester (Main) Examination, May / June 2017

Subject : Theory of Structures-II

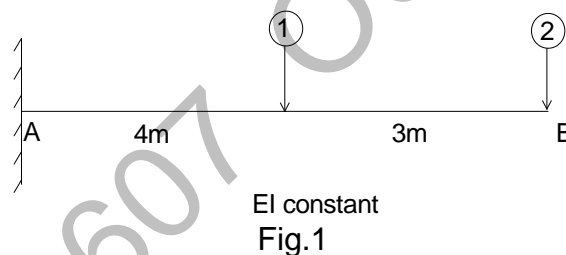
Time : 3 Hours

Max.Marks: 75

Note : Answer all questions from Part A. Answer any five questions from Part B.

**PART-A ( 25 Marks)**

1. State the condition to obtain the max. shear force that can occur under a particular chosen wheel load, when a series of wheel loads move across a simply supported beam. (2)
2. Define influence line diagram for force in a member of a truss. (2)
3. Why the flexibility method of analysis is called the force method also? (2)
4. Define stiffness and explain stiffness coefficient  $K_{ij}$  (2)
5. State the advantages of direct element method. (2)
6. A single point load of magnitude 40 kN crosses a simply supported beam of span 20m, construct the curve of max. bending moment for the beam. (3)
7. A Warren girder truss of 30 m span of 5 panels has a height of 4m. Sketch the influence line for force in top chord of second panel. Calculate the member force if the entire span is loaded by a UDL of 25 kN/m. (3)
8. Develop the flexibility matrix for the beam shown in fig.1 (3)



9. Develop the stiffness matrix for 2 noded beam element with 3 Degrees of freedom at each node. (3)
10. A structure has the following flexibility matrix. Develop the stiffness matrix (3)

$$\frac{1}{EI} \begin{bmatrix} 72 & 48 & 30 \\ 48 & 256 & -72 \\ 30 & -72 & 30 \end{bmatrix}$$

**PART-B (50 Marks)**

11. A series of point loads 170 kN, 170kN, 170kN, 170kN, 120kN, 120kN and 80kN all spaced at 2m intervals, crosses a simply supported girder of span 24 m from left to right with 80 kN load leading. Determine the absolute maximum bending moment and EUDLL for the beam.
12. A Pratt truss of 30m span consists of 6 panels each of 5m. The height of the truss is 5m. Draw the Influence Line Diagrams for the forces in the members of the third panel from left and determine the maximum forces in these members due to a dead load of 10 kN/m .

..2..

13. Analyse the frame shown in fig.2 by using flexibility matrix method. Draw the bending moment diagram and Shear force diagram.

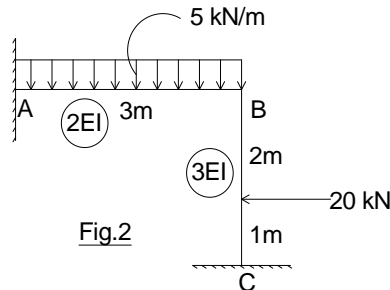


Fig.2

14. Analyse the plane truss shown in fig.3 using stiffness matrix approach.

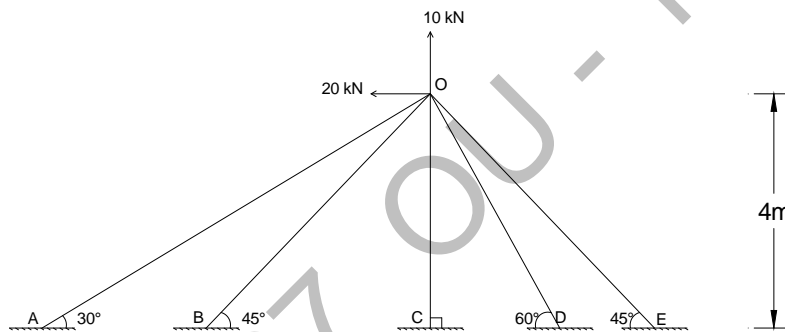


Fig.3

15. A cable supported at its end 40m apart at the same level carries loads 200kN, 100kN and 150kN at 10m, 20m and 30m from the left end respectively. If the point where 100kN is acting below the level of support, find the length of the cable and the cross sectional area required of the cable if the permissible tensile stress is 150 MPa.

16. Analyse the following continuous beam shown in fig.4 by either flexibility or stiffness method if the support 'B' sinks down by 10mm. Take  $E = 200 \text{ GPa}$  and  $I = 1.35 \times 10^{-3} \text{ m}^4$ . Also draw BMD

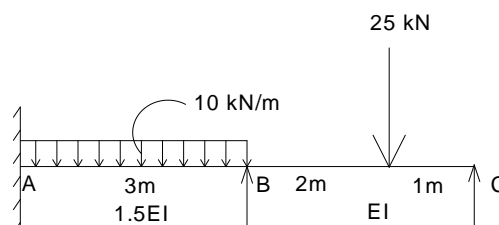


Fig.4

17. Write short notes on the following
- Differences between Force method and Displacement method of analysis
  - Differences between Two hinged and three hinged stiffening girders
  - EUDLL.

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**FACULTY OF ENGINEERING**  
**B.E. 3/4 (EEE) II - Semester (Old) Examination, May / June 2017**

**Subject : Switch Gear and Protection**

**Time : 3 Hours**

**Max. Marks: 75**

**Note: Answer All Questions From Part- A, & Any Five Questions From Part-B**  
**PART – A ( 25 Marks)**

1. Define the terms i) PSM ii) TMS. [2]
2. Explain need of instrument transformers in switchgear protection. [2]
3. What do you understand by duality of comparators? [3]
4. Define Amplitude comparator and classify them [2]
5. Mention the faults occurring in generator and also different methods of protection against them. [3]
6. Mention disadvantages of simple differential protection scheme [2]
7. What is current zero method in circuit breakers [2]
8. Define the terms i) Arc Voltage ii) Recovery Voltage and iii) Restriking Voltage [3]
9. How do earthing screens and ground wires provide protection against direct lightning strokes [3]
10. What is meant by insulation co-ordination ? [3]

**PART – B ( 50 Marks )**

11. a) Explain briefly Over current protective schemes [5]  
 b) With neat diagram explain the protective scheme for Radial feeders using definite time relays. [5]
12. a) Define Reactance Relays? Draw and explain operating characteristics of Reactance Relay on R-X diagram [6]  
 b) Write short notes on Sampling Comparator [4]
13. a) With neat diagram explain construction and working principle of Bucholz Relay. [6]  
 b) Explain protection of generator against loss of excitation [4]
14. a) A 50 Hz, 11 kV, 3-phase alternator with earthed neutral has a reactance of 5 ohms per phase and is connected to a bus-bar through a circuit breaker. The distributed capacitance upto circuit breaker between phase and neutral is  $0.01 \mu\text{F}$ . Determine [4]  
 (i) peak re-striking voltage across the contacts of the breaker  
 (ii) frequency of oscillations  
 (iii) the average rate of rise of re-striking voltage upto the first peak  
 b) Explain construction and working principle of Vacuum Circuit diagram with neat diagram and their applications [6]

15. a) Describe the construction and working principle of valve type lightning arrestor with neat diagram [6]  
b) Explain the concept of tower footing resistance and discuss the methods to reduce it [4]
16. a) Discuss about Protection of earthing transformer [6]  
b) Mention the advantages of Induction Cup type relay over the Induction disc type relays? [4]
17. Write short notes on :  
a) Auto-reclosure [3]  
b) Microprocessor based Over current Relay [4]  
c) Peterson coil [3]

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**FACULTY OF ENGINEERING****B.E. 3/4 (EEE) II - Semester (New)(Main) Examination, May / June 2017****Subject : Switch Gear and Protection****Time : 3 Hours****Max. Marks: 75****Note: Answer All Questions From Part- A, & Any Five Questions From Part-B****PART – A ( 25 Marks)**

1. Define PSM and explain what do you understand by relay time? [3]
2. What are the main features of directional type of relays? [2]
3. For what type of protection will you recommend i)Reactance Relay ii)Impedance Relay and iii)Mho Relay. [3]
4. How are static relays classified ? [2]
5. What is magnetizing inrush current ? [2]
6. Mention different abnormal condition present in generator ? [2]
7. List the advantages and applications of SF<sub>6</sub> circuit breakers. [3]
8. Explain the phenomenon of Current Chopping in circuit breaker? [3]
9. Discuss protection angle of ground wire ? [2]
10. What are the causes of under and over voltages? [3]

**PART-B (50 Marks)**

11. a) Derive an expression for torque developed in induction relay? [4]  
b) Discuss in detail about Earth fault and phase fault protection? [6]
12. a) With the help of block diagram explain micro processor based over current relay? [4]  
b) Explain stepped time-distance characteristics of 3-step distance relays used for I, II and III zone protection? [6]
13. a) What is Buchholz Relay ? Which equipment is protected by it ? For what type of faults is it employed ? Discuss its construction and Working Principle? [6]  
b) Explain briefly Stator over heating protection of generator with neat diagram? [4]
14. Explain the terms: restriking voltage, recovery voltage and RRRV. Derive an expression for restriking voltage and RRRV in terms of system voltage, inductance and capacitance? [10]
15. a) Discuss the concept of Insulation coordination and its volt-time curve ? [5]  
b) With neat diagram explain construction and working principle of expulsion type of lightning arrester ? [5]
16. a) Discuss Merz Price protection of transformer? [5]  
b) Draw and explain construction and operating principle of valve type of lightning arrester? [5]
17. Write Short Notes on
  - i) Testing of circuit breaker [5]
  - ii) Duality of comparator [5]

**FACULTY OF ENGINEERING**  
**B.E. 3/4 (Inst.) II - Semester (Old) Examination, May / June 2017**

**Subject : Power Plant Instrumentation**

**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 What is the main function of Boiler? (2)
- 2 Draw the Block Diagram of thermal power plant. (3)
- 3 Enumerate the elastic elements used as pressure sensors. (3)
- 4 What is meant by Shrinking in boiler? (2)
- 5 What is the function of governing systems in turbine? (2)
- 6 Explain the principle of bypass damper super heater. (3)
- 7 What different control loops are formulated in turbine monitoring and control? (2)
- 8 Draw a line diagram for hydrogen generator cooling system. (3)
- 9 Mention the reactor dynamics in Nuclear Power Plant. (3)
- 10 What are the safety measures taken in Nuclear reactor. (2)

**PART – B (50 Marks)**

- 11 Explain the methods of feed water flow rate measurement. Also explain any two flow meter. (10)
- 12 (a) What is the primary and secondary transducer for the measurement of pressure? (5)  
 (b) Explain the LVDT type pressure sensor with a neat diagram. (5)
- 13 Explain furnace draft and excess control with relevant diagram. (10)
- 14 (a) What is the main purpose of heat exchangers in the turbine monitoring and control? Explain its operation with neat diagram. (5)  
 (b) What is meant by vibration? Explain any one method of vibration measurement. (5)
- 15 Explain the piping Diagram of different types of nuclear power plant. (10)
- 16 (a) With a neat diagram, explain the ball and race pulverizing mill. (5)  
 (b) Discuss the speed control of turbines. (5)
- 17 Write short notes on the following: (10)  
 (a) Sliding pressure mode of control in TPP  
 (b) Hydrogen generator cooling system

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**FACULTY OF ENGINEERING****B.E. 3/4 (Inst.) II - Semester (New)(Main) Examination, May / June 2017****Subject : Power Plant Instrumentation****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 What is the function of Air Preheated and economizer? (3)
- 2 What is the importance of I & C in Power Plant? (2)
- 3 Explain Shaft and Pedestal Vibration. (3)
- 4 What are the non contact types sensors used for speed measurement? (2)
- 5 What is Attemperation? (2)
- 6 Draw the diagram of super heater temperature control using by-pass damper. (3)
- 7 What is the purpose of Condenser vacuum control? (2)
- 8 Write down any one method for Vibration measurement. (3)
- 9 What is meant by Combined Cycle Power Point? (2)
- 10 Draw the block diagram of Nuclear Power Plant. (3)

**PART – B (50 Marks)**

- 11 With a schematic diagram, explain the Piping and Instrumentation drawing of Boiler and indicate all control loops that can be established without redundancy. (10)
- 12 (a) What are the Primary and Secondary transducer for the measurement of Pressure? (5)  
(b) Explain the Piping system for Pressure Measuring devices. (5)
- 13 For proper combustion of fuel. Explain with a neat diagram how Air-Fuel ratio control is achieved in Power Point. (10)
- 14 With a neat diagram explain the working of Lubricating oil temperature control system. (10)
- 15 With a neat diagram explain Power generation in Nuclear Power Point (NPP) and explain the importance of control rods in NPP. (10)
- 16 With a relevant process diagram explain the 3-element drum level control of boiler and also mention its significance. (10)
- 17 Write short notes on the following:
  - (a) Flame Monitoring Instruments (5)
  - (b) Hydro Power Point (5)

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**FACULTY OF ENGINEERING**  
**B.E. 3/4 (ECE) II - Semester (Old) Examination, May / June 2017**

**Subject : Antennas and Wave Propagation**

**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 Directive gain and Directivity. (2)
- 2 State Helmholtz theorem. (2)
- 3 The radiation intensity of an antenna is given by  $\Phi(\theta, \Phi) = \sin^2\theta$  Compute its directivity. (2)
- 4 What is meant by multiplication of radiation pattern? (3)
- 5 What are the parasitic elements? Mention its uses. (3)
- 6 Distinguish between broadside array and end fire array. (3)
- 7 Why yagi-uda antenna is called 'super directive'? (3)
- 8 What is the H Plane metal plate lens? (2)
- 9 Explain Duct propagation. (3)
- 10 Estimate the radio horizon distance for an antenna of height 12 meters. (2)

**PART – B (50 Marks)**

- 11 (a) Derive an expression for the power radiated and radiation resistance of a small current element. (8)
- (b) The radial component of the radiated power density of an infinitesimal linear dipole of length  $l \ll \lambda$  is given by  $W_{av} = A_m \sin^2\theta / r^2 \text{ W/m}^2$ . Calculate the directivity of the antenna. (2)
- 12 (a) What is uniform linear array? Derive the expressions for widths of the principle lobe for both the cases. (8)
- (b) A thin dipole antenna is  $\lambda/20$  meters long. Its loss resistance is  $1.5\Omega$ . Find its efficiency. (2)
- 13 (a) What is folded dipole antenna ? Show that its input impedance is 292 ohms. (5)
- (b) Discuss the methods of multiplication of pattern. (5)
- 14 (a) Draw the structure of log-periodic array and explain its working principle. (5)
- (b) Derive the parameters that describe the configuration of LPDA. (5)
- 15 (a) Explain the radiation pattern measurement of an antenna. (6)
- (b) How the stepping and zoning will be done in the case of lens antenna. (4)
- 16 (a) Discuss the mechanism of radio wave bending by the atmosphere. (5)
- (b) Discuss about ionospheric abnormalities. (5)
- 17 Write short notes on the following:
  - (a) Travelling wave antenna (5)
  - (b) Duct propagation (5)

**FACULTY OF ENGINEERING**  
**B.E. 3/4 (ECE) II - Semester (New)(Main) Examination, May / June 2017**

**Subject: Antennas and Wave Propagation**

**Time: 3 Hours.**

**Max. Marks: 75**

**Note: Answer all Questions in Part – A, and any five questions from Part – B.**

**PART – A (25 Marks)**

1. Compare power gain and Directive gain. (2)
2. Obtain distance from an antenna where near field is equal to far field. (2)
3. Draw the diagram of rectangular microstrip antenna and sketch its fields. (2)
4. Why is loop antenna called as magnetic dipole? (3)
5. Draw the radiation pattern of vertical dipole. (2)
6. Differentiate 'V' antenna from rhombic antenna. (3)
7. Why frequency independent antennas are called so? (3)
8. How is beam scanning achieved with array antenna? (3)
9. What is the free space loss factor? (2)
10. What are the effects of ground on low frequency wave propagation? (3)

**PART – B (50 Marks)**

- 11 a) Explain how the electric field lines are formed and detached from short dipole antenna. (8)
- b) Comment on antenna temperature. (2)
- 12 a) Obtain field equations of half wave dipole. (8)
- b) What are the differences between transmission line and dipole antenna? (2)
- 13 What is the principle of equality of path length? How is it applicable to Horn antennas? Obtain an expression for the directivity of a pyramidal horn in terms of its aperture dimensions. (10)
- 14 a) Explain in detail the different cases of the array containing two isotropic sources (7)
- b) Discuss principle of pattern multiplication. (3)
- 15 a) Explain the following terms: (8)
- i) Critical frequency ii) MUF
- iii) Skip Distance iv) Virtual height
- b) Find the range of LOS system when the receive and transmit antenna heights are 10m and 100m respectively. (2)
- 16 a) Discuss the effect of earth on vertical radiation patterns of an antenna. (5)
- b) Discuss about design considerations of log-periodic antenna. (5)
17. Write short notes on:
- a) Lens antenna (5)
- b) Friis transmission formula (5)

**FACULTY OF ENGINEERING**  
**B.E. 3/4 (M/A.E.) II - Semester (Old) Examination, May / June 2017**

**Subject : CAD / CAM**

**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 What is NURBS? Give its formulation. (2)
- 2 Write the basic parametric equation for circle with neat sketch. (3)
- 3 Write characteristics of B-spline curves. (2)
- 4 List nay three Analytic surface entities with neat sketch. (3)
- 5 Explain IGES and PDES CAD exchange formats. (2)
- 6 Differentiate NC, CNC and CNC. (3)
- 7 Define Canned cycle in CNC programming. (2)
- 8 Explain three basic categories of robot programming methods. (3)
- 9 Define Trunkey CAD / CAM systems. (2)
- 10 Give basic processes involved in any rapid prototyping technique. (3)

**PART – B (50 Marks)**

- 11 (a) Define Bezier curve. Mention characteristics of Bezier curve with neat sketches. (7)  
 (b) Give properties of splines. (3)
- 12 List the types of 2D transformation and explain. (10)
- 13 (a) Explain various CAD data bases. (5)  
 (b) What are G codes and M codes explain with a program in CNC programming. (5)
- 14 (a) Explain programming methods for robotic systems. (5)  
 (b) Write short notes on Robot Anatomy. (5)
- 15 Explain variant and generative process planning. (10)
- 16 (a) Write brief about optimize type of group technology. (5)  
 (b) Write brief about MICLASS CODE system in group technology. (5)
- 17 Write short notes on the following:
  - (a) Rapid prototyping (5)
  - (b) Reverse Engineering (5)

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**FACULTY OF ENGINEERING**

B.E. 3/4 (M/A.E.) II - Semester (New) (Main) Examination, May / June 2017

Subject : CAD / CAM

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 What are the properties of Splines?
- 2 Differentiate between analytic and synthetic surfaces.
- 3 Differentiate between sheering and reflection transformation.
- 4 Differentiate between variable and fixed canned cycles.
- 5 What is G code for
  - (a) Cutter nose radius compensation in a Lathe and
  - (b) Cutter diameter compensation in milling
- 6 Explain Turnkey CAD / CAM system.
- 7 Differentiate between CNC and DNC.
- 8 What is Machine vision?
- 9 Explain how mass property of a model is evaluated.
- 10 Explain ATP statements GOTO / GO / TO.

**PART – B (50 Marks)**

- 11 (a) Describe PDES format. Explain where it is used.  
(b) Write a APT statements for point to point, straight cut and contouring motions with examples.
- 12 (a) Explain surface modeling through analytic surface and enumerate their advantages.  
(b) Compose a Bi-Cubic surface patch of heuristic explain continuity.
- 13 (a) Explain MICLASS system of coding.  
(b) What are benefits and limitations of FMS.
- 14 (a) Describe the IGES format.  
(b) Describe the various features and elements of NC and CNC.
- 15 (a) Find the new coordinates after performing  $45^\circ$  rotation of triangle A (0, 0) B(1, 1) C(5, 2) about a point P (-1, 1).  
(b) Compose solid modeling through C-rep & B-rep approaches with a suitable examples. Explain how mass properties are evaluated.
- 16 (a) Describe basic robot motions with a neat sketch.  
(b) What are the differences between retrieval and generative types of CAPP.
- 17 Write short notes on the following:
  - (a) Reverse Engineering
  - (b) Rapid Prototyping technique
  - (c) MICROS

**FACULTY OF ENGINEERING****B.E. 3/4 (Prod.) II – Semester (New) (Main) Examination, June 2017****Subject: Turbo Machinery****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 Differentiate between impulse and reaction turbines?
- 2 Obtain an expression for force exerted by a jet of water on a fixed vertical plate in the direction of the jet.
- 3 Explain various losses and efficiencies of a centrifugal pump with a neat sketch?
- 4 Explain factors affecting the performance of axial flow compressor?
- 5 Define unit quantities?
- 6 Differentiate between outward flow machine and radial flow machine?
- 7 Explain the method of velocity compounding of an impulse turbine for achieving rotor speed reduction?
- 8 List out the merits and demerits of CCGT?
- 9 Explain the methods to improve the cycle efficiency of closed cycle.
- 10 State the assumptions made in an ideal cycle analysis of gas turbine?

**PART – B (5x10 = 50 Marks)**

- 11 A jet of water having a velocity of 20 m/s enters tangentially a stationary curved vane without shock and is deflected through an angle of  $150^\circ$ . If the volume flow rate of water is  $0.002 \text{ m}^3/\text{s}$ , find the magnitude and direction of the resultant force on the vane.
- 12 a) Explain with a neat sketch the working of a single stage centrifugal pump.  
b) A centrifugal pump delivers  $0.3 \text{ m}^3/\text{s}$  against a head of 30 m at 1400 rpm. The external diameter of impeller is 0.5 m and the outlet is 0.05 m. if the manometric efficiency is 80%, find the vane angle at outlet.
- 13 Air is compressed in a centrifugal compressor from  $27^\circ \text{C}$  to  $150^\circ \text{C}$  and pressure from 1 bar to 3 bar. Calculate (a) the isentropic efficiency of the compressor and (b) the power developed. Take mass flow rate of 28 kg/min.
- 14 A turbine with an overall efficiency of 85% is to be installed in a hydroelectric plant. The head and discharge available at the plant are 25 m and  $45 \text{ m}^3/\text{s}$  respectively. If the specific speed of the turbine is 230, determine the unit speed, unit discharge and unit power.

- 15 a) Write short notes on methods of compounding.  
b) Explain steam turbine reheating cycle with h-s diagram.
- 16 a) Explain the working principle of closed cycle gas turbine with the help of T-S diagram?  
b) Air enters the compressor of a gas turbine plant operating on Brayton cycle at 1.5 bar and 20°C. The pressure ratio of the cycle is 6.5; calculate the maximum temperature of the cycle and the cycle efficiency. Assume the turbine work is 3 times the compressor work. Take  $\gamma=1.4$ .
- 17 a) Application of airfoil to turbo-machinery blades.  
b) Calculation of work done and efficiencies in gas turbine.  
c) Explain multi stage rotary compressors.

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**FACULTY OF ENGINEERING****B.E. 3/4 (Prod.) II - Semester (Old) Examination, May / June 2017****Subject: Turbo Machinery****Time: 3 Hours****Max. Marks: 75**

- Note:** (i) Answer all questions in Part-A and any five questions from Part-B  
(ii) Answer to the questions of Part-A must be at one place and in the same order as they occur in the question paper  
(iii) Candidate is advised not to attempt more questions than required.  
(iv) Missing data if any may suitably be assumed  
(v) Use of data of book is permitted

**PART- A (25 Marks)**

1. A jet 50 mm diameter moving at 15 m/s has a direct impact on a fixed plate inclined at an angle of  $45^\circ$  with horizontal. Find the resultant force on it. Find also the rate of discharge
2. Define turbo machine and how they are classified
3. Derive an expression for specific speed of a centrifugal pump.
4. What are the merits and demerits of axial flow compressor over centrifugal compressor
5. Draw the velocity diagram of pelton wheel
6. Draw velocity diagram of Francis turbine
7. Define critical pressure ratio of steam nozzle
8. Draw pressure-velocity diagram of pressure compounded steam turbine
9. Draw the configuration diagram and temperature-entropy diagram for open-cycle gas turbine with reheating
10. Define optimum ratio in terms of temperature ratio of gas turbine plant

**PART-B (50 Marks)**

11. A 15 cm jet is moving at 30 m/s impinges on a series of vanes moving at 15 m/s in the direction of the jet. The jet leaves the vanes at  $60^\circ$  with the direction of motion of the vanes. Calculate: (i) the force exerted by the jet in the direction of motion of the vanes, (ii) work done by the jet per second.
12. A centrifugal pump running at 1450rpm discharges 110l/s against head of 23 m. if the diameter of the impeller is 25 cm and its width is 5 cm, find vane angles at the outer periphery. Assume manometric efficiency is 75%.
13. An axial flow compressor having 8 stages and with 50% reaction design compresses air in the pressure ratio of 4:1. The air enters the compressor at  $20^\circ\text{C}$  and flows through it with a constant speed of 90 m/s. The compressor rotates with a mean speed of 180 m/s. Assume isentropic efficiency of compressor is 82%,  $\gamma = 1.4$  and  $C_p = 1.005 \text{ kJ/kg-K}$ , calculate i) work done on the compressor and ii) blade angles.
14. Details of Pelton wheel: Head- 500 m, Overall efficiency – 85%, Speed- 430 rpm, Bucket speed= 0.47 Jet speed, Velocity coefficient- 0.97, find the wheel diameter and jet diameter.



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15. In a simple impulse steam turbine the nozzles are inclined at  $20^\circ$  to the direction of motion of the moving blades. The steam leaves the nozzles at 375 m/s. The blade speed is 165 m/s, Find suitable inlet and outlet angles for the blades in order that the axial thrust is zero. Determine also the power developed for a flow rate of 10 kg/s.
16. In an open cycle constant pressure gas turbine, air enters the compressor at 1 bar and 300 K. The pressure ratio is 4:1. The isentropic efficiencies of compressor and turbine are 85% and 90% respectively. The air fuel ratio is 85:1, calculate the power developed and thermal efficiency of the cycle if the flow rate of air is 2.5 kg/sec. Assume  $C_p$  for air and exhaust gases = 1.005 kJ/kg-K,  $\gamma = 1.4$  for air and exhaust gases. Calorific value of fuel is 44000 kJ/kg.
17. Details of Kaplan turbine. BP- 10000 kW, Head-5.5 m, Speed ratio-2.0, Flow ratio-0.7, and the overall efficiency-80%, the diameter of the boss is one third of the diameter of the runner. Find the diameter of runner, its speed and its specific speed.

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**FACULTY OF ENGINEERING****B.E. 3/4 (CSE) II – Semester (New) (Main) Examination, May/June 2017****Subject: Compiler Construction****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A and any five questions from Part B.****PART – A (25 Marks)**

- 1 Distinguish between tokens, patterns and lexemes giving examples for each. [3]
- 2 What is left factoring? Why should a grammar be left factored? [2]
- 3 Give the specifications of YACC. [3]
- 4 What are ambiguous grammars? Give an example. [2]
- 5 What are the different parameter passing mechanisms? [2]
- 6 What is an activation record? Explain all the fields in detail. [3]
- 7 Explain how dynamic memory allocation is done. [2]
- 8 Differentiate between SLR(1) and LR(1) grammars. [3]
- 9 Differentiate between a Basic block and a flow graph. [2]
- 10 Explain Recursive descent parsing. [3]

**PART – B (5x10 = 50 Marks)**

- 11 a) Explain the translation process of a compiler for the given expression:  
 $p = i + r * 60$ , where  $p, i, r$  are float. [6]  
 b) Explain Boot strapping and Porting. [4]
- 12 a) Give the rules to construct FIRST and FOLLOW sets. [4]  
 b) Is the given grammar LR(1)? [6]  
 $S \rightarrow id \mid V := E$   
 $V \rightarrow id$   
 $E \rightarrow V \mid n$
- 13 a) What is an Attribute grammar? Give the SDD for the given grammar and construct the annotated parse tree for the string: float  $x, y$  [6]  
 $decl \rightarrow type \text{ var\_list}$   
 $type \rightarrow int \mid float$   
 $var\_list \rightarrow id, \text{ var\_list} \mid id$   
 b) What is the structure of a symbol table? What are its contents? [4]
- 14 a) Construct a DAG and 3-address for the given expression: [6]  
 $((a - b) + (x + y) * (a + b)) - (a + b) * (x + y)$   
 b) Discuss Static run time environment.

- 15 a) Discuss the Issues in Code Generation. [5]  
b) Differentiate between Machine Dependent and Machine Independent optimizations. [5]
- 16 a) Error Recovery in top down parsers. [5]  
b) Give quadruples, triples and indirect triples for the expression:  
 $X := - a + b * - a + b$  [5]
- 17 Answer any two of the following questions. [10]  
a) Brute forcing parsing  
b) LEX.  
c) Input Buffering.

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**FACULTY OF ENGINEERING****B.E. 3/4 (CSE) II – Semester (Old) Examination, May/June 2017****Subject: Compiler Construction****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A and any five questions from Part B.****PART – A (25 Marks)**

- 1 Distinguish between Pass and Phase. (2M)
- 2 What is Boot Strapping? (3M)
- 3 What is Left Recursion? How to eliminate it? (3M)
- 4 Write applications of Syntax Directed Translation. (2M)
- 5 What is DAG Notation? (2M)
- 6 What is Symbol Table and Write the Operations of symbol table. (2M)
- 7 Write triple notation for the given expression (3M)  
 $X := -a*b + -a*b$
- 8 What is Basic Block in Code Generation? (3M)
- 9 State the Parameter passing mechanisms in programming Languages. (2M)
- 10 What is Yacc ? Explain the Syntax. (3M)

**PART – B (5x10 = 50 Marks)**

- 11 a) Explain the Translation Process. (6M)  
 b) Write Lex Specification for valid identifier and digits recognition (4M)
- 12 a) Show that the given grammar is LL(1) or Not (6M)  
 $S \rightarrow iEts \mid iEtses \mid a$   
 $E \rightarrow b$   
 b) What are the major Problems in topdown parsers explain with example? (4M)
- 13 a) Given Grammar G is SLR(1) or not (10M)  
 $S \rightarrow CC$   
 $C \rightarrow aC \mid d$
- 14 Explain symbol table organization for block structured and non Block structured Languages. (10M)
- 15 a) Explain Peephole Optimization Techniques. (5M)  
 b) Explain Machine Independent Optimization. (5M)
- 16 a) Write Error Recovery Strategies in Parsers. (6M)  
 b) List common errors in phases of a compiler. (4M)
17. Write Short Notes on: (10M)
  - a) Shift Reduce Parsers
  - b) Storage Organization

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**FACULTY OF INFORMATICS****B.E. 3/4 (IT) II – Semester (Old) Examination, May/June 2017****Subject: Compiler Construction****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A. Answer any five questions from Part B.****PART – A (25 Marks)**

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|----|--|---|
| 1  | Define compiler construction.  | 2 |
| 2  | What is the role of lexical analyzer?  | 3 |
| 3  | Difference between Top Down parsing and Bottom up parsing.                   | 2 |
| 4  | Explain the procedure to eliminate immediate left recursion with example.    | 3 |
| 5  | Define attribute and attribute grammar.                                      | 2 |
| 6  | Draw directed acyclic graph for the expression $a + a * (b-c) + (b-a) * d$ . | 3 |
| 7  | What is the difference between stack storage and heap storage?               | 2 |
| 8  | Write about activation record in detail.                                     | 3 |
| 9  | Define data locality.  | 2 |
| 10 | What is the role of absolute loader.   |   |

**PART – B (5x10 = 50 Marks)**

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|----|--|--------|
| 11 | Explain the translation process of the compiler for the given expression.<br>$id = id * id + id$   | 10     |
| 12 | Explain about Recursive Descent Parser with example.   | 10     |
| 13 | Write the attribute grammar for the following grammar.<br>$exp \rightarrow exp + term \mid exp - term \mid term$<br>$term \rightarrow term * factor \mid factor$<br>$factor \rightarrow (exp) \mid number$ | 10     |
| 14 | a) Explain the different issues in the design of code generator.<br>b) Explain storage allocation strategies.  | 5<br>5 |
| 15 | a) Explain the synchronization between parallel loops.<br>b) Discuss about a simple bootstrap loader.  | 5<br>5 |
| 16 | Construct SLR (1) parsing table for the following grammar.<br>$S \rightarrow I \mid Other$<br>$I \rightarrow if S \mid if else S$  | 10     |
| 17 | Write short notes on:<br>a) Type checking<br>b) Optimization of basic blocks.  | 4<br>6 |

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**FACULTY OF INFORMATICS****B.E. 3/4 (IT) II – Semester (New) (Main) Examination, June 2017****Subject: Compiler Construction****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A and any five questions from Part B.****PART – A (25 Marks)**

- 1 Define cross compiler. 2
- 2 Draw a finite automata for floating point numbers 2
- 3 Define left recursion removal and remove left recursion from.  
exp  $\rightarrow$  exp + term / exp – term / term 3
- 4 What is the role of a Lexical Analyzer in a compiler 2
- 5 Write LR(0) items for the following grammar 3  
E  $\rightarrow$  E + n / n
- 6 Define FIRST and FOLLOW sets .Find the FOLLOW of a grammar 3  
given below:  
S  $\rightarrow$  aABb  
A  $\rightarrow$  c|  
B  $\rightarrow$  d|
- 7 Write the Attribute grammar from 3  
number  $\rightarrow$  number / digit  
digit  $\rightarrow$  0 / 1
- 8 List the parameter passing techniques 3
- 9 What is Back-patching? 2
- 10 What is the role of Literal Table 2

**PART – B (5x10=50 Marks)**

- 11 a) Explain the major data structures in a compiler 5  
b) Explain the Bootstrapping and Porting process 5
- 12 a) Draw NFA for the regular expression 10(01)\* using Thompson's  
construction 5  
b) Give a brief description about Lex 5

- 13 Construct SLR (1) parsing table for the grammar given below: 10
- $S \rightarrow dA \mid aB$   
 $A \rightarrow bA \mid c$   
 $B \rightarrow bB \mid c$
- 14 a) Draw the syntax tree structure for TINY program for computing a factorial of a given number 3
- b) Consider the following Grammar: 7
- $S \rightarrow 0A \mid 1B \mid 0 \mid 1$   
 $A \rightarrow 0S \mid 1B \mid 1$   
 $B \rightarrow 0A \mid 1S$
- Construct a Leftmost Derivation and the Parse tree using left most derivation of the following Sentences:
- a) 0101
- b) 1100101
- 15 a) What is shift-reduce conflict? 2
- b) Construct the automata of LR(0) items and identify any conflicts if present using the following grammar : 8
- $E \rightarrow E + T \mid T$   
 $T \rightarrow TF \mid F$   
 $F \rightarrow F^* \mid a \mid b$
- 16 a) Explain code generation for control statements and Logic Expressions. 5
- b) Write three Address code and P-code for the following 5
- Function Definition : int f (int x, int y)
- { return x + y + 1 }
- Function call : f(2 + 3, 4)
- 17 Write short notes on the following:
- a) Recursive Descent Parsing 3
- b) Semantic Analysis 3
- c) Symbol Table Organization 4